NEXUS GAS TRANSMISSION PROJECT

RESOURCE REPORT 9

Air and Noise Quality

FERC Docket No. CP16-__-000

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RESOURCE REPORT 9 – AIR AND NOISE QUALITY	
Filing Requirement	**Location in Environmental Report**
☒ Describe existing air quality in the vicinity of the project. (§ 380.12(k)(1)) • Identify criteria pollutants that may be emitted above EPA-identified significance levels.	Section 9.2.3 and Section 9.2.4
☒ Quantify the existing noise levels (day-night sound level (L_{dn}) and other applicable noise parameters) at noise sensitive areas and at other areas covered by relevant state and local noise ordinances. (§ 380.12(k)(2)) • If new compressor station sites are proposed, measure or estimate the existing ambient sound environment based on current land uses and activities. • For existing compressor stations (operated at full load), include the results of a sound level survey at the site property line and nearby noise-sensitive areas. • Include a plot plan that identifies the locations and duration of noise measurements. • All surveys must identify the time of day, weather conditions, wind speed and direction, engine load, and other noise sources present during each measurement.	Section 9.3.4 • Section 9.3.4 and Appendix 9E • N/A • Appendix 9E • Appendix 9E
☒ Quantify existing and proposed emissions of compressor equipment, plus construction emissions, including nitrogen oxides (NO_X) and carbon monoxide (CO), and the basis for these calculations. Summarize anticipated air quality impacts for the project. (§ 380.12(k)(3)) • Provide the emission rate of NO_X from existing and proposed facilities, expressed in pounds per hour and tons per year for maximum operating conditions, include supporting calculations, emission factors, fuel consumption rate, and annual hours of operation.	Section 9.2.5, Appendix 9A, and Appendix 9D
☒ Describe the existing compressor units at each station where new, additional, or modified compressor units are proposed, including the manufacturer, model number, and horsepower of the compressor units. For proposed new, additional, or modified compressor units include the horsepower, type, and energy source. (§ 380.12(k)(4))	Section 9.2.1
☒ Identify any nearby noise-sensitive area by distance and direction from the proposed compressor unit building/enclosure. (§ 380.12(k)(4))	Section 9.3.1 and Appendix 9E
☒ Identify any applicable state or local noise regulations. (§ 380.12(k)(4)) • Specify how the facility will meet the regulations.	Section 9.3.3
☒ Calculate the noise impact at noise-sensitive areas of the proposed compressor unit modifications or additions, specifying how the impact was calculated, including manufacturer's data and proposed noise control equipment. (§ 380.12(k)(4))	Section 9.3.4, Section 9.3.5, and Appendix 9E
Additional Information Often Missing and Resulting in Data Requests	
☒ Provide copies of application for state air permits and agency determinations, as appropriate.	Appendix 9A
☒ For major sources of air emissions (as defined by the EPA), provide copies of applications for permits to construct (and operate, if applicable) or for applicability determinations under regulations for the prevention of significant air quality deterioration and subsequent determinations.	N/A

RESOURCE REPORT 9 – AIR AND NOISE QUALITY	
Filing Requirement	**Location in Environmental Report**
☒ Describe measures and manufacturer's specifications for equipment proposed to mitigate impact to air and noise quality, including emission control systems, installation of filters, mufflers, or insulation of piping and building, and orientation of equipment away from noise-sensitive areas.	Section 9.2.5 and Section 9.3.5
☒ Provide greenhouse gas emission estimates for both construction and operation activities associated with the project.	Section 9.2.5, Appendix 9A, and Appendix 9D
☒ Provide construction emission estimates resulting from all construction activities associated with the project.	Appendix 9D

ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
API *Compendium*	American Petroleum Institute *Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry*, August 2009
AQCR	air quality control region
A-wt.	A-weighted
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CEMS	continuous emissions monitoring systems
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
dB	decibels
dBA	A-weighted decibels
DTE	DTE Energy Company
DTE Energy	DTE Energy Company
EGU	electric generating unit
FCVs	flow-control valves
FERC	Federal Energy Regulatory Commission
GHG	greenhouse gas
HAP	hazardous air pollutant
HDD	horizontal directional drilling
hp	horsepower
ICE	internal combustion engine
ISO	International Standard Operations
km	kilometers
L_{eq}	equivalent sound level in decibels
M&R	metering and regulating
MAGLCs	Maximum Allowable Ground Level Concentrations
MDEQ	Michigan Department of Environmental Quality
MMBtu/hr	million British thermal units per hour
MP	milepost
MPSC	Michigan Public Service Commission
NAAQS	National Ambient Air Quality Standards
NCDC	National Climatic Data Center
NESHAP	National Emission Standards for Hazardous Air Pollutants
NEXUS	NEXUS Gas Transmission, LLC
NEXUS Project	NEXUS Gas Transmission Project
NNSR	nonattainment area NSR
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NSAs	noise-sensitive areas
NSPS	New Source Performance Standards
NSPS JJJJ	40 CFR Part 60, Subpart JJJJ
NSR	New Source Review
O_3	ozone

OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
PA DEP	Pennsylvania Department of Environmental Protection
Pb	lead
pCi/L	picocuries per liter
PD	pressure drop
PM	particulate matter
PM_{10}	particulate matter with a diameter ≤ 10 microns
$PM_{2.5}$	particulate matter with a diameter ≤ 2.5 microns
Project	NEXUS Gas Transmission Project
PSD	Prevention of Significant Deterioration
PTE	potential to emit
PTI	Permit-to-Install
PTIO	Permit-to-Install-and-Operate
PTO	Permit-to-Operate
RACT	Reasonably Available Control Technology
RICE	reciprocating internal combustion engine
ROP	Renewable Operating Permit
RSI	Risk Sciences International
SER	significant emission rate
SI ICE	spark-ignition internal combustion engine
SIP	State Implementation Plan
SO_2	sulfur dioxide
Solar	Solar Turbines, Inc.
Spectra	Spectra Energy Partners, LP
Spectra Energy	Spectra Energy Partners, LP
Texas Eastern	Texas Eastern Transmission, LP
TGP	Tennessee Gas Pipeline L.L.C.
Title V PTO	Title V Permit-to-Operate
TPY	tons per year
U.S.	United States
USDOE	U.S. Department of Energy
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
VOC	volatile organic compound(s)

9.0 RESOURCE REPORT 9 – AIR AND NOISE QUALITY

9.1 Introduction

NEXUS Gas Transmission, LLC ("NEXUS") is seeking a Certificate of Public Convenience and Necessity ("Certificate") from the Federal Energy Regulatory Commission ("FERC") pursuant to Section 7(c) of the Natural Gas Act ("NGA") authorizing the construction and operation of the NEXUS Gas Transmission Project ("NEXUS Project" or "Project"). NEXUS is owned by affiliates of Spectra Energy Partners, LP ("Spectra" or "Spectra Energy") and DTE Energy Company ("DTE" or "DTE Energy"). The NEXUS Project will utilize greenfield pipeline construction and capacity of third party pipelines to provide for the seamless transportation of 1.5 million dekatherms per day ("Dth/d") of Appalachian Basin shale gas, including Utica and Marcellus shale gas production, directly to consuming markets in northern Ohio and southeastern Michigan, and to the Dawn Hub in Ontario, Canada. Through interconnections with existing pipelines, supply from the NEXUS Project will also be able to reach the Chicago Hub in Illinois and other Midwestern markets. The United States portion of the NEXUS Project includes new greenfield pipeline in Ohio and Michigan and capacity leased from others in Pennsylvania, West Virginia, Ohio and Michigan, terminating at the United States ("U.S.")/Canada international boundary between Michigan and Ontario. The Canadian portion of the Project will extend from the U.S./Canada international boundary to the Dawn Hub.

Resource Report 9 addresses air quality (Section 9.2) and noise effects (Section 9.3) associated with the construction and operation of the proposed Project facilities. A checklist showing the status of the FERC filing requirements for Resource Report 9 is included following the table of contents.

Project drawings, maps, and aerial photo based alignment sheets are provided in Resource Report 1, Appendix 1A – Volume II-B.

9.2 Air Quality

The following subsections discuss air emissions and related effects associated with Project construction activities as well as from operation of stationary equipment proposed at Project facilities. Topics discussed within this section include proposed facilities and stationary equipment, existing ambient air quality, applicable permitting and regulatory requirements, air emissions, anticipated air quality effects, and potential mitigation measures.

9.2.1 Aboveground Facilities

9.2.1.1 Compressor Stations

Four new compressor stations are proposed for the Project. The design of the compressor stations includes the following air emission sources at each facility. All horsepower ("hp") ratings for compressor turbines are provided using National Electrical Manufacturers Association ratings.

Hanoverton Compressor Station - Columbiana County, Ohio

The proposed Hanoverton Compressor Station will include the following point source emissions units:

- Two (2) 26,000 hp (52,000 hp total) Titan 250-30002 natural gas-fired turbine compressor units, manufactured by Solar Turbines, Inc. ("Solar");
- One (1) 1.2 million British thermal units per hour ("MMBtu/hr") natural gas-fired turbine compressor fuel heater; and
- One (1) Waukesha VGF48GL natural gas-fired emergency generator with a power output rating of 1,175 hp.

Wadsworth Compressor Station - Medina County, Ohio

The proposed Wadsworth Compressor Station will include the following point source emissions units:

- One (1) 26,000 hp Solar Titan 250-30002 natural gas-fired turbine compressor unit;
- One (1) 1.2 MMBtu/hr natural gas-fired turbine compressor fuel heater; and
- One (1) Waukesha VGF36GL natural gas-fired emergency generator with a power output rating of 880 hp.

Clyde Compressor Station - Sandusky County, Ohio

The proposed Clyde Compressor Station will include the following point source emissions units:

- One (1) 26,000 hp Solar Titan 250-30002 natural gas-fired turbine compressor unit;
- One (1) 1.2 MMBtu/hr natural gas-fired turbine compressor fuel heater; and
- One (1) Waukesha VGF36GL natural gas-fired emergency generator with a power output rating of 880 hp.

Waterville Compressor Station - Lucas County, Ohio

The proposed Waterville Compressor Station will include the following point source emissions units:

- One (1) 26,000 hp Solar Titan 250-30002 natural gas-fired turbine compressor unit;
- One (1) 1.2 MMBtu/hr natural gas-fired turbine compressor fuel heater; and
- One (1) Waukesha VGF36GL natural gas-fired emergency generator with a power output rating of 880 hp.

Included with the new turbine compressor units at the four Project compressor stations will be lube oil coolers, turbine exhaust systems, turbine air intake systems, and unit control panels. Operation of the new compressor units is not expected to have any significant impact on air quality. To minimize potential air quality effects, all of the new compressor turbines will be equipped with Solar's SoLoNO$_X$ emissions control technology. This technology incorporates low nitrogen oxides ("NO$_X$") combustors to limit emissions of NO$_X$ and also limits emissions of carbon monoxide ("CO") and other pollutants. The new turbines will also be equipped with oxidation catalysts to further reduce CO, volatile organic compounds ("VOC"), and hazardous air pollutant ("HAP") emissions. Table 9.2-1 provides a summary of proposed compression facilities for the Project.

9.2.1.2 Other Aboveground Facilities

NEXUS will construct five new metering and regulating ("M&R") stations as presented in Table 1.1-2 of Resource Report 1. Three of the new M&R stations (NEXUS/TGP M&R Station, NEXUS/Kensington M&R Station, and NEXUS/Texas Eastern M&R Station) will be constructed in Columbiana County, Ohio; one will be constructed in Erie County, Ohio (NEXUS/Dominion East Ohio M&R Station); and one will be constructed in Washtenaw County, Michigan (NEXUS/Willow Run M&R Station). The new M&R stations will contain meter runs with gas flow meters, regulator runs with flow- and pressure-control valves for measuring and controlling gas flow and regulating gas pressures, isolation block valves, and associated instrumentation/controls. Each of the new M&R stations will also include a small emergency generator with a natural gas-fired fuel heater.

There are other additional aboveground facilities proposed as part of NEXUS such as launcher and receiver facilities and mainline valve sites as presented in Table 1.1-2 of Resource Report 1.

9.2.2 New Pipeline Facilities

The Project includes construction of approximately 255 miles of new 36-inch diameter natural gas transmission mainline pipeline to be constructed in Ohio and Michigan, and approximately 0.9 mile of new 36-inch interconnecting pipeline to Tennessee Gas Pipeline L.L.C. ("TGP") facilities proposed in Ohio, as described further in Section 1.1.1 of Resource Report 1.

9.2.3 Existing Conditions

This subsection discusses the existing air quality conditions in the vicinity of the proposed NEXUS facilities.

9.2.3.1 Climate

The Project pipeline facilities will cross from the Appalachian plateaus through the Great Lakes plains. The underlying geology of the Project includes relatively flat-lying Paleozoic sedimentary strata overlain by varying amounts of unconsolidated Pleistocene deposits. The landscape of the Project is a result of the inundation of the area by seas in the Paleozoic, the advance and retreat of continental ice sheets in the Pleistocene, and fluvial erosion in the Holocene.

The climate at the Project sites is primarily continental in character, but is subjected to modification by the Great Lakes, most notably, Lake Erie. The mid-latitude site location and proximity to Lake Erie exposes the region to a variety of meteorological conditions and events. A broad range of weather can occur at the Project sites, including blizzards, thunderstorms, and droughts, and extreme occurrences of such events have been recorded. The mid-latitude location exposes the area to large annual ranges in temperatures. Cold outbreaks originating from the northern latitudes contrast significantly with the heat and humidity that is often transported from the Gulf of Mexico. The primary interaction point between these regions experiences weather that is characterized by frequent, sometimes powerful, changes. At times, mesoscale influences alter this meteorological variety.

Stagnation in the weather pattern will expose the area to extended periods of a particular type of weather. When there is stagnation in the weather pattern, the weather experienced will depend on what local meteorological feature is being trapped by the stagnation. High pressure stalled in the Atlantic Ocean in the summer often results in extended periods of heat, humidity and, at times, drought. Conversely, a stalled frontal boundary can result in extended periods of rain, ice or snow in the winter.

Northcentral and Eastern Ohio

The climate in the vicinity of the mainline pipeline work from Columbiana County to Erie County; the Hanoverton and Wadsworth Compressor Stations; the TGP Interconnecting Pipeline work; and the Project M&R stations in Ohio is mid-latitude continental (USDA, 2006; CoCoRaHS, 2009). The primary airflow and weather systems that affect the area are either cold, dry air originating from sub-arctic North America or warm, moist air moving across the mid-continent from the Gulf of Mexico and sub-tropical waters of the Atlantic. Lake Erie provides a tempering influence during the summer and fall. Winter precipitation, frequently in the form of snow, results in an accumulation of soil moisture by spring and minimizes drought during the summer. Precipitation is distributed equally throughout the year and temperatures fluctuate greatly on a daily and annual basis. Ohio experiences great diversity in weather over short periods of time and the climate for the same season or month of different years is often not comparable. Humidity tends to be lowest in the spring and highest in the late summer and early fall.

The National Climatic Data Center's ("NCDC") *1981-2010 Climate Normals* (NCDC, 2012) were evaluated from meteorological stations near Lisbon in Columbiana County, at the Akron Fulton Airport in Summit County, and in the City of Fremont in Sandusky County.

The 1981-2010 Climate Normals for the meteorological station in Lisbon indicate temperatures in this portion of eastern Ohio are generally highest in July and lowest in January. Maximum temperatures of 90 degrees Fahrenheit (°F) or higher occur about four days per year on average, while minimum temperatures of 0 °F or lower occur about five days per year on average. The mean annual precipitation is 38.5 inches, with monthly average precipitation ranging from a low of 2.41 inches in February to a maximum of 4.09 inches in July. Precipitation of 0.01 inch or greater occurs on about 126 days per year on average. Precipitation of 1.0 inch or greater occurs on average about seven days per year. The average annual snowfall is 29.1 inches.

The *1981-2010 Climate Normals* for the Akron Fulton Airport meteorological station indicate temperatures in this portion of eastern Ohio are generally highest in July and lowest in January. Maximum temperatures of 90 °F or higher occur about six days per year on average, while minimum temperatures of 0 °F or lower occur about two days per year on average. The mean annual precipitation is 37.1 inches, with monthly average precipitation ranging from a low of 1.95 inches in February to a maximum of 4.13 inches in March.

The *1981-2010 Climate Normals* for the meteorological station in Fremont indicate temperatures in this portion of central Ohio are generally highest in July and lowest in January. Maximum temperatures of 90 °F or higher occur about 16 days per year on average, while minimum temperatures of 0 °F or lower occur about five days per year on average. The mean annual precipitation is 37.0 inches, with monthly average precipitation ranging from a low of 2.15 inches in February to a maximum of 4.07 inches in June. Precipitation of 0.01 inch or greater occurs on about 126 days per year on average. Precipitation of 1.0 inch or greater occurs on average about seven days per year. The average annual snowfall is 25.7 inches.

Northwest Ohio and Southeast Michigan

The climate in the vicinity of the mainline pipeline work from Sandusky County, Ohio to Wayne County, Michigan; the Clyde and Waterville Compressor Stations; and the NEXUS/Willow Run M&R Station in Washtenaw County, Michigan is mid-latitude continental (USDA, 1984). Northwest Ohio and Southeast Michigan have a humid continental climate with four distinct seasons, which is the predominant climate for Ohio and Michigan. Summers are typically warm to hot, rainy, and humid, while winters are cold, windy, and snowy. Spring and fall are usually mild, but conditions are widely varied, depending on wind direction and jet stream positioning. The warmest month is July, with an average high temperature of 83 °F and an average low temperature of 61 °F. The coldest month is January, with an average high temperature of 31 °F and an average low temperature of 16 °F. Severe thunderstorms do occur occasionally, however tornados are a rare occurrence.

According to the *1981-2010 Climate Normals* for the Toledo Express Airport meteorological station in Lucas County, temperatures near the Waterville Compressor Station are generally highest in July and lowest in January. Maximum temperatures of 90 °F or higher occur about 14 days per year on average, while minimum temperatures of 0 °F or lower occur about five days per year on average. The mean annual precipitation is 34.2 inches, with monthly average precipitation ranging from a low of 2.05 inches in January to a maximum of 3.58 inches in May. Precipitation of 0.01 inch or greater occurs on about 132 days per year on average. Precipitation of 1.0 inch or greater occurs on average about six days per year. The average annual snowfall is 37.6 inches.

The *1981-2010 Climate Normals* for the Detroit Willow Run Airport meteorological station in Washtenaw County indicate temperatures in this portion of southeastern Michigan are generally highest in July and lowest in January. Maximum temperatures of 90 °F or higher occur about nine days per year on average, while minimum temperatures of 0 °F or lower occur about five days per year on average. The mean annual precipitation is 32.5 inches, with monthly average precipitation ranging from a low of 1.63 inches in January to a maximum of 3.48 inches in July.

9.2.3.2 National and State Ambient Air Quality Standards

The U.S. Environmental Protection Agency ("USEPA") has promulgated National Ambient Air Quality Standards ("NAAQS") to protect human health and welfare. The NAAQS include primary standards, which are designed to protect human health, including the health of sensitive subpopulations such as children and individuals with chronic respiratory problems. The NAAQS also include secondary standards designed to protect public welfare, including protection against visibility impairment and damage to economic interests, vegetation, animal species, and other interests not related to human health.

NAAQS currently apply to the following criteria pollutants: particulate matter ("PM") with a nominal aerodynamic diameter of 10 microns or less ("PM_{10}"); PM with a nominal aerodynamic diameter of 2.5 microns or less ("$PM_{2.5}$"); sulfur dioxide ("SO_2"); nitrogen dioxide ("NO_2"); CO; ozone ("O_3"); and lead ("Pb"). Each NAAQS is expressed in terms of a concentration level and an associated averaging period. The current NAAQS for these criteria pollutants are summarized in Table 9.2-2. Footnotes to Table 9.2-2 explain how compliance with each NAAQS is assessed.

The NAAQS apply in all Project areas. States and municipalities are free to adopt standards that are more stringent than the NAAQS. The Ohio Environmental Protection Agency ("OEPA") has adopted ambient air quality standards that differ in some respects from the current NAAQS, but pursuant to Ohio law, these standards cannot be more stringent than the NAAQS.[1] The Michigan Department of Environmental Quality ("MDEQ") has adopted the NAAQS in full.

Table 9.2-3 summarizes the current Ohio Ambient Air Quality Standards promulgated in Chapter 3745 of the Ohio Administrative Code ("OAC"). Footnotes to Table 9.2-3 provide additional information concerning how compliance with these state standards is assessed.

9.2.3.3 Existing Ambient Air Quality

The NEXUS Project will involve construction in various counties in Ohio and Michigan. Many of these counties contain ambient air quality monitors that collect data concerning existing levels of various air pollutants. Summary data from the USEPA AirData database were reviewed in order to characterize maximum or near-maximum existing concentrations in representative counties in which Project facilities will be constructed (USEPA, 2015). In most cases, the counties in which a compressor station is located are used to represent existing air quality for the Project facilities in that vicinity, and in all cases ambient air quality concentrations were taken from the nearest monitoring station for each project component. In some cases in which no data were available from a representative county, data from a neighboring or nearby county were used as a substitute.

Ambient air quality monitoring data from the 3-year period 2012-2014 are summarized in Table 9.2-4 for those monitoring stations nearest to the proposed NEXUS Project facilities. For each project component, Table 9.2-4 lists the maximum annual mean concentration and/or a near-maximum short-term concentration in each year. Second-high short-term concentrations are listed for most pollutants, but Table 9.2-4 includes the fourth-highest 8-hour average concentration for ozone, the 98th percentile 1-hour average concentration for NO_2, the 98th percentile 24-hour average concentration for $PM_{2.5}$, and the 99th percentile 1-hour average concentration for SO_2, consistent with the structure of the NAAQS for those pollutants and averaging periods.

9.2.3.4 Attainment Status

A useful way to characterize existing air quality in a given area is to identify the attainment status of the air quality control region ("AQCR") in which it is located. An AQCR, as defined in Section 107 of the Clean

[1] Ohio Revised Code, Title 37, Chapter 3704.03(D).

Air Act ("CAA"), is a federally-designated area in which NAAQS must be met. An implementation plan is developed for each AQCR describing how ambient air quality standards will be achieved and maintained.

USEPA designates the attainment status of an area on a pollutant-specific basis, based on whether an area meets the NAAQS. Areas that meet the NAAQS are termed "attainment areas." Areas that do not meet the NAAQS are termed "nonattainment areas." Areas for which insufficient data are available to determine attainment status are termed "unclassified areas." Areas formerly designated as nonattainment areas that have subsequently reached attainment are termed "maintenance areas."

The attainment status designations appear in the Code of Federal Regulations ("CFR") at 40 CFR Part 81. The attainment status of a region, in conjunction with projected emission rates or emissions increases, determines the regulatory review process for a new project. Table 9.2-5 summarizes the attainment status of the AQCRs in which Project facilities will be located. As shown in Table 9.2-5, all Project facilities will be located in areas designated as attainment or unclassifiable with the exception of Summit, Medina, and Lorain County which are designated nonattainment for the 2008 8-hour ozone standard. In addition, Lorain County is designated nonattainment for the 2012 annual $PM_{2.5}$ standard. Several Project facilities are located in designated maintenance areas for the 1997 8-hour ozone standard[2] and $PM_{2.5}$ standards.

9.2.4 Relevant Air Quality and Permitting Requirements

In addition to the NAAQS, Project air emissions and equipment will be subject to various other federal and state air quality regulations. Federal air quality requirements are contained in 40 CFR Parts 50 through 99. The following sections briefly discuss air regulations that potentially apply to Project facilities.

9.2.4.1 New Source Review Permitting/Licensing

Preconstruction air permitting programs that regulate the construction of new stationary sources of air pollution and the modification of existing stationary sources are commonly referred to as New Source Review ("NSR"). NSR can be divided into two categories: major NSR and minor NSR. Major NSR has two components: the Prevention of Significant Deterioration ("PSD") permitting program and the nonattainment area NSR ("NNSR") permitting program.

Major NSR requirements are established on a federal level but may be implemented by state or local permitting authorities under either a delegation agreement with USEPA or as a State Implementation Plan ("SIP") program approved by USEPA. For new major sources and major modifications located in attainment or unclassifiable areas, the PSD program applies, while the NNSR program applies for new major sources and major modifications located in nonattainment areas. Depending on its potential emissions and location, a new source or a modification to an existing source could be subject to both major NSR programs for various pollutants.

PSD requirements include the use of Best Available Control Technology, air quality impact analyses, and additional impact analyses. NNSR requirements for nonattainment pollutants include Lowest Achievable Emission Rate, emission offsets, and an alternatives analysis. In some cases, a net air benefits analysis may also be needed. One additional factor considered in the NSR process is the potential impact on protected Class I areas. Pristine natural areas or areas of natural significance are specifically designated as Class I areas. The remainder of the U.S. is classified as Class II. Class III designations, intended for heavily industrialized zones, can only be made upon request and must meet all requirements outlined in 40 CFR §51.166.

[2] The 1997 O_3 standard was revoked on March 6, 2015 per 80 FR 12263. Note that with respect to general conformity applicability, areas that were designated as nonattainment or maintenance for the revoked 1997 8-hour ozone NAAQS, are no longer nonattainment or maintenance for the purposes of general conformity with respect to this pollutant. The EPA notice at 80 FR 12263 specifically indicates that when a specific NAAQS is revoked, general conformity requirements end with respect to that standard.

The requirements for the PSD and state NSR programs, as well as the implementation of NSR permitting in Ohio and Michigan, are discussed below. A copy of each air permit application that includes application forms and detailed emissions calculations for the Project compressor stations are provided in Appendix 9A.

Ohio

Paragraph (NNN) of rule 3745-31-01 of the OAC establishes the PSD major stationary source threshold for all regulated NSR pollutants except for greenhouse gases ("GHG") as 100 tons per year ("TPY") for 28 specifically listed source categories. For unlisted source categories, such as natural gas pipeline compressor stations, the PSD major source threshold is 250 TPY of potential emissions of any air pollutant except for GHG. Paragraph (NNN) of rule 3745-31-01 of the OAC establishes the NNSR major source threshold as 100 TPY of a nonattainment pollutant. Additionally, the final PSD and Title V Greenhouse Gas Tailoring Rule was published in the Federal Register on June 3, 2010 (75 FR 31514) but was ultimately overturned on June 23, 2014 by the US Supreme Court.[3] Under the formerly effective rule, as of July 1, 2011, newly constructed sources that emit or have the potential to emit GHGs at or above 100,000 TPY carbon dioxide equivalents ("CO_2e") would be subject to permitting under the PSD and Title V programs. However, *Utility Air Regulatory Group v. EPA* clarified that a source's potential to emit GHGs could not, on its own, make it a major stationary source for permitting purposes.

Columbiana, Sandusky, and Lucas Counties are all currently designated as attainment/unclassifiable for all NAAQS. Therefore, the PSD major source thresholds of 250 TPY for NO_X, CO, PM_{10}, $PM_{2.5}$, SO_2, and VOC apply to the Hanoverton, Clyde, and Waterville Compressor Stations. Medina County is currently designated as attainment/unclassifiable for all NAAQS except for the 8-hour ozone standard. Therefore, the PSD major source thresholds of 250 TPY for CO, PM_{10}, $PM_{2.5}$, and SO_2, and the NNSR major source threshold of 100 TPY for NO_X and VOC (i.e., the precursors to ozone formation) apply to the Wadsworth Compressor Station.

Emissions of all criteria pollutants from the Hanoverton, Wadsworth, Clyde, and Waterville Compressor Stations (i.e., those located in Columbiana, Medina, Sandusky, and Lucas Counties, respectively) will not exceed the respective major source permitting thresholds; therefore, neither PSD nor NNSR permitting requirements will apply to the Project. In addition, the closest Class I area to the Hanoverton, Wadsworth, Clyde, and Waterville Compressor Stations is the Otter Creek Wilderness in West Virginia, which is 216 kilometers ("km"), 286 km, 373 km, and 440 km, from each respective compressor station.

The emissions of criteria pollutants from the M&R stations to be constructed in Columbiana and Erie Counties (i.e., NEXUS/TGP M&R Station [MR01], NEXUS/Kensington M&R Station [MR02], NEXUS/Texas Eastern M&R Station [MR03], and NEXUS/Dominion East Ohio M&R Station [MR05]), will not exceed the respective major source permitting thresholds.

In addition to PSD and NNSR permitting requirements, Ohio administers its own construction permitting requirements within Chapter 3745-31 of the OAC. At a minimum, new or modified stationary sources with potential air emissions that exceed the *de minimis* permitting thresholds of 10 pounds per day or 25 TPY for any air pollutant, or 1 TPY for total HAPs, are required to obtain a Permit-to-Install ("PTI") or Permit-to-Install-and-Operate ("PTIO"), unless specifically exempted by Rule 3745-15-05 or 3745-31-03. For each pollutant for which the requested allowable emissions exceed 10 TPY, the use of Best Available Technology, as defined in OAC 3745-31-01, is required.

The emissions from the Project compressor stations and three of the M&R stations to be constructed in Ohio will exceed the *de minimis* thresholds and, therefore, each facility is required to obtain a PTIO. Launcher/receiver facilities located at the Wadsworth and Waterville Compressor Stations will be

[3] *Utility Air Regulatory Group v. EPA*, 134 S.Ct. 2427 (2014).

incorporated into the PTIO for the respective station. The potential air emissions from the proposed mainline valve sites in Ohio will be less than the *de minimis* thresholds and will be exempt from air permitting.

The NEXUS/Dominion East Ohio M&R Station (MR05) and the remaining launcher/receiver facilities to be constructed in Ohio as part of the NEXUS Project will be required to obtain a PTIO if potential emissions exceed the *de minimis* thresholds. Based on initial data, NEXUS has determined that emissions from the NEXUS/Dominion East Ohio M&R Station (MR05) and the launcher/receiver facilities to be constructed in Ohio will not result in regulated air emissions requiring permitting or other authorizations. If based on final design, it is determined that these facilities will result in regulated air emissions, NEXUS will apply for the appropriate air authorizations.

Michigan

Michigan's construction permitting requirements are contained within the "Michigan Air Pollution Control Rules," adopted pursuant to Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (ACT 451). Rule 336.1201 (Rule 201) states that a person must not install, construct, reconstruct, relocate, or modify an emission unit that may emit an air contaminant unless the MDEQ issues a PTI authorizing the action. Rules 280 through 290 contain permit exemptions which may relieve a facility of the requirement to obtain a PTI.

Paragraph (cc) of Rule 336.2801 (Rule 1801) establishes the PSD major source threshold for all regulated NSR pollutants except for GHGs as 100 TPY for 28 specifically listed source categories. For unlisted source categories, such as natural gas pipeline compressor stations, the PSD major source threshold is 250 TPY of potential emissions of any air pollutant except for GHG.

Paragraph (t) of Rule 336.2901 (Rule 1901) establishes the NNSR major source threshold as 100 TPY of a nonattainment pollutant. Lower major source thresholds may apply depending on the severity of nonattainment in the county in which the source will be located.

The new M&R station in Michigan (i.e., NEXUS/Willow Run M&R Station [MR04]) will be constructed in Washtenaw County, which is currently designated as attainment/unclassifiable for all NAAQS. Therefore, the PSD major source threshold of 250 TPY applies for NO_X, CO, PM_{10}, $PM_{2.5}$, SO_2, and VOC. The emissions of all criteria pollutants from the NEXUS/Willow Run M&R Station will not exceed the respective major source permitting thresholds; therefore, neither PSD nor NNSR permitting requirements will apply. Additionally, emissions sources at the M&R station in Michigan qualify for the permitting exemptions provided in Rule 336.1282(b)(i) for gas-fired heaters, in Rule 336.1285(g) for emergency generators, in Rule 336.1285(mm)(i) for gas releases, in Rule 336.1284(e) for storage vessels, and in Rule 336.1290(a) for equipment leaks and truck loading. Therefore, NEXUS will not be required to obtain a PTI for the M&R station in Michigan. The potential air emissions from the mainline valve sites in Michigan will be exempt from air permitting as well.

9.2.4.2 State and Title V Operating Permit Programs

The Title V permit program in 40 CFR Part 70 requires major sources of air pollutants to obtain operating permits. The major source thresholds under the Title V program, as defined in 40 CFR §70.2, are 100 TPY of any air pollutant, 10 TPY of any single HAP, or 25 TPY of any combination of HAPs. More stringent Title V major source thresholds apply for VOC and NO_X in ozone nonattainment areas, namely 50 TPY of VOC or NO_X in areas with a nonattainment area designation of serious, 25 TPY in areas designated severe, and 10 TPY in areas designated extreme. *Utility Air Regulatory Group v. EPA* clarified and USEPA's July 24, 2014 memorandum to the Regional Administrators reinforced that stationary sources will not be required to obtain a Title V permit on the sole basis of GHG emissions levels (i.e., exceeding the Title V major source threshold for GHG only).

Ohio

The authority to issue Title V operating permits has been delegated to OEPA by USEPA. Ohio administers the Title V operating permit program through Chapter 3745-77 and a state operating permit program through its PTIO Program in OAC Chapter 3745-31.

As mentioned previously, OEPA issues new stationary sources a PTIO if the unrestricted potential emissions do not exceed Title V major source thresholds. These PTIOs authorize both the construction and operation of the permitted source. For major sources, there is also the option to accept federally enforceable limitations within a Federally Enforceable Permit-to-Install-and-Operate that limit the facility-wide potential to emit to below Title V thresholds. Both the PTIO and Federally Enforceable Permit-to-Install-and-Operate are applied for and issued through one application process. For Title V major sources, the permit process is split into two steps requiring that a source first apply for and be issued a PTI and then apply for a Title V Permit-to-Operate ("Title V PTO").

Emissions from the Hanoverton, Wadsworth, Clyde, and Waterville Compressor Stations, and Project M&R stations in Ohio will not exceed the relevant Title V major source thresholds of 100 TPY of any air pollutant, 10 TPY of any single HAP, or 25 TPY of total HAPs. Therefore, these sites will not be subject to the Title V permitting program. Each of these sites will, however, be required to obtain a PTIO. As mentioned previously, the launcher/receiver facilities located at the Wadsworth and Waterville Compressor Stations will be incorporated into the PTIO for the respective station. The remaining aboveground facilities to be constructed in Ohio as part of the NEXUS Project will not require a PTIO.

Michigan

The authority to issue Title V operating permits has been delegated to MDEQ by USEPA. Michigan administers the Title V operating permit program through Rule 210 and Rule 211 via the Renewable Operating Permit ("ROP") program.

As mentioned previously, MDEQ issues new stationary sources a PTI. For Title V major sources, the permit process is split into two steps requiring that a source first apply for and be issued a PTI and then apply for a Renewable Operating Permit (i.e., Title V operating permit).

The aboveground facilities to be constructed in Michigan as part of the NEXUS Project will not require a ROP from MDEQ.

9.2.4.3 Standards of Performance for New Stationary Sources

New Source Performance Standards ("NSPS") in 40 CFR Part 60 regulate certain emissions from specific source categories. Facilities associated with the Project include equipment in some source categories that could be subject to NSPS requirements as discussed below.

40 CFR Part 60, Subpart Dc (Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units)

40 CFR Part 60, Subpart Dc applies to steam generating units with a maximum design heat input capacity of greater than or equal to 10 MMBtu/hr but less than or equal to 100 MMBtu/hr for which construction, modification, or reconstruction is commenced after June 9, 1989. It is not expected that the Project will include any new boilers installed with a maximum heat input capacity greater than 10 MMBtu/hr. Therefore, the requirements of Subpart Dc will not apply.

40 CFR Part 60, Subpart Kb (Standards of Performance for Volatile Organic Liquid Storage Vessels [Including Petroleum Liquid Storage Vessels] for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984)

40 CFR Part 60, Subpart Kb potentially applies to storage vessels with a capacity greater than 75 cubic meters (m^3) that will store volatile organic liquids. A capacity of 75 m^3 is equal to approximately 19,813 gallons. The Project does not include the construction, reconstruction, or modification of any storage vessels containing volatile organic liquids with a capacity that exceeds this threshold. Therefore, Subpart Kb will not apply to the proposed Project activities.

40 CFR Part 60, Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines)

40 CFR Part 60, Subpart JJJJ ("NSPS JJJJ"), is applicable to owners and operators of new or existing stationary spark ignition internal combustion engines that commence construction, modification, or reconstruction after June 12, 2006. The Project includes a new emergency stationary spark-ignition internal combustion engine ("SI ICE") to be installed at each compressor station and M&R station. Based on preliminary design, the new emergency stationary SI ICE will be greater than 25 hp and will therefore be subject to requirements under NSPS JJJJ.

Per 40 CFR §60.4233(e), the units will meet the emission standards specified in Table 1 of Subpart JJJJ. NEXUS will ensure that each engine satisfies the monitoring requirements specified in 40 CFR §60.4237(a) by installing a non-resettable hour meter. NEXUS will also ensure that each emergency generator satisfies the compliance requirements for periodic testing and maintenance specified in 40 CFR §60.4243(b)(2), the operational restrictions for emergency engines in 40 CFR §60.4243(d), and the notification, reporting and recordkeeping requirements specified in 40 CFR §60.4245.

NEXUS will comply with the requirements for a non-certified generator pursuant to 40 CFR §60.4243(b)(2)(ii), including conducting an initial performance test within one year of startup and subsequent tests every 8,760 hours or three (3) years, whichever comes first. 40 CFR §60.4245(d) requires the submittal of a copy of the performance test within 60 days of its completion.

Since the engines will be used as emergency generators, non-resettable hour meters are required. Per 40 CFR §60.4243(d), emergency engines are allowed to be operated according to the following time constraints:

1. There is no time limit on use in emergency situations; and
2. The emergency ICE can operate for up to 100 hours per year total for the following reasons:

    a. Maintenance checks and readiness testing, provided that the tests are recommended by federal, state, or local government, the manufacturer, the vendor, the regional transmission organization or equivalent balancing authority and transmission operator, or the insurance company associated with the engine;

    b. Emergency demand response for periods specified in 40 CFR §60.4243(d)(2)(ii); and

    c. Periods where there is a deviation of voltage or frequency of 5 percent or greater below standard voltage or frequency.

The emergency ICE can operate for up to 50 hours per year in non-emergency situations. The 50 hours of operation in non-emergency situations are counted as part of the 100 hours per year for maintenance and testing and emergency demand response described in the previous bullet point. NEXUS will track each engine's run time and the reason for use in order to demonstrate compliance with the run time requirements.

Initial notification is required for the engines, which are non-certified reciprocating internal combustion engines ("RICE") greater than 500 hp. Since performance testing is required, advanced notification and results reporting are required, in addition to semiannual compliance reports.

40 CFR Part 60, Subpart KKKK (Standards of Performance for Stationary Combustion Turbines)

Stationary combustion turbines with a heat input rate at peak load of 10 MMBtu/hr or greater that commenced construction, modification (as defined in 40 CFR §60.14), or reconstruction (as defined in 40 CFR §60.15) after February 18, 2005 are regulated under Subpart KKKK. Subpart KKKK limits emissions of NO_X as well as the sulfur content of fuel that is combusted in subject units. The Project involves the installation of new stationary combustion turbines at each compressor station. Therefore, the Project will trigger the emissions limitations as well as the monitoring, reporting, recordkeeping, and testing requirements under Subpart KKKK.

Units subject to the requirements of Subpart KKKK must meet the emissions standards listed in Table 1 to Subpart KKKK. New turbines firing natural gas with a heat input capacity greater than 50 MMBtu/hr and less than 850 MMBtu/hr are required to limit NO_X emissions to less than 25 ppm at 15 percent O_2. The proposed combustion turbines are designed with maximum NO_X emissions of 9 ppm at 15 percent O_2, which is lower than the applicable NSPS emission limits.

In accordance with 40 CFR §60.4330(a), each combustion turbine must comply with one of the following:

1. Limit emissions to less than 110 nanograms per Joule (ng/J) of SO_2 (0.90 lb/MWh) gross output; or
2. Burn fuel which contains total potential sulfur emissions equal to or less than 26 ng/J of SO_2 (0.060 lb/MMBtu HHV) heat input.

The SO_2 limits will be met by firing only pipeline quality natural gas in the combustion turbine, which will satisfy the requirements of 40 CFR §60.4330(a)(2).

Pursuant to 40 CFR §60.4333(a), both new turbines, their air pollution control equipment, and their monitoring equipment will be maintained in a manner that is consistent with good air pollution control practices for minimizing emissions. This requirement applies at all times including during startup, shutdown, and malfunction.

Since the turbines will not be equipped with water or steam injection, NEXUS will perform the required initial and annual performance testing to demonstrate compliance with the NO_X emission limit. If the results of a NO_X performance test are under 75 percent of the NO_X emissions limits, NEXUS will only be required to perform the performance tests for that turbine every two years (no more than 26 calendar months following the previous performance test), provided that subsequent performance test results are less than 75 percent of the emission limit. If the results of subsequent performance tests indicate NO_X emissions greater than 75 percent of the limit, then annual performance testing for NO_X will resume. NEXUS may also choose to install, calibrate, and maintain continuous emissions monitoring systems ("CEMS") for NO_X on the turbines and operate them in accordance with NSPS Subpart A and Subpart KKKK, in which case NO_X performance testing will not be required. However, at this time NEXUS elects not to install CEMS and plans to verify compliance using stack tests.

For compliance with the SO_2 emission limit, facilities are required to perform regular determinations of the total sulfur content of the combustion fuel and to conduct initial and annual compliance demonstrations. The total sulfur content of gaseous fuel combusted in the turbines must be determined and recorded once per operating day or using a custom schedule as approved by OEPA; however, NEXUS may elect to opt out of this provision of the rule by using a fuel that is demonstrated not to exceed potential sulfur emissions of 0.060 lb/MMBtu SO_2. This demonstration can be made using one of the following methods:

1. By using a purchase contract specifying that the fuel sulfur content for the natural gas is less than or equal to 20 grains of sulfur per 100 standard cubic feet and results in potential emissions not exceeding 0.060 lb/MMBtu.
2. By using representative fuel sampling data which show that the sulfur content of the fuel does not exceed 0.060 lb SO_2/MMBtu heat input. At a minimum, the amount of fuel sampling data specified in Section 2.3.1.4 or 2.3.2.4 of Appendix D to Part 75 is this chapter is required.

Pursuant to 40 CFR §60.4365(a), in order to demonstrate continuous compliance with the applicable 0.060 lb/MMBtu potential SO_2 emissions limit, NEXUS will obtain a current tariff sheet for the fuel specifying that the maximum total sulfur content for natural gas use is 20 grains of sulfur or less per 100 scf and potential sulfur emissions are less than 26 ng SO_2/J (0.060 lb SO_2/MMBtu) heat input for continental areas.

Pursuant to 40 CFR §60.4375(b), since NEXUS will be conducting annual performance testing in accordance with 40 CFR §60.4340(a), a written report of the results of each performance test will be submitted to OEPA and the USEPA before the close of business on the 60th day following the completion of the performance test.

Per 40 CFR §60.7(a)(1), NEXUS will submit notification of the date construction of each new turbines commenced. The submittal will be postmarked by no later than 30 days after the commencement of construction date. Per 40 CFR §60.7(a)(3), the submittal of the notification of the actual date of initial startup of each new turbine will be postmarked by no later than 15 days after the initial startup date.

40 CFR Part 60, Subpart OOOO (Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution)

40 CFR Part 60, Subpart OOOO establishes standards of performance for the oil and natural gas source category, which USEPA defines to include production, processing, transmission and storage. The standards apply to storage vessels in the oil and natural gas production segment, natural gas processing segment, or natural gas transmission and storage segment that have the potential for VOC emissions equal to or greater than 6 TPY, as determined according to 40 CFR §60.5365(e) by April 15, 2014, or 30 days after startup (whichever is later) for storage vessels for which construction, modification or reconstruction has commenced after April 12, 2013. Natural gas transmission is defined as the pipelines used for the long distance transport of natural gas (excluding processing). Specific equipment used in natural gas transmission includes the land, mains, valves, meters, boosters, regulators, storage vessels, dehydrators, compressors, and their driving units and appurtenances, and equipment used for transporting gas from a production plant, delivery point of purchased gas, gathering system, storage area, or other wholesale source of gas to one or more distribution area(s).

The regulation at 40 CFR §60.5365(e) specifies that VOC emissions from the storage vessels must be calculated based on the maximum average daily throughput determined for a 30-day period of production. Estimated VOC emissions from all of the tanks at the compressor stations associated with the Project are significantly below 6 TPY, therefore the requirements of Subpart OOOO will not apply to the proposed Project.

40 CFR Part 60, Subpart OOOOa (Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution) [Proposed]

On August 18, 2015, USEPA proposed amendments to its 2012 New Source Performance Standards for VOC emissions from the oil and natural gas source category, in which the USEPA proposed to regulate methane emissions, as well as VOCs, from oil and natural gas production, transmission, and distribution facilities. The proposed rule would require owners and operators of such facilities to implement measures to minimize leaks and to find and repair those leaks that do occur. The proposed amendments also included

requirements to limit emissions from equipment used at natural gas transmission compressor stations and gas storage facilities, including pneumatic pumps. The existing NSPS does not cover this equipment. NEXUS will comply with all applicable requirements in the final promulgation of these proposed amendments.

9.2.4.4 National Emission Standards for Hazardous Air Pollutants

The USEPA has established National Emission Standards for Hazardous Air Pollutants ("NESHAP") for specific pollutants and industries in 40 CFR Part 61. The Project does not include any of the specific sources for which NESHAP have been established in Part 61. Therefore, Part 61 NESHAP requirements will not apply to the Project.

The USEPA has also established NESHAP requirements in 40 CFR Part 63 for various source categories. The Part 63 NESHAP generally apply to certain emission units at facilities that are major sources of HAP. Additionally, some NESHAP apply to non-major sources (area sources) of HAP.

40 CFR Part 63, Subpart HHH (National Emission Standards for Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities)

40 CFR Part 63, Subpart HHH applies to natural gas transmission and storage facilities that are major sources of HAP and that transport or store natural gas prior to entering the pipeline to a local distribution company or to a final end user (if there is no local distribution company). The affected source is each new and existing glycol dehydration unit located at the facility. The owner or operator of a facility that does not contain an affected source is not subject to the requirements of this subpart. The proposed compressor stations associated with the Project will not be major sources of HAP and will not include any glycol dehydration units. Therefore, the requirements of Subpart HHH will not apply to the Project.

40 CFR Part 63, Subpart YYYY (National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines)

40 CFR Part 63, Subpart YYYY applies to stationary combustion turbines at major sources of HAP. Emissions and operating limitations under Subpart YYYY apply to new and reconstructed stationary combustion turbines. The proposed compressor stations associated with the Project are not considered major sources of HAP. Therefore, the Project will not trigger any requirements under Subpart YYYY.

40 CFR Part 63, Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines)

40 CFR Part 63, Subpart ZZZZ, applies to existing, new, and reconstructed stationary RICE located at either major or area sources of HAP. The Project includes a new emergency stationary RICE at each of the compressor stations and M&R stations associated with the Project, which will be area sources of HAP. However, new stationary RICE located at area sources of HAP must meet the requirements of Subpart ZZZZ by meeting the NSPS standards at 40 CFR Part 60, Subpart JJJJ. As discussed above in Section 9.2.5.3, the new emergency stationary RICE at the compressor stations and M&R stations will be subject to the requirements of NSPS JJJJ.

40 CFR Part 63, Subpart DDDDD (National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters)

40 CFR Part 63, Subpart DDDDD applies to certain new and existing boilers and process heaters at major HAP sources. The Project does not involve the installation of any subject boilers or heaters at major sources of HAP. Therefore the Project will not trigger any Subpart DDDDD requirements.

40 CFR Part 63, Subpart JJJJJJ (National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources)

40 CFR Part 63, Subpart JJJJJJ applies only to certain new and existing boilers at area sources, where a boiler is defined as "enclosed device using controlled flame combustion in which water is heated to recover thermal energy in the form of steam and/or hot water." The rule does not apply to natural gas-fired boilers. The heating devices proposed as part of the Project will be fired by natural gas and therefore will not be subject to Subpart JJJJJJ requirements.

9.2.4.5 State Air Regulations

Ohio

In addition to the federal air quality requirements identified above, there are several other state air pollution regulations administered by OEPA that are potentially applicable to the Project. OEPA air pollution regulations are located in the OAC in chapters 3745-14 to 3745-26, 3745-31, 3745-71 to 3745-80, 3745-100 to 3745-101, 3745-103 to 3745-105, 3745-109, and 3745-112 to 3745-114. In Ohio, any emission unit that is considered *de minimis* is exempt from the requirements of the OAC.[4]

Ohio Particulate Matter Standards

The turbines and emergency generators proposed as part of the Project will be subject to OAC 3745-17-07(A)(1)(a), which establishes that visible particulate emissions from any stack shall not exceed twenty percent opacity as a six-minute average except as provided by rule. NEXUS will demonstrate compliance with this opacity limitation by conducting visible emissions observations using Method 9 in Appendix A to 40 CFR Part 60 if required by OEPA. The turbines will be subject to OAC 3745-17-11(B)(4), which establishes that particulate emissions from any stationary gas turbine shall not exceed 0.04 pounds per million British thermal units of actual heat input. Also, the emergency generators will be subject to OAC 3745-17-11(B)(5), which establishes limits for particulate emissions from stationary internal combustion engines based on the size of the engine in question. These emission sources will fire natural gas exclusively, which is a clean burning fuel with low particulate emissions. NEXUS will demonstrate compliance with these mass-based emission limitations using Method 5 in Appendix A to 40 CFR Part 60 if required by OEPA.

OEPA requires the application of Reasonably Available Control Measures (RACM) pursuant to OAC 3745-17-08(B) to minimize fugitive dust from construction activities occurring in areas listed in Appendix A to the rule. The Hanoverton, Wadsworth, and Waterville Compressor Stations are located in Appendix A areas; therefore, NEXUS will apply RACM including but not necessarily limited to the control measures provided in OAC 3745-17-08(B) to minimize fugitive dust from construction activities at these sites.

Ohio Sulfur Dioxide Regulations

OAC 3745-18 contains Ohio's Sulfur Dioxide Regulations which apply to fuel burning equipment, stationary gas turbines, jet engine test stands and stationary internal combustion engines. The turbines and emergency generators will fire pipeline quality natural gas, which is an inherently low sulfur content fuel. In accordance with OAC 3745-18-06(A), these sources are exempt from the sulfur dioxide emission limits during any calendar day in which natural gas is the only fuel burned. Therefore, the Sulfur Dioxide Regulations will not apply to the Project.

[4] The natural gas-fired fuel gas heaters proposed for the Project compressor stations and M&R stations have potential emissions less than 10 pounds per day or 25 TPY for any air pollutant, or 1 TPY for total HAPs, and are therefore considered *de minimis* sources.

Ohio Open Burning Standards

The Open Burning Standards at OAC 3745-19 will apply to Project construction if and to the extent this means of disposal is used for land-clearing waste. Land-clearing waste, such as tree trimmings, stumps, brush, weeds, shrubbery, and crop residues may be burned on the property where it was generated, with prior written permission from OEPA. Open burning of land-clearing waste is only permitted outside of restricted areas, which include: within the boundaries of any municipal corporation; within corporation limits and a 1,000 foot zone outside any municipal corporation having a population of 1,000 to 10,000; and within corporation limits and a 1 mile zone outside any municipal corporation with a population of more than 10,000. Any open burning that occurs as part of the Project construction will not be conducted in a restricted area. A request to conduct open burning of land-clearing waste must be submitted to OEPA at least ten working days prior to the burn, and OEPA must issue written approval prior to the burn. NEXUS will request and await receipt of approval from OEPA before conducting open burning.

Ohio Standards for Road Construction

NEXUS may not construct any of the roadways at these sites using cutback asphalts or emulsified asphalts except as provided in OAC 3745-21-09(N).

Ohio Standards for Architectural and Industrial Maintenance (AIM) Coatings

NEXUS may not use coatings with a VOC content exceeding the limits established in OAC 3745-113-03(A).

Ohio Gasoline Volatility Standards

If a violation of the ambient air quality standard for ozone occurs in Medina County or Columbiana County, NEXUS may not use gasoline with a Reid vapor pressure exceeding 7.8 pounds per square inch at the Wadsworth Compressor Station or the Hanoverton Compressor Station, respectively, for a period of eight months following the violation of the ozone standard pursuant to OAC 3745-72-01(C) and 03(A).

Ohio VOC Emission Standards

The VOC Emission Standards at OAC 3745-21-09(L) prohibit the storage of any petroleum liquid with a true vapor pressure greater than 1.52 actual pounds per square inch in fixed roof tanks unless such tanks meet the specified design requirements. Fixed roof tanks with capacities less than 40,000 gallons are exempt from the requirements of OAC 3745-21-09(L)(1). All of the storage vessels to be installed at the compressor stations associated with the Project will have nominal storage capacities of less than 40,000 gallons. Therefore, the requirements of OAC 3745-21-09(L) will not apply to the Project.

Reasonably Available Control Technology for NO_X

OAC 3745-110 contains Ohio's NO_X Reasonably Available Control Technology ("RACT"). For new sources, NO_X RACT applies to any stationary source of NO_X emissions that is a very large boiler, large boiler, mid-size boiler, small boiler, stationary combustion turbine, stationary internal combustion engine, or reheat furnace, except where the emission limitations and requirements of an applicable NSPS under 40 CFR Part 60 are more stringent than the NO_X RACT emission limitations and requirements. The stationary combustion turbines to be installed at the compressor stations associated with the Project will be subject to the NO_X standard of 40 CFR Part 60, Subpart KKKK, which is more stringent than the NO_X RACT standard. Though the emergency generators proposed as part of the Project are stationary internal combustion engines, they will be less than 2,000 hp and therefore no applicable emission limitations are established by the NO_X RACT regulation. Finally, the small natural gas-fired heating devices proposed as part of the

Project all have heat input capacities less than the threshold for a "small boiler" as defined at OAC 3745-110-01.[5]

Ohio Air Toxics Requirements

Item 1 of OEPA's Engineering Guide #69 requires air dispersion modeling for each toxic pollutant for which the increase in allowable emissions exceeds one TPY.[6] The air dispersion modeling must demonstrate that the ambient incremental impact is less than the Maximum Allowable Ground Level Concentrations ("MAGLCs") established in accordance with OEPA guidance as required by ORC 3704.03(F)(4)(b).[7]

The Hanoverton Compressor Station is the only Project compressor station which will cause an increase in potential emissions of air toxics greater than one TPY. OEPA specifies in Item 4.2 of Engineering Guide #69 that sources of toxic pollutants from sources emitting air contaminants solely from the combustion of fossil fuel are not required to be evaluated in an air quality analysis in support of a state-only permit. Therefore, the process heaters are not required to be evaluated for air toxics.

After excluding the process heaters, toluene remains the only toxic air pollutant for which project increases exceed one TPY. Approximately half of the facility-wide toluene emissions originate from gas releases. These gas releases are intermittent events that rarely exceed three minutes in total duration. On March 1, 2011, U.S. EPA issued guidance for applicants conducting air dispersion modeling analyses to demonstrate compliance with short-term air quality standards.[8] This memorandum clarifies that intermittent sources may be excluded from short-term modeling analyses given that inclusion of such sources would involve the excessively conservative assumption that the intermittent source would operate during the same single hour as the worst-case meteorological conditions. Specifically, "EPA believes that existing modeling guidelines provide sufficient discretion for reviewing authorities to exclude certain types of intermittent emissions from compliance demonstrations for the 1-hour NO_2 standard under these circumstances."

Because compliance with OEPA's MAGLCs is evaluated using the absolute highest-first-high modeled concentration over a one-hour averaging period, the format of these MAGLCs could be considered to be even more stringent than the probabilistic format of the 1-hour NO_2 standard referenced in U.S. EPA's March 1, 2011 memorandum. NEXUS has therefore excluded gas releases from the air toxics modeling analysis given that these releases are truly intermittent.

After excluding gas releases from the air toxics modeling analysis, potential emissions of each individual toxic air contaminant emitted from the Hanoverton Compressor Station will not exceed one TPY, and an air toxics modeling analysis is not required.

Additional Ohio Requirements

The new permitted air contaminant sources proposed as part of the Project will also be subject to OAC 3745-16, which establishes good engineering stack height requirements for all new air contaminant sources at OAC 3745-16-01(F) and the Fee Emission Reporting requirements at OAC 3745-78. NEXUS will

[5] "Small boiler" means an industrial boiler with a maximum heat input capacity greater than 20 MMBtu/hr and equal to or less than 50 MMBtu/hr.

[6] Air toxic pollutants include any pollutant listed in OAC 3745-114-01.

[7] ORC 3704.03(F)(4)(b) requires that applicable MAGLCs be determined in accordance with Option A: Review of New Sources of Air Toxic Emissions, Ohio EPA Air Quality Modeling and Planning Section (May 1986).

[8] Tyler Fox, Leader, U.S. EPA Air Quality Modeling Group, "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard." March 1, 2011.

construct all stacks in accordance with good engineering practice and will submit the Fee Emission Reports as required by rule.

Michigan

In addition to the federal air quality requirements identified above that are administered by MDEQ, there are other state air pollution regulations potentially applicable to the Project. MDEQ air pollution regulations are located in the Michigan Air Pollution Control Rules (i.e., R 336).

State requirements that will apply to the NEXUS/Willow Run M&R Station (MR04) are the VOC standards in Rule 702, the opacity standards in Rule 301, and the open burning standards in Rule 310.

Michigan VOC Emission Standards

Rule 702 states that any new source of VOC emissions must not allow the emission of VOCs from the new source in excess of the lowest maximum allowable emission rate as determined by one of the following:

1. Listed by the MDEQ on its own initiative or based upon the application of Best Available Control Technology;
2. Specified by an NSPS requirement;
3. Specified as a condition of a PTI or a Permit-to-Operate ("PTO"); or
4. Specified in part 6 of the rules for emissions of VOC from existing sources.

Because the NEXUS/Willow Run M&R Station will be exempt from air permitting requirements, emission limitations on the emission units at the M&R station will only be imposed under Rule 702 if MDEQ initiates a specific action to impose such limits.

Michigan Opacity Standards

Rule 301 states that visible emissions into the outer air from a process or process equipment must not exceed the most stringent of the following opacity standards:

1. A 6-minute average of 20 percent opacity, except for one 6-minute average per hour of not more than 27 percent opacity;
2. A limit specified by an applicable federal NSPS requirement; or
3. A limit specified as a condition of a PTI or PTO.

The provisions of Rule 301 do not apply to process equipment for which fugitive visible emissions limitations are specified by another MDEQ rule, or for visible emissions due to uncombined water vapor.

The Project will be subject to the opacity requirements of Rule 301. The emergency generator and fuel gas heater at the NEXUS/Willow Run M&R Station will meet the opacity requirements by burning natural gas exclusively. The Construction activities associated with the NEXUS/Willow Run M&R Station will also be subject to this rule. NEXUS will demonstrate compliance with this opacity restriction using Method 9 in Appendix A to 40 CFR Part 60 if required by MDEQ.

Michigan Open Burning Standards

The open burning standards found in Rule 310 will apply to Project construction, assuming the contractor(s) elect to utilize this means of disposal of land-clearing waste. Land-clearing waste, such as trees, logs, brush, and stumps may be burned in accordance with applicable state and local requirements if the burning is not conducted within a Priority I or Priority II area as identified in Table 33 and Table 34 of Rule 331,

respectively, nor closer than 1,400 feet to an incorporated city or village limit, and if the burning does not violate any other department rules.

Michigan Standards for Fugitive Dust from Construction Activities

If requested by MDEQ, NEXUS will update its Fugitive Dust Plan (Appendix 1B5 of Resource Report 1) pursuant to Rules 336.1371(1) and 336.1372(8) for construction activities associated with the NEXUS/Willow Run M&R Station.

Michigan Standards for Road Construction

NEXUS may not construct any of the roadways at the NEXUS/Willow Run M&R Station using cutback asphalts or emulsified asphalts except as provided in Rule 336.1618.

Michigan Air Toxics Requirements

Rules 336.1224 and 336.1225 require applicants to use best available control technology for toxics (T-BACT) and to demonstrate that emissions of toxic air contaminants will not result in predicted maximum ambient impacts greater than initial threshold screening levels or initial risk screening levels, respectively, for any project that requires a Permit-to-Install and generates emissions of toxic air contaminants. Although certain of the emissions activities at the NEXUS/Willow Run M&R Station will generate emissions of toxic air contaminants, this site will not trigger air permitting requirements as described in Section 9.2.4.1, and NEXUS will not be required to satisfy T-BACT or evaluate ambient impacts for emissions of toxic air contaminants for this site.

Michigan Annual Emissions Reporting

Air Quality Division Policy and Procedure No. AQD-013 outlines the requirements for annual emissions reporting of criteria pollutants from point sources. In accordance with AQD-013, the following sources are required to submit annual emissions reports:

1. Sources with actual emissions that are expected to be greater than 100 TPY of CO, 40 TPY of NO_X, 25 TPY of PM, 15 TPY of PM_{10}, 10 TPY of VOC, or 0.5 TPY of Pb;
2. Sources that are specifically required to report emissions or compliance status in accordance with a Michigan Air Pollution Control Rule or federal CAA requirement;
3. Sources that have an active Opt-out Permit; and
4. Sources that are considered Category I or Category II Fee-subject sources pursuant to PA 451.

Because the M&R station proposed in Michigan (MR04) will not meet any of the above four criteria, the Project will not be subject to annual emissions reporting to MDEQ.

9.2.4.6 Risk Management Program

USEPA has established accidental release prevention and risk management plan requirements as part of 40 CFR Part 68 (Chemical Accident Prevention Provisions). Part 68 lists regulated substances along with thresholds for determining the applicability of the associated requirements. If a regulated substance is handled, stored, or processed in greater than threshold quantities at a stationary source, then a risk management plan must be prepared.

Even if a facility is not required to prepare a risk management plan, requirements of the General Duty Clause found at Section 112(r)(1) of the CAA still apply if the facility produces, processes, handles, or stores regulated substances or other extremely hazardous substances on site. Compliance with the General Duty Clause requires that owners of facilities be continuously vigilant about potential hazards and methods of minimizing the consequences of accidental releases.

Except for constituents of natural gas, such as ethane and methane, the Project is not expected to produce, process, handle, or store any substance regulated under Part 68 in quantities exceeding applicability thresholds. Moreover, natural gas pipelines are not subject to Part 68 if they are subject to U.S. Department of Transportation ("USDOT") requirements or to a state natural gas program certified by USDOT. In addition, the storage of natural gas incidental to transportation (i.e., natural gas taken from a pipeline during non-peak periods, placed in storage fields, and then returned to the pipeline when needed) is not subject to Part 68. Consequently, the Project will not be subject to Part 68 requirements.

9.2.4.7 General Conformity

General conformity regulations in 40 CFR Part 93, Subpart B, are designed to ensure that federal actions that occur in nonattainment and maintenance areas do not interfere with a state's ability to attain or maintain compliance with NAAQS. The Project is considered to be a federal action, since a Federal agency (i.e., FERC) will be licensing, permitting, or otherwise approving portions of the Project. Many of the proposed Project activities will occur in federally designated nonattainment or maintenance areas. Consequently, a general conformity applicability analysis is required to determine if a conformity determination is required. A conformity determination, if required, documents that a Federal action will conform to the applicable implementation plan for the nonattainment or maintenance area and meet other requirements of Subpart B of Part 93.

As part of the general conformity applicability determination process, the sum of non-exempt direct and indirect emissions of nonattainment pollutants or designated precursors associated with a Federal action is compared to annual general conformity applicability emissions thresholds in 40 CFR §93.153. If an applicability threshold is exceeded, then general conformity applies and a conformity determination is required. If emissions are below the applicability thresholds, then the emissions are considered to be *de minimis*, general conformity requirements do not apply, and a conformity determination is not required.

The general conformity regulations were revised on April 5, 2010, and the changes to the regulations became effective on July 6, 2010. Under the revised general conformity regulations, emissions from stationary sources that are covered by any NSR permit (major or minor) are exempt from general conformity. Therefore, emissions covered by a NSR permit do not count towards the general conformity applicability thresholds. The emissions associated with the operation of proposed new emissions units at the affected compressor stations will be permitted and will not count towards the general conformity applicability thresholds. Any new emissions from the new M&R stations that are required to be permitted will similarly not count towards the general conformity applicability thresholds. However, emissions from other Project activities, such as emissions from construction, need to be considered. Under the revised regulations, USEPA clarified that if emissions from a federal action occur in more than one nonattainment or maintenance area, then each area is evaluated separately. Emissions from separate nonattainment or maintenance areas are treated as if they result from separate actions.

A general conformity applicability analysis is provided in Appendix 9B and demonstrates that the non-exempt Project emissions are below the relevant general conformity applicability thresholds (i.e., *de minimis*). Therefore, a general conformity determination is not required.

9.2.5 Anticipated Air Quality Impacts

9.2.5.1 Air Quality Mitigation Measures

Air quality impacts from operation of the Hanoverton, Wadsworth, Clyde, and Waterville Compressor Stations will be minimized by the use of equipment, emissions controls, and operating practices that meet or exceed Best Available Technology. Measures proposed to minimize air quality impacts include the use of clean burning natural gas as the fuel for all combustion devices and the use of low-NO_X combustors. The turbines will also be equipped with oxidation catalysts to reduce CO, VOC, and HAP emissions. Implementation of NEXUS' preventive maintenance program, as discussed further in Resource Report 11,

to identify and prevent leaks, repair quickly any leaks that are found, and reduce the frequency and extent of unscheduled maintenance requiring evacuating the gas from the compressor station and/or a portion of the pipeline ("blowdowns") will minimize fugitive VOC and GHG emissions. As discussed previously, the compressor stations associated with the Project will not be subject to PSD or NNSR permitting requirements, and will be classified as true minor sources with regard to Title V permitting and OEPA requirements. Compliance with federal and state air regulations and state permit requirements will ensure that the compressor stations minimize air quality impacts.

Fugitive dust emissions during construction will be mitigated, as necessary, by spraying water or other commercially-available dust control agents on unpaved areas subject to frequent vehicle traffic in accordance with the NEXUS Project Fugitive Dust Plan provided in Appendix 1B5 of Resource Report 1. In addition, construction equipment will be properly tuned and operated only on an as-needed basis to minimize the combustion emissions from diesel and gasoline engines. Should the contractor(s) use open burning as a means of disposing of land-clearing waste in Ohio, the burning locations will be selected to avoid restricted areas, as defined at OAC 3745-19, nearby residences, and weather conditions that could exacerbate the impact on local residences. A request to conduct open burning of land-clearing waste will be submitted to OEPA at least ten working days prior to the burn. All open burning will be conducted in accordance with the required written approval received from OEPA. Should the contractor(s) use open burning as a means of land-clearing waste in Michigan, the burning locations will be selected to avoid Priority I and II areas, as identified in Tables 33 and 34 of Rule 331, and will be located greater than 1,400 feet from any incorporated city or village.

9.2.5.2 Emissions from Operation of the Affected Compressor Stations

Maximum potential air emissions estimates from operation of the proposed compressor stations are summarized in Tables 9.2-6 through 9.2-9. As shown in the tables, the emissions of criteria air pollutants and HAPs from station operations will be below the applicable major source thresholds.

Ambient Air Quality Analyses

The Project compressor stations will not be major sources with regard to NSR, therefore a PSD ambient air quality analysis is not required. Although not required for permitting, NEXUS has completed screening level ambient air quality analyses to demonstrate compliance with all ambient air quality standards for criteria pollutants for the new air emissions sources proposed as part of the Project. The screening level air quality analyses were completed using AERSCREEN, and are provided in Appendix 9C. Additional details about the screening level air quality analyses, including the selection of representative monitoring sites for use as background and associated modeling inputs, is also provided in Appendix 9C.

9.2.5.3 Emissions from Operation of Project M&R Stations

Sources of air emissions at the new M&R stations will include an emergency generator with a small natural gas-fired fuel gas heater. These fuel gas heaters are expected to have a rated maximum heat input capacity less than 1 MMBtu/hr. Estimated potential emissions from the combustion sources at the Project M&R stations are provided in Table 9.2-10. Actual emissions from these combustion sources will be even lower.

Additional emissions from the operation of all Project M&R stations result from fugitive releases from piping components, such as valves and fittings, as well as gas releases, working, breathing, and flashing losses from storage vessels, and vapor losses from liquid loading operations. Table 9.2-11 provides estimated potential emissions from non-combustion sources at the Project M&R stations. The estimates of potential emissions from combustion and non-combustion sources at the Project M&R stations are based on vendor data, emission calculation techniques provided in AP-42, 40 CFR Part 98, U.S. EPA's Protocol for Equipment Leak Emissions Estimates (EPA 453/R-95-017), and historic sampling data for similar sites.

9.2.5.4 Emissions from Operation of the NEXUS Pipelines

Emissions from the operation of natural gas transmission pipelines result from fugitive releases from piping components. Occasionally, non-routine activities, such as maintenance activities, will require venting/blowdown of a section of pipe between valves located along the pipeline. Table 9.2-12 presents an estimate of the actual emissions from operation of the proposed NEXUS pipeline (approximately 256 miles of pipe), using industry emission factors provided in Table 5-26 and Table 6-6 of the *Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry*, prepared by the American Petroleum Institute in August 2009 ("API *Compendium*") (API, 2009). The emission factors were adjusted based on the expected methane ("CH_4") content of the site-specific gas.

9.2.5.5 Construction Emissions

NEXUS estimated construction-related emissions of criteria pollutants and greenhouse gases for the Project. Tables 9.2-13 through 9.2-18 provide a summary of estimated emissions from construction activities. Detailed construction emissions calculations along with the methodology and emissions factors used are provided in Appendix 9D. Construction of the Project will result in temporary increases in emissions of some pollutants due to the use of equipment powered by diesel fuel or gasoline engines. Construction activities may also result in the temporary generation of fugitive dust due to disturbance of the ground surface and other dust generating actions. There may also be some temporary indirect emissions attributable to construction workers commuting to and from work sites during construction.

Fugitive Dust Emissions

Construction activities along the pipeline right-of-ways and at the compressor station and M&R station sites will result in emissions of fugitive dust from vehicular traffic and soil disturbance, and combustion emissions from diesel and gasoline fired construction equipment. Such air quality effects, however, will generally be temporary and localized, and are not expected to cause or significantly contribute to an exceedance of the NAAQS. Large earth-moving equipment and other mobile sources are sources of combustion-related emissions, including criteria pollutants (i.e., NO_X, CO, VOC, SO_2, and PM_{10}) and small amounts of HAPs. Air pollutants from the construction equipment will be limited to the immediate vicinity of the construction area and will be temporary.

Fugitive dust will result from land clearing, grading, excavation, concrete work, and vehicle traffic on paved and unpaved roads. The amount of dust generated will be a function of construction activity, soil type, soil moisture content, wind speed, precipitation, vehicle traffic, vehicle types, and roadway characteristics. Emissions will be greater during dry periods and in areas of fine-textured soils subject to surface activity. NEXUS will employ proven construction-related practices to control fugitive dust such as application of water or other commercially-available dust control agents on unpaved areas subject to frequent vehicle traffic in accordance with the NEXUS Project Fugitive Dust Plan included in Appendix 1B5 of Resource Report 1. In addition, construction equipment will be operated only on an as-needed basis.

Table 9.2-13 provides estimates of fugitive dust emissions associated with construction activities.

Construction Engine Emissions

Construction-related emissions estimates are based on a typical construction equipment list, hours of operation, and vehicle miles traveled by the construction equipment and supporting vehicles for each pipeline segment of the Project and for work planned at aboveground facilities and ware yards. This is a very conservative estimate based on worst case assumptions and USEPA emission factors. Nevertheless, the estimated air emissions from construction of the NEXUS Project are expected to be transient in nature, with negligible impact on the regional air quality.

There will be some emissions attributable to vehicles delivering materials to the construction site and from on-road support vehicles at the construction site (i.e., mechanic trucks, water trucks, pickup trucks, etc.).

Emission factors in grams per vehicle mile traveled for on-road vehicles were obtained from the USEPA MOVES (Motor Vehicle Emission Simulator) model. Emissions from non-road construction equipment engines used during Project construction were estimated based on the anticipated types of non-road equipment and their associated levels of use. Emission factors in grams per hp-hour were obtained using the most recent version of USEPA's NONROAD model (NONROAD2008a).

Table 9.2-14 summarizes the estimated emissions of criteria pollutants and total HAPs from construction equipment and material deliveries and Table 9.2-15 summarizes the estimated GHG emissions from construction equipment and material deliveries. For the types of sources of GHG emissions associated with Project construction, total carbon dioxide ("CO_2") is essentially the same as CO_2e.

Emissions from Commuting

There also will be some emissions attributable to vehicles driven by construction workers commuting to and from the Project work sites during construction. Emission factors in grams per vehicle mile traveled for on-road vehicles were obtained from the USEPA MOVES model.

Table 9.2-16 provides estimates of tailpipe emissions of criteria pollutants from vehicles used by commuting construction workers and Table 9.2-17 provides estimates of emissions of GHG emissions from vehicles used by commuting construction workers.

Emissions from Open Burning

Any open burning of land clearing debris will be conducted in accordance with applicable state and local regulations and requirements. The forested land to be cleared prior to construction in Columbiana, Stark, and Summit Counties, and a portion of Wayne County, Ohio, will be harvested as merchantable timber or firewood. In these counties, only limbs and slash will likely be burned; therefore, it is assumed that approximately 25 percent of the forested land in these counties will be burned. About 50 percent of the forested land to be cleared in the remaining portions of the Project in Ohio and Michigan are located near residential areas and will be harvested as merchantable timber or firewood. Since these portions of the Project are located near residential areas, the limbs and slash will likely be chipped and/or mulched, rather than burned. Estimates of criteria pollutant and GHG emissions resulting from open burning were calculated based on these assumptions and are provided in Table 9.2-18.

9.2.5.6 Radon

Radon is a naturally occurring radioactive gas that is odorless and tasteless. It is produced by the radioactive decay of radium-226, which is found in uranium ores; phosphate rock; shales; igneous and metamorphic rocks such as granite, gneiss, and schist; and, to a lesser degree, in common rocks such as limestone. Radioactive decay is a natural, spontaneous process in which an atom of one element decays or breaks down to form another element by losing atomic particles (protons, neutrons, or electrons) (USGS, 2015). Radon can be entrained in fossil fuels including natural gas.

Health studies conducted for the U.S. Department of Energy ("USDOE") and the USEPA, Office of Radiation Programs,[9] reports prepared by Dr. Lynn R. Anspaugh[10] and Risk Sciences International

[9] Texas Eastern Transmission, LP, 141 FERC ¶ 61,043 at n. 78 (2012) (Texas Eastern) (Gogolak, C., Review of 222RN in Natural Gas Produced from Unconventional Sources. Prepared for the U.S. Department of Energy, Environmental Measurements Laboratory as DOE/EML-385, New York, New York (1980), and Johnson, R., D. Bernhardt, N. Nelson, and H. Calley, Assessment of Potential Radiological Health Effects from Radon in Natural Gas, Prepared for the U.S. Environmental Protection Agency, Office of Radiation Programs as EPA-520/1-83-004, Washington, D.C. (1973)).

[10] Id. at n. 82 (Lynn R. Anspaugh, Scientific Issues Concerning Radon in Natural Gas (July 5, 2012)).

("RSI"),[11] and most recently a study conducted by the Pennsylvania Department of Environmental Protection ("PA DEP"),[12] have found that radon in natural gas does not pose a health risk to end users of the natural gas. The Gogolak/USDOE study looked at the radon concentration in natural gas from eight wells in West Virginia and Kentucky and found an average radon concentration of 151 picocuries per liter ("pCi/L"). The Johnson/USEPA study found an average concentration of radon in natural gas of 37 pCi/L from over 2,000 wells nationwide. The Anspaugh study focused on gas samples taken at eight locations on the Texas Eastern system in West Virginia, Pennsylvania and New Jersey and found an average radon concentration of 29 pCi/L. In addition to these studies, the U.S. Geological Survey ("USGS") released a report in 2012 regarding radon activities in natural gas from certain wells.[13] The USGS found an average concentration of radon of 37 pCi/L based on gas samples from eleven wells in Pennsylvania.

The PA DEP Study encompassed radiological surveys at well sites, wastewater treatment plants, landfills, gas distribution and end use, and roads treated with brine produced from oil and gas wells. The media sampled included solids, liquids, natural gas, ambient air, and surface radioactivity. The PA DEP Study included the observation that there is little or limited potential for radiation exposure to workers and the public from the development, completion, production, transmission, processing, storage, and end use of natural gas.

The Gogolak/USDOE and Johnson/USEPA studies examined the deterioration/reduction of radon in the gas during transmission, processing, and at combustion. These studies concluded that due to radon's deterioration half-life of less than four days, the amount of radon entrained in natural gas rapidly diminishes as the natural gas is gathered from the wellhead, is processed to remove liquids and other elements, and is stored or delivered into a natural gas transmission pipeline system.

In its consideration of this issue in the New Jersey-New York Expansion Project, Algonquin Incremental Market Project, and the Constitution Pipeline and Wright Interconnect Projects certificate proceedings, the FERC considered many of these same studies and, based on those studies, concluded that the transportation of gas by the Projects did not result in a significant risk of exposure to radon and would not pose a health hazard to end users.[14] Similarly, radon exposure related to the NEXUS Project will not pose a health hazard and no mitigation measures are necessary.

9.3 Noise Quality

This section of Resource Report 9 and associated appendices provide an overview of applicable noise regulations; an assessment of the existing ambient noise levels at nearby noise-sensitive areas ("NSAs") such as a residence, school, hospital, etc.; and a noise impact evaluation of new aboveground permanent facilities (i.e., new compressor stations and new M&R stations), which includes an acoustical analysis at nearby NSAs surrounding each respective facility for the Project. In addition, this section includes a summary of noise mitigation measures to be implemented to ensure compliance with the FERC noise

[11] Id. at n. 82 and 86 (RSI, An Assessment of the Lung Cancer Risk Associated with the Presence of Radon in Natural Gas Used for Cooking in Homes in New York State (July 4, 2012)).

[12] Perma-Fix Environmental Services, Inc, Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM) Study Report. Prepared for the Pennsylvania Department of Environmental Protection (January 2015).

[13] Rowan, E.L. and Kraemer, T.F., Radon-222 Content of Natural Gas Samples from Upper and Middle Devonian Sandstone and Shale Reservoirs in Pennsylvania: Preliminary Data, Prepared for the U.S. Department of the Interior, U.S. Geological Survey, Open-File Report Series 2012–1159, Reston, Virginia (2012).

[14] Texas Eastern Transmission, LP, 141 FERC ¶ 61,043 at P 56; Final Environmental Impact Statement, Constitution Pipeline and Wright Interconnect Projects, FERC Docket Nos. CP13-499-000 and CP13-502-00, Volume I at pages 4-187 to 4-188, published October 2014, by the Federal Energy Regulatory Commission; Final Environmental Impact Statement, Algonquin Incremental Market Project, FERC Docket No. CP14-96-000, Volume I at pages 4-241 to 4-245, published January 2015, by the Federal Energy Regulatory Commission.

standard during operation of the Project compressor stations and M&R stations. Also, a noise assessment of horizontal directional drilling ("HDD") operations at the potential trenchless crossings associated with the installation of the new pipeline is included along with a discussion regarding the noise impact from other construction activities.

On-site ambient sound surveys and/or acoustical analyses for the Project compressor stations, new M&R stations, and HDD crossing were conducted by Hoover & Keith Inc., an acoustical engineering company.

In general, the operation of the Project compressor stations and M&R stations associated with the Project will result in an increase in noise levels in the vicinity of the respective facilities over the life of the facilities. In addition, the installation of the new pipeline segments for the Project and other project-related construction activities will result in short-term increases in noise in the vicinity of those activities.

9.3.1 Aboveground Facilities

9.3.1.1 Compressor Stations

Table 9.3-1 summarizes the four new natural gas compressor stations associated with the Project along with the general location of those facilities and a summary of the anticipated equipment that could result in a noise impact at nearby NSAs during compressor station operation.

Hanoverton Compressor Station - Columbiana County, Ohio

A noise report entitled *Hanoverton Compressor Station - Results of an Ambient Sound Survey and Acoustical Analysis of the Natural Gas Compressor Station Associated with the NEXUS Gas Transmission Project* is provided in Appendix 9E, which includes an area layout of the compressor station showing the NSAs within 1 mile of the compressor station site and sound measurement positions near the identified nearby NSAs around the compressor station.

The Hanoverton Compressor Station is proposed in Hanover Township, Columbiana County, Ohio. The following lists the closest identified NSAs using distance and compass direction from the center of the proposed station site.

- NSA #1: Residences located approximately 1,040 feet south-southeast of the station site center (i.e., anticipated location of the compressor building);
- NSA #2: Residence located approximately 1,680 feet west of the station site center;
- NSA #3: Residence located approximately 1,800 feet northeast of the station site center;
- NSA #4: Residence located approximately 1,740 feet south of the station site center; and
- NSA #5: Residence located approximately 1,900 feet southwest of the station site center.

Currently, the Hanoverton Compressor Station will consist of two (2) Solar Titan 250 natural gas turbine compressor units and gas cooling that will serve all compressor units at the station. The new turbine compressor units will be installed inside an acoustically-insulated building. Primary auxiliary equipment for the new turbine compressor units will include: (1) lube oil cooler; (2) turbine exhaust system with exhaust stack; (3) turbine air intake system; (4) gas piping; and (5) a unit blowdown silencer for each compressor unit.

Wadsworth Compressor Station - Medina County, Ohio

A noise report entitled *Wadsworth Compressor Station - Results of an Ambient Sound Survey and Acoustical Analysis of the Natural Gas Compressor Station Associated with the NEXUS Gas Transmission Project* is provided in Appendix 9E, which includes an area layout of the compressor station showing the NSAs within 1 mile of the compressor station site and sound measurement positions near the identified nearby NSAs around the compressor station.

The Wadsworth Compressor Station is proposed in Guilford Township, Medina County, Ohio approximately six (6) miles west of Wadsworth, Ohio and approximately seven (7) miles south of Medina, Ohio. The following lists the closest identified NSAs using distance and compass direction from the center of the proposed station site.

- NSA #1: Residences located 1,800 feet west of the station site center;
- NSA #2: Residences located 1,840 feet west-northwest of the station site center; and
- NSA #3: Residences located 2,490 feet northeast of the station site center.

Currently, the Wadsworth Compressor Station will consist of one (1) Solar Titan 250 natural gas turbine compressor unit and gas cooling that will serve the compressor station. The new turbine compressor unit will be installed inside an acoustically-insulated building. Primary auxiliary equipment for the new turbine compressor unit will include: (1) lube oil cooler; (2) turbine exhaust system with exhaust stack; (3) turbine air intake system; (4) gas piping; and (5) a unit blowdown silencer for the compressor unit.

Clyde Compressor Station - Sandusky County, Ohio

A noise report entitled *Clyde Compressor Station - Results of an Ambient Sound Survey and Acoustical Analysis of the Natural Gas Compressor Station Associated with the NEXUS Gas Transmission Project* is provided in Appendix 9E, which includes an area layout of the compressor station showing the NSAs within 1 mile of the compressor station site and sound measurement positions near the identified nearby NSAs around the compressor station.

The Clyde Compressor Station is proposed in Townsend Township, Sandusky County, Ohio approximately five (5) miles northeast of the City of Clyde and south of Interstate 80. The following lists the closest identified NSAs using distance and compass direction from the center of the proposed station site.

- NSA #1: Residences located 1,450 feet north-northwest of the station site center;
- NSA #2: Residences located 810 feet southwest of the station site center; and
- NSA #3: Residence located 1,160 feet southeast of the station site center.

Currently, the Clyde Compressor Station will consist of one (1) Solar Titan 250 natural gas turbine compressor unit and gas cooling that will serve the compressor station. The new turbine compressor unit will be installed inside an acoustically-insulated building. Primary auxiliary equipment for the new turbine compressor unit will include: (1) lube oil cooler; (2) turbine exhaust system with exhaust stack; (3) turbine air intake system; (4) gas piping; and (5) a unit blowdown silencer for the compressor unit.

Waterville Compressor Station - Lucas County, Ohio

A noise report entitled *Waterville Compressor Station - Results of an Ambient Sound Survey and Acoustical Analysis of the Natural Gas Compressor Station Associated with the NEXUS Gas Transmission Project* is provided in Appendix 9E, which includes an area layout of the compressor station showing the NSAs within 1 mile of the compressor station site and sound measurement positions near the identified nearby NSAs around the compressor station.

The Waterville Compressor Station is proposed in Waterville Township, Lucas County, Ohio west of the City of Waterville, Ohio and approximately 2.5 miles southeast of Whitehouse, Ohio. The following lists the closest identified NSAs using distance and compass direction from the center of the proposed station site.

- NSA #1: Residence located 1,390 feet east of the station site center;
- NSA #2: Residence located 1,990 feet north of the station site center;

- NSA #3: Residence located 3,790 feet west of the station site center; and
- NSA #4: Residence located 1,660 feet southeast of the station site center.

Currently, the Waterville Compressor Station will consist of one (1) Solar Titan 250 natural gas turbine compressor unit and gas cooling that will serve the compressor station. The turbine compressor unit will be installed inside an acoustically-insulated building. Primary auxiliary equipment for the new turbine compressor unit will include: (1) lube oil cooler; (2) turbine exhaust system with exhaust stack; (3) turbine air intake system; (4) gas piping; and (5) a unit blowdown silencer for the compressor unit.

9.3.1.2 Meter Stations

Table 9.3-2 summarizes the proposed new M&R stations associated with the Project along with the general location of each and the anticipated equipment that could affect the noise generated by the M&R stations.

A noise report entitled *Acoustical Assessment of the Meter/Regulator Stations ("M&R Stations") Associated with the Proposed NEXUS Gas Transmission Project [Columbiana County (OH), Erie County (OH), Washtenaw County (MI)]* is provided in Appendix 9F. A general layout of each respective M&R station showing its location, nearby NSAs, and other areas of interest are included in the subject noise report in Appendix 9F.

Each new M&R station will consist of meter runs with gas flow meters, regulator runs with flow-control valves ("FCVs") employed for gas flow-control and gas pressure regulation, isolation block valve(s), some aboveground piping/components and associated instrumentation/controls. An acoustical analysis was conducted for each M&R station.

9.3.2 Horizontal Directional Drilling

Table 9.3-3 provides a list and description of the planned HDDs for the Project, including the expected drilling duration. Currently, the trenchless method for installing the pipeline (via HDD) will be used to cross 17 areas located along the planned route of the new pipeline installation for the Project. For most of the HDDs, it is expected that the drilling rig will be located at the "HDD entry site" (i.e., drilling rig will not be utilized at the "HDD exit site").

A noise report entitled *Acoustical Assessment of the Planned HDDs (Ohio and Michigan) for the Natural Gas Pipeline System Associated with the NEXUS Project* is provided in Appendix 9G.

9.3.3 Applicable Noise Guidelines and Summary of Acoustical Terminology

The unit of noise measurement is the decibel ("dB"), which measures the energy of noise. Because the human ear is not uniformly sensitive to all noise frequencies, the A-weighted ("A-wt.") frequency scale (denoted as "dBA") was devised to correspond with the ear's sensitivity.

The equivalent sound level ("L_{eq}", an A-wt. sound level or "dBA") is considered an average A-wt. sound level measured during a period of time, including any fluctuating sound levels during that period. The L_{eq} is equal to the level of a steady (in time) A-wt. sound level that would be equivalent to the sampled A-wt. sound level on an energy basis for a specified measurement interval. The concept of measuring L_{eq} has been used broadly to relate individual and community reaction to aircraft and other environmental noises.

The daytime sound level (L_d) is the equivalent A-wt. sound level (dBA) for a 15 hour time period, between 7:00 am and 10:00 pm. The nighttime sound level (L_n) is the equivalent A-wt. sound level (dBA) for a nine hour time period, between 10:00 pm and 7:00 am.

The L_{dn} is a 24-hour average A-wt. equivalent sound level (i.e., L_{eq}) of the measured daytime L_{eq} (i.e., L_d) and measured nighttime L_{eq} (i.e., L_n) with 10 dB added to the sound levels occurring during the nighttime hours between 10:00 pm and 7:00 am to compensate for enhanced receptor sensitivity during the nighttime. Rather than being a true measure of the sound level, the L_{dn} represents a skewed average that correlates

generally with the results of studies relating environmental sound levels to physiological reaction and effects. For a source that operates at a continuous sound level over a 24-hour period, such as a compressor station, the L_{dn} is approximately 6.4 dB above the measured L_{eq}. Consequently, an L_{dn} of 55 dBA corresponds to a L_{eq} of 48.6 dBA. If both the L_d and L_n are measured, then the L_{dn} is calculated using the following formula:

$$L_{dn} = 10 \log_{10}\left(\frac{15}{24}10^{L_d/10} + \frac{9}{24}10^{(L_n+10)/10}\right)$$

9.3.3.1 Federal Energy Regulatory Commission Guidelines

In 1974, the USEPA published a document evaluating the effects of environmental noise with respect to health and safety. Using results presented in this document, the USEPA determined that noise levels should not exceed an L_{dn} of 55 dBA, defined as the level that protects the public from indoor and outdoor activity interference. This noise level has been referenced by state and federal agencies to establish noise limitations for various noise sources, such as natural gas compressor stations. However, this noise level is not a regulatory standard.

Accordingly, the FERC Office of Energy Projects includes in its Certificates conditions requiring that sound attributable to a new compressor station not exceed an L_{dn} of 55 dBA at any nearby NSA, such as a residence, school, or hospital. This also can be utilized for new M&R stations. In addition, FERC guidelines require that the operation of a new compressor station should not result in a perceptible increase in vibration at any nearby NSA. The sound level of 55 dBA (L_{dn}) also can be used as a "benchmark sound criterion/guideline" for assessing the noise impact of temporary or intermittent noise such as site construction noise at a compressor station and a natural gas blowdown event of a compressor unit.

Regarding HDD construction sites, conditions set forth by the FERC typically require that the sound attributable to drilling operations should not exceed 55 dBA (L_{dn}) at any nearby NSA. If it is projected that this sound criterion/guideline could be exceeded at a nearby NSA, it will be necessary to describe noise mitigation measures/options which would be implemented during drilling activity to reduce the noise impact of the drilling operations and achieve the sound criterion/guideline.

9.3.3.2 State and Local Noise Regulations

Ohio

The State of Ohio has not established noise regulations governing the construction and/or the permanent operation of the Project facilities. Any applicable local (e.g., county or township) noise regulations (e.g., quantitative sound level limits) related to the construction and/or the permanent operation of Project facilities are typically found in established ordinances in the specific county in which the facility would be located. The only local noise regulations identified in the counties in which Project compressor stations and/or M&R stations would be located are qualitative, nuisance-related references to noise and vibration requirements in Columbiana County. Local noise regulations related to other Project facilities in Ohio will be addressed through consultations with the local governing authority and will demonstrate compliance with the FERC noise standard of 55 dBA (L_{dn}) at nearby NSAs.

Michigan

The State of Michigan has established noise regulations for oil or gas surface facilities through the Michigan Public Service Commission ("MPSC") in Michigan Oil and Gas Regulations, Rule 324.1015 *Nuisance noise* and Rule 324.1016 *Construction standards for noise abatement at compressors associated with surface facilities*. The noise requirements stipulate that the noise due to compressors associated with surface facilities must not exceed 45 dBA at a distance of 1,320 feet. The FERC noise standard of 55 dBA (L_{dn}) is considered more stringent than the MPSC regulations. Therefore, though the MPSC regulations

may not be applicable to an interstate natural gas pipeline project, NEXUS will comply with these noise standards by meeting the FERC noise standard at nearby NSAs.

The only local noise regulations identified in the counties in which Project compressor stations and/or M&R stations would be located are in Ypsilanti Charter Township. These regulations specify 75 decibels daytime/70 decibels nighttime at the property line of the proposed NEXUS/Willow Run M&R Station. The FERC noise standard of 55 dBA (L_{dn}) is considered more stringent than the local ordinance; therefore NEXUS will comply with the local noise ordinance by meeting the FERC noise standard at nearby NSAs. Local noise regulations related to other Project facilities in Michigan, if any, will be addressed through consultations with the local governing authority and will demonstrate compliance with the FERC noise standard of 55 dBA (L_{dn}) at nearby NSAs.

9.3.4 Noise Quality Analysis and Effects

9.3.4.1 Compressor Stations

An acoustical analysis for each Project compressor station was performed since the noise of each respective Project compressor station could have a noise impact at the nearby NSAs. The existing ambient sound levels at nearby NSAs for each Project compressor station were determined from ambient sound surveys. The complete results of the acoustical analysis for each Project compressor station, including the current ambient noise levels, are provided in the noise reports in Appendix 9E. The acoustical analysis for each compressor station considers the noise that will be produced by all continuous-operating equipment at the compressor station that could impact the sound contribution at the nearby NSAs. For the acoustical analyses, the sound contribution of the Project compressor stations at the nearby NSAs along with the total station noise at the nearby NSAs is estimated (i.e., estimated sound level contribution of the proposed station plus the current ambient noise level). The principal sound sources at each compressor station are:

- Noise generated by the turbine compressor units that penetrates the compressor building(s);
- Turbine exhaust noise (primary noise source that could generate perceptible vibration);
- Noise radiated from aboveground gas piping and related piping components;
- Noise of the outdoor lube oil cooler(s) and outdoor gas cooler(s); and
- Noise generated by the turbine air intake system.

Tables 9.3-4 through 9.3-7 provide a Noise Quality Analysis for the Project compressor stations, assuming operation of the station equipment at full load, noting that the estimated (calculated) A-wt. sound level was used to infer a representative L_{dn}. A description of the acoustical analysis methodology and source of sound data related to this Noise Quality Analysis is provided in the respective noise report in Appendix 9E.

Based on the acoustical analysis, if the anticipated and recommended noise control measures for the Project compressor stations, as discussed further in Section 9.3.5.1, are successfully implemented, the noise attributable to the station will be lower than 55 dBA (L_{dn}). In addition, since noise sources that could cause perceptible vibration (e.g., turbine exhaust noise) will be adequately mitigated, no perceptible increase in vibration at any NSA is anticipated during compressor station operations after installation of the Project modifications, and the noise of gas blowdowns associated with the new turbine compressor units will be lower than 55 dBA (L_{dn}).

9.3.4.2 Meter Stations

All Project M&R stations have NSAs within 0.5 mile of the M&R station site. Consequently, an acoustical analysis was performed for each M&R station. The existing ambient sound levels at nearby NSAs for each Project M&R station were determined from ambient sound surveys. The results of the acoustical analyses for the Project M&R stations, including the measured ambient noise levels and subsequent data

calculations, are provided in the noise report in Appendix 9F. The acoustical analyses for the M&R stations consider the noise that will be produced by all continuous-operating equipment at each facility that could affect the sound levels at the nearby NSAs. For the acoustical analyses, the sound contribution at the nearby NSAs along with the total noise level at the nearby NSAs is estimated (i.e., estimated sound level contribution of the M&R station plus the existing ambient noise level).

The primary noise associated with an M&R station is related to the FCVs (i.e., regulator valve-generated noise) and the FCV noise radiated from aboveground gas piping. The level of piping noise is directly related to the gas pressure drop ("PD") and amount of gas flow across the FCVs. For the acoustical analysis of each facility, the operating condition that could generate the highest amount of the M&R station noise (i.e., so-called "worst case" condition) was evaluated. The analysis assumes that the valve-generated noise will be equal to or less than 90 dBA for the worst case operating condition (i.e., measured A-wt. sound level at 3 feet from the piping, downstream of the regulator valve during operation of the respective regulator run), and if necessary to achieve the noise criteria, additional noise control measures are included (e.g., acoustical building for the regulator skid, which is anticipated, and/or acoustical insulation for regulator skid piping).

Table 9.3-8 summarizes the Noise Quality Analysis for the new Project M&R stations. Based on the acoustical analysis, if the anticipated and/or recommended noise control measures for the Project M&R stations, as discussed further in Section 9.3.5.2, are successfully implemented, the noise attributable to each respective M&R station will be lower than 55 dBA (L_{dn}) at the nearby NSAs.

9.3.4.3 Construction Activities

Aboveground Facilities

Site construction noise associated with the installation of new Project compressor stations and new M&R stations should have a negligible impact on nearby NSAs, noting that the construction will be primarily limited to daytime hours. Construction activities will be performed with standard heavy equipment such as a track-excavator, backhoe, as well as a bulldozer, dump truck(s) and concrete trucks. Many construction machines operate intermittently, and the types of machines in use at a construction site changes with the construction phase.

The acoustical assessments in Appendix 9E indicate that the noise from construction activities at the Project compressor station sites should have a minimal impact on the surrounding environments (i.e., noise of construction activities should be lower than 55 dBA (L_{dn})). If necessary, pro-active measures will be used to further reduce noise levels during construction so that the estimated maximum construction-related sound levels at the closest NSAs will be less than 55 dBA (L_{dn}). For these reasons, it is not anticipated that construction-type noise at the Project compressor stations and at the Project M&R stations will have substantive impacts on the surrounding environment.

Pipeline Construction

Pipeline construction activity and associated noise levels will vary depending on the phase of construction in progress at any one time. These construction phases include site grading, clearing/grubbing, building construction, etc. The highest level of construction noise is assumed to occur during earth work.

Pipeline construction noise-related impacts from the Project are expected to be short in duration at any given location and, therefore, have minimal impact. The equipment likely to be used during pipeline construction and the associated noise levels are presented in Table 9.3-9. Construction equipment noise levels will typically be less than 85 dBA at 50 feet when equipment is operating at full load. People at nearby residences and buildings will hear the construction noise but the overall impact will be short-duration and insignificant. Construction will not result in the generation of, or exposure of persons to, excessive noise or vibration levels for lengthy periods.

Horizontal Directional Drilling

Ambient noise surveys were conducted to quantify the current ambient noise levels and verify the nearby NSAs to each potential HDD site. A noise assessment (i.e., predicted sound contribution of HDD operations at the closest NSA during peak operating conditions) was conducted for all HDD entry and exit sites. Table 9.3-10 provides a Noise Quality Analysis for the NSAs located closest to either an entry or exit site for each HDD, and assumes that a "standard" drilling rig is employed (i.e., no additional noise mitigation measures included). For most of the planned HDD sites, there are NSA(s) that are within 0.5 mile of both an entry and exit site.

In summary, the acoustical assessment indicates that the noise of HDD operations at some of the HDD entry sites and exit sites could exceed the noise criterion/guideline at the closest NSAs if noise mitigation measures are not employed. Additional discussion and summary of noise mitigation measures that could be implemented at the HDD sites is provided in Section 9.3.5.3 and in the noise report provided in Appendix 9G. Table 9.3-11 provides an acoustical assessment of HDD operations at the HDD sites if additional noise mitigation measures are employed. It is anticipated that if adequate noise mitigations are successfully employed, the sound level due to HDD operations at the planned HDD construction sites should not exceed the 55 dBA (L_{dn}) FERC sound criterion/guideline at the nearby NSAs.

9.3.5 Noise Mitigation Measures

9.3.5.1 Compressor Stations

NEXUS continues to evaluate noise control measures to be implemented at each new compressor station for the Project through detailed design of the facilities. The noise reports in Appendix 9E provide detailed recommendations for noise control measures and equipment sound requirements for the significant sound sources associated with each proposed station along with other assumptions that may affect the noise and vibration generated by the compressor station equipment. The following is a summary list of noise mitigation measures that are being evaluated for the equipment at the compressor stations that have proven to be very effective for similar facilities.

- Noise control measures for the compressor building enclosing the new turbine(s) and compressor(s), including the use of appropriate building materials;
- Adequate muffler system for each turbine exhaust system;
- If necessary, acoustical pipe insulation for outdoor aboveground gas piping;
- Adequate silencer for each turbine air intake and exhaust system;
- Low-noise lube oil cooler for each compressor unit;
- Low-noise gas cooler at facilities that require the installation of a new gas cooler; and
- Silencers on all new gas blowdown lines, such as the compressor unit blowdown vent.

Sound Contribution of a Blowdown Event for any New Compressor Unit: The noise of a unit blowdown venting event for each compressor unit will occur via a blowdown silencer that will be specified to meet an A-wt. sound level of 60 dBA at a distance of 300 feet, noting that a unit blowdown event occurs infrequently for a short time frame (e.g., 1 to 5 minute period).

NEXUS will employ these noise mitigation measures (as described above and in the acoustical analysis report for each Project facility) or equal noise mitigation measures, as necessary, to demonstrate compliance with the FERC's 55 dBA (L_{dn}) noise standard.

9.3.5.2 Meter Stations

NEXUS continues to evaluate noise control measures to be implemented at the Project M&R stations throughout the detailed design of the facilities. The noise report in Appendix 9F summarizes proposed noise control recommendations and equipment sound specifications for the Project M&R stations along

with other assumptions that may affect the noise and vibration generated by these facilities. For each respective Project M&R station, FCVs associated with any new regulator runs should be designed to achieve 90 dBA for the full range of operating conditions (i.e., A-wt. sound level at 3 feet from the piping downstream of the FCV). In addition, to reduce pipe/valve–radiated noise associated with the regulator skid, it may be necessary to cover aboveground gas piping with a type of acoustical insulation if the FCVs cannot achieve 90 dBA for the full range of operating conditions. The regulator runs/valves (e.g., regulator skid) and metering skid/piping at each respective M&R station will be located inside an enclosure/building (e.g., acoustical-insulated "off-skid" building that covers the regulator skid, metering skid and associated aboveground gas piping).

NEXUS will employ these noise mitigation measures (as described in the acoustical analysis report) or equal noise mitigation measures, as necessary, to demonstrate compliance with the FERC's 55 dBA (L_{dn}) noise standard.

9.3.5.3 Construction Activities

Because of the temporary nature of construction noise during normal installation of the pipeline and aboveground facilities along the pipeline route, no adverse or long term effects are anticipated. Noise mitigation measures to be employed during construction include ensuring that sound muffling devices that are provided as standard equipment by the construction equipment manufacturer are kept in good working order. If needed, additional noise abatement techniques and other measures can be implemented during the construction phase to mitigate construction-related noise disturbances at nearby NSAs.

Construction noise, while varying according to equipment in use, will be mitigated by the attenuating effect of distance and the intermittent and short-lived character of the noise. Further, the nature of construction of a pipeline dictates that construction activities and associated noise levels will move along the corridor and that no single NSA will be exposed to substantive noise levels for an extended period. Some discrete activities (e.g., hydrostatic testing, tie-ins, purge and packing the pipeline, etc.) may require 24-hour activity for limited periods of time (e.g., from one to three days). These 24-hour activities require only a few overnight construction personnel and do not result in significant noise generation.

There will be locations where pipeline construction will occur within 50 feet of residences. Noise and any vibration generated during construction at this distance will not be unusual in nature and will be similar to that which occurs during public works type projects (e.g., paving, trenching). This work will only occur for a few days or less at any location and impacts will be temporary. This work will only occur during daytime hours in order to minimize impacts.

Horizontal Directional Drilling

NEXUS is evaluating implementation of specific noise mitigation measures for the HDDs proposed as part of the Project. Currently, to achieve the FERC's sound level guideline of 55 dBA (L_{dn}), the following noise mitigation measures at the HDD entry sites are being evaluated:

- A temporary noise barrier constructed of plywood panels or a sound-absorptive/barrier material designed with a septum mass layer with a minimum STC 20–31 rating placed around the workspace;
- A temporary noise reducing tent lined with sound-absorptive/barrier material covering the workspace or equipment;
- A partial noise barrier or enclosure constructed of plywood panels or a sound-absorptive/barrier material placed around the hydraulic power unit and engine-driven pumps;
- "Low noise" generators (i.e., with factory designed enclosures);

- Residential-grade exhaust silencers on any engines associated with the HDD equipment;
- Relocation of the mud mixing/cleaning rig remotely and/or locating equipment, such as the mud rig (if must be outside the workspace tent), such that the tent provides sound shielding; and
- Limiting HDD operations to daytime operation only, if feasible.

NEXUS will employ these noise mitigation measures (as described above and in the respective acoustical analysis report) or equal noise mitigation measures to demonstrate compliance with the FERC's 55 dBA (L_{dn}) noise standard. Once the HDD construction work is awarded to an HDD contractor and the Project HDD crossing sites are finalized, a site-specific noise mitigation plan will be determined for those HDD sites that may require additional noise mitigation measures.

Blasting

As described in Resource Report 1, Section 1.7.1.8, blasting may be required to install the proposed NEXUS pipeline in areas with shallow bedrock. Geological and soils information contained in Resource Reports 6 and 7, respectively, identify the areas where shallow bedrock may be encountered at anticipated trench depths in the Project area. The amount of blasting required to construct the NEXUS Project will be minimized to the extent possible by utilizing mechanical methods for rock excavation. In the event that un-rippable subsurface rock is encountered, blasting for ditch excavation will be necessary.

Should blasting be required, nearby residents or businesses, if any, will hear and may feel the ground vibration resulting from a blast. Section 6.3 of Resource Report 6 describes the types of procedures that will be used to mitigate potential adverse impacts from blasting, which include noise and ground vibration.

Blasting that is required will be conducted during daylight hours. All blasting operations will be performed according to strict guidelines designed to control energy release and protect personnel and property in the vicinity of proposed blasting. The guidelines are consistent with applicable federal and state regulations that apply to controlled-blasting and blast vibration limits in the vicinity of structures and underground utilities. Special care will be taken to monitor and assess blasting within 150 feet of buildings and water supply wells. Additional precautions shall be taken to prevent damage to livestock and other property and inconvenience to the property owner or tenant during blasting operations. This includes conducting preconstruction surveys of such homes, businesses, and wells, as approved by the landowner.

In addition to the measures cited above, the NEXUS Project Blasting Plan in Appendix 1B3 of Resource Report 1 contains mitigation measures to reduce noise and vibration during blasting, including controlling excessive noise and vibration by limiting the size of charges and by using charge delays, which stagger or sequence the detonation times for each charge; and monitoring the ground vibration and air overpressure (i.e., airblast or noise) effects of each blast by seismographs. If a charge greater than eight pounds per delay is used, the distance of the ground vibration and air overpressure monitoring will be in accordance with the U.S. Bureau of Mines Report of Investigation 8507.

9.3.6 Post Construction Sound Survey(s)

Within 60 days of placing the Project compressor stations in-service, a "post-construction" sound survey will be performed to ensure that the sound level attributable to each respective new compressor station, at full load operation does not exceed the FERC sound level requirement and/or any applicable state/local noise regulations. The results of the post-construction sound surveys will be filed with the Secretary.

9.4 References

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TABLES

TABLE 9.2-1

Summary of Proposed NEXUS Project Compression Facilities

Unit ID	Make and Model	Rated Engine Output (hp/ISO)	Rated Engine Output (hp/NEMA)
Hanoverton Compressor Station, Columbiana County, OH			
P001	Solar Titan 250-30002 Turbine Engine	30,000	26,000
P002	Solar Titan 250-30002 Turbine Engine	30,000	26,000
	Station Subtotal:	***60,000***	***52,000***
Wadsworth Compressor Station, Medina County, OH			
P001	Solar Titan 250-30002 Turbine Engine	30,000	26,000
	Station Subtotal:	***30,000***	***26,000***
Clyde Compressor Station, Sandusky County, OH			
P001	Solar Titan 250-30002 Turbine Engine	30,000	26,000
	Station Subtotal:	***30,000***	***26,000***
Waterville Compressor Station, Lucas County, OH			
P001	Solar Titan 250-30002 Turbine Engine	30,000	26,000
	Station Subtotal:	***30,000***	***26,000***
	PROJECT TOTAL:	**150,000**	**130,000**

Notes:
hp = horsepower
ISO = International Standard Operations conditions.
NEMA = National Electrical Manufacturers Association conditions.

TABLE 9.2-2

National Ambient Air Quality Standards

Pollutant	Averaging Period	Standards	
		Primary	**Secondary**
Sulfur dioxide (SO_2)	1-hour [12,13]	75 ppb	
	3-hour [2]	--	0.5 ppm 1300 µg/m^3
	Annual [1,13]	0.03 ppm 80 µg/m^3	--
	24-hour [2,13]	0.14 ppm 365 µg/m^3	--
PM_{10}	24-hour [4]	150 µg/m^3	150 µg/m^3
$PM_{2.5}$ (2012 Standard)	Annual [5,14]	12.0 µg/m^3	15.0 µg/m^3
$PM_{2.5}$ (2006 Standard)	24-hour [6]	35 µg/m^3	35 µg/m^3
$PM_{2.5}$ (1997 Standard)	Annual [5,14]	15.0 µg/m^3	15.0 µg/m^3
	24-hour [6]	65 µg/m^3	65 µg/m^3

TABLE 9.2-2

National Ambient Air Quality Standards

Pollutant	Averaging Period	Standards	
		Primary	**Secondary**
Nitrogen Dioxide (NO_2)	Annual [1]	0.053 ppm (53 ppb) 100 µg/m^3	0.053 ppm (53 ppb) 100 µg/m^3
	1-hour [3]	100 ppb 188 ug/m^3	--
Carbon Monoxide (CO)	8-hour [2]	9 ppm 10,000 µg/m^3	--
	1-hour [2]	35 ppm 40,000 µg/m^3	--
Ozone (2008 Standard)	8-hour [7,8]	0.075 ppm	0.075 ppm
Ozone (2015 Standard)	8-Hour[9]	0.070 ppm	0.070 ppm
Ozone (O_3)	1-hour [10,11]	0.12 ppm	0.12 ppm
Lead (Pb)	Rolling 3-month [1]	0.15 µg/m^3	0.15 µg/m^3

Notes:

[1] Not to be exceeded.

[2] Not to be exceeded more than once per year.

[3] Compliance based on 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area.

[4] Not to be exceeded more than once per year on average over 3 years.

[5] Compliance based on 3-year average of weighted annual mean $PM_{2.5}$ concentrations at community-oriented monitors.

[6] Compliance based on 3-year average of 98th percentile of 24-hour concentrations at each population-oriented monitor within an area.

[7] Compliance based on 3-year average of fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area.

[8] The 2008 8-hour ozone standard will remain in effect until one year after an area is designated for the 2015 8-hour ozone standard. Area designations are not expected to be completed until late 2017.

[9] Permit applications that have not met EPA's grandfathering criteria would have to demonstrate that the proposed project does not cause or contribute to a violation of any revised ozone standards that are in effect when the permit is issued, including the 2015 revised standards.

[10] Maximum 1-hour daily average not to be exceeded more than one day per calendar year on average.

[11] The 1-hour ozone standard has been revoked in all areas in which Project activities will occur.

[12] Compliance based on 3-year average of 99th percentile of the daily maximum 1-hour average at each monitor within an area.

[13] The 24-hour and annual average primary standards for SO_2 remain in effect until one year after an area is designated for the 1-hour standard.

[14] The 1997 annual $PM_{2.5}$ standard and associated implementation rules remain in in effect until one year after an area is designated for the 2013 annual $PM_{2.5}$ standard. Area designations were finalized for the 2013 standard on January 15, 2015.

ppm = parts per million by volume.
ppb = parts per billion by volume.
µg/m^3 = micrograms per cubic meter.

TABLE 9.2-3

Ohio Primary and Secondary Standards

Pollutant	Averaging Period	Standards	
		Primary	Secondary
Sulfur dioxide (SO_2)	Annual [1]	0.03 ppm	--
	24-hour [2]	0.14 ppm	--
	3-hour [2]	--	0.5 ppm
	1-hour [3]	75 ppb	--
PM_{10}	24-hour [4]	150 µg/m^3	150 µg/m^3
$PM_{2.5}$	24-hour [5]	35 µg/m^3	35 µg/m^3
	Annual [6]	12 µg/m^3	15 µg/m^3
Nitrogen Dioxide (NO_2)	Annual [1]	53 ppb	53 ppb
	1-hour [7]	100 ppb	--
Carbon Monoxide (CO)	8-hour [2]	9 ppm	--
	1-hour [2]	35 ppm	--
Ozone	8-hour [8]	0.075 ppm	0.075 ppm

Notes:
[1] Not to be exceeded.
[2] Not to be exceeded more than once per year.
[3] Compliance based on 3-year average of 99th percentile of the daily maximum 1-hour average.
[4] Not to be exceeded more than once per year on average over 3 years.
[5] Compliance based on 3-year average of 98th percentile of 24-hour concentrations.
[6] Compliance based on 3-year average.
[7] Compliance based on 3-year average of the 98th percentile of the daily maximum 1-hour average.
[8] Compliance based on 3-year average of the annual fourth-highest daily maximum 8-hour average.

ppm = parts per million by volume.
ppb = parts per billion by volume.
µg/m^3 = micrograms per cubic meter.

TABLE 9.2-4

Ambient Air Quality Concentrations Representative of NEXUS Project Facilities

Pollutant and Averaging Period	Rank	Project Component	2012	2013	2014	Units	Monitor ID
1-Hour CO	2nd	Hanoverton Compressor Station; NEXUS/Kensington M&R Station; NEXUS/Texas Eastern M&R Station; NEXUS/TGP M&R Station; and TGP Interconnecting Pipeline	1.8	1.3	1.5	ppm	S
		Mainline Route (Eastern Ohio Portion)	1.8	1.3	1.5	ppm	S
		Wadsworth Compressor Station	1.5	1.1	1.2	ppm	U
		Clyde Compressor Station, NEXUS/Dominion East Ohio M&R Station	2.1	2.0	1.5	ppm	F
		Mainline Route (Central Ohio Portion)	7.5	7.8	7.1	ppm	K
		Mainline Route (Western Ohio Portion)	2.1	2.0	1.5	ppm	F
		Waterville Compressor Station	2.1	2.0	1.5	ppm	F
		NEXUS/Willow Run M&R Station	2.6	2.0	1.9	ppm	R
		Mainline Route (Michigan Portion)	2.1	2.0	1.5	ppm	F
8-Hour CO	2nd	Hanoverton Compressor Station; NEXUS/Kensington M&R Station; NEXUS/Texas Eastern M&R Station; NEXUS/TGP M&R Station; and TGP Interconnecting Pipeline	1.6	1.0	1.1	ppm	S
		Mainline Route (Eastern Ohio Portion)	1.6	1.0	1.1	ppm	S
		Wadsworth Compressor Station	1.2	1.0	0.7	ppm	U
		Clyde Compressor Station, NEXUS/Dominion East Ohio M&R Station	1.3	1.3	1.1	ppm	F
		Mainline Route (Central Ohio Portion)	4.6	4.6	3.7	ppm	K
		Mainline Route (Western Ohio Portion)	1.3	1.3	1.1	ppm	F
		Waterville Compressor Station	1.3	1.3	1.1	ppm	F
		NEXUS/Willow Run M&R Station	2.5	1.7	1.4	ppm	R
		Mainline Route (Michigan Portion)	1.3	1.3	1.1	ppm	F
1-Hour NO_2	98%	Hanoverton Compressor Station; NEXUS/Kensington M&R Station; NEXUS/Texas Eastern M&R Station; NEXUS/TGP M&R Station; and TGP Interconnecting Pipeline	40.0	38.0	44.0	ppb	C
		Mainline Route (Eastern Ohio Portion)	48.0	53.0	48.0	ppb	L
		Wadsworth Compressor Station	48.0	53.0	48.0	ppb	L
		Clyde Compressor Station, NEXUS/Dominion East Ohio M&R Station	48.0	53.0	48.0	ppb	L
		Mainline Route (Central Ohio Portion)	48.0	53.0	48.0	ppb	L

TABLE 9.2-4

Ambient Air Quality Concentrations Representative of NEXUS Project Facilities

Pollutant and Averaging Period	Rank	Project Component	2012	2013	2014	Units	Monitor ID
		Mainline Route (Western Ohio Portion)	43.0	43.0	51.0	ppb	R
		Waterville Compressor Station	43.0	43.0	51.0	ppb	R
		NEXUS/Willow Run M&R Station	43.0	43.0	51.0	ppb	R
		Mainline Route (Michigan Portion)	43.0	43.0	51.0	ppb	R
Annual NO_2	Maximum	Hanoverton Compressor Station; NEXUS/Kensington M&R Station; NEXUS/Texas Eastern M&R Station; NEXUS/TGP M&R Station; and TGP Interconnecting Pipeline	10.1	10.1	10.7	ppb	C
		Mainline Route (Eastern Ohio Portion)	13.8	12.9	12.5	ppb	L
		Wadsworth Compressor Station	13.8	12.9	12.5	ppb	L
		Clyde Compressor Station, NEXUS/Dominion East Ohio M&R Station	13.8	12.9	12.5	ppb	L
		Mainline Route (Central Ohio Portion)	13.8	12.9	12.5	ppb	L
		Mainline Route (Western Ohio Portion)	12.9	12.1	12.2	ppb	R
		Waterville Compressor Station	12.9	12.1	12.2	ppb	R
		NEXUS/Willow Run M&R Station	12.9	12.1	12.2	ppb	R
		Mainline Route (Michigan Portion)	12.9	12.1	12.2	ppb	R
8-Hour Ozone	4th	Hanoverton Compressor Station; NEXUS/Kensington M&R Station; NEXUS/Texas Eastern M&R Station; NEXUS/TGP M&R Station; and TGP Interconnecting Pipeline	0.07	0.07	0.06	ppm	X
		Mainline Route (Eastern Ohio Portion)	0.07	0.07	0.06	ppm	X
		Wadsworth Compressor Station	0.07	0.07	0.06	ppm	G
		Clyde Compressor Station, NEXUS/Dominion East Ohio M&R Station	0.08	0.07	0.07	ppm	Q
		Mainline Route (Central Ohio Portion)	0.08	0.06	0.07	ppm	M
		Mainline Route (Western Ohio Portion)	0.08	0.07	0.07	ppm	Q
		Waterville Compressor Station	0.07	0.07	0.06	ppm	O
		NEXUS/Willow Run M&R Station	0.09	0.07	0.07	ppm	E
		Mainline Route (Michigan Portion)	0.09	0.06	0.07	ppm	B
24-Hour PM_{10}	2nd	Hanoverton Compressor Station; NEXUS/Kensington M&R Station; NEXUS/Texas Eastern M&R Station; NEXUS/TGP M&R Station; and TGP Interconnecting Pipeline	32.0	31.0	28.0	ug/m^3	I
		Mainline Route (Eastern Ohio Portion)	29.0	25.0	24.0	ug/m^3	H

TABLE 9.2-4

Ambient Air Quality Concentrations Representative of NEXUS Project Facilities

Pollutant and Averaging Period	Rank	Project Component	2012	2013	2014	Units	Monitor ID
		Wadsworth Compressor Station	31.0	27.0	29.0	ug/m^3	V
		Clyde Compressor Station, NEXUS/Dominion East Ohio M&R Station	21.0	21.0	19.0	ug/m^3	W
		Mainline Route (Central Ohio Portion)	21.0	21.0	19.0	ug/m^3	W
		Mainline Route (Western Ohio Portion)	31.0	27.0	33.0	ug/m^3	F
		Waterville Compressor Station	31.0	27.0	33.0	ug/m^3	F
		NEXUS/Willow Run M&R Station	31.0	27.0	33.0	ug/m^3	F
		Mainline Route (Michigan Portion)	31.0	27.0	33.0	ug/m^3	F
24-Hour $PM_{2.5}$	98%	Hanoverton Compressor Station; NEXUS/Kensington M&R Station; NEXUS/Texas Eastern M&R Station; NEXUS/TGP M&R Station; and TGP Interconnecting Pipeline	22.7	24.3	23.5	ug/m^3	S
		Mainline Route (Eastern Ohio Portion)	22.7	24.3	23.5	ug/m^3	S
		Wadsworth Compressor Station	19.1	22.5	20.3	ug/m^3	G
		Clyde Compressor Station, NEXUS/Dominion East Ohio M&R Station	24.7	20.1	24.4	ug/m^3	P
		Mainline Route (Central Ohio Portion)	22.0	20.9	23.2	ug/m^3	W
		Mainline Route (Western Ohio Portion)	24.7	20.1	24.4	ug/m^3	P
		Waterville Compressor Station	21.5	21.6	28.6	ug/m^3	N
		NEXUS/Willow Run M&R Station	22.6	18.5	24.5	ug/m^3	E
		Mainline Route (Michigan Portion)	26.6	16.8	23.0	ug/m^3	B
Annual $PM_{2.5}$	Maximum	Hanoverton Compressor Station; NEXUS/Kensington M&R Station; NEXUS/Texas Eastern M&R Station; NEXUS/TGP M&R Station; and TGP Interconnecting Pipeline	10.5	10.7	10.6	ug/m^3	S
		Mainline Route (Eastern Ohio Portion)	10.5	10.7	10.6	ug/m^3	S
		Wadsworth Compressor Station	9.3	9.2	8.6	ug/m^3	G
		Clyde Compressor Station, NEXUS/Dominion East Ohio M&R Station	10.1	9.5	10.6	ug/m^3	P
		Mainline Route (Central Ohio Portion)	9.5	8.8	9.1	ug/m^3	W
		Mainline Route (Western Ohio Portion)	10.1	9.5	10.6	ug/m^3	P
		Waterville Compressor Station	10.0	9.6	10.3	ug/m^3	N
		NEXUS/Willow Run M&R Station	9.2	8.7	9.8	ug/m^3	E
		Mainline Route (Michigan Portion)	9.0	7.9	8.8	ug/m^3	B
1-Hour SO_2	99%	Hanoverton Compressor Station; NEXUS/Kensington M&R Station;	32.0	23.0	23.0	ppb	D

TABLE 9.2-4

Ambient Air Quality Concentrations Representative of NEXUS Project Facilities

Pollutant and Averaging Period	Rank	Project Component	2012	2013	2014	Units	Monitor ID
		NEXUS/Texas Eastern M&R Station; NEXUS/TGP M&R Station; and TGP Interconnecting Pipeline					
		Mainline Route (Eastern Ohio Portion)	22.0	23.0	21.0	ppb	T
		Wadsworth Compressor Station	47.0	59.0	43.0	ppb	U
		Clyde Compressor Station, NEXUS/Dominion East Ohio M&R Station	48.9	43.1	56.0	ppb	F
		Mainline Route (Central Ohio Portion)	83.0	63.0	65.0	ppb	J
		Mainline Route (Western Ohio Portion)	48.9	43.1	56.0	ppb	F
		Waterville Compressor Station	12.0	7.0	13.0	ppb	A
		NEXUS/Willow Run M&R Station	48.9	43.1	56.0	ppb	F
		Mainline Route (Michigan Portion)	48.9	43.1	56.0	ppb	F
24-Hour SO_2	2nd	Hanoverton Compressor Station; NEXUS/Kensington M&R Station; NEXUS/Texas Eastern M&R Station; NEXUS/TGP M&R Station; and TGP Interconnecting Pipeline	8.5	8.5	7.0	ppb	D
		Mainline Route (Eastern Ohio Portion)	8.4	8.0	6.7	ppb	T
		Wadsworth Compressor Station	15.8	19.3	19.1	ppb	U
		Clyde Compressor Station, NEXUS/Dominion East Ohio M&R Station	12.5	8.9	11.9	ppb	F
		Mainline Route (Central Ohio Portion)	23.4	25.1	21.6	ppb	J
		Mainline Route (Western Ohio Portion)	12.5	8.9	11.9	ppb	F
		Waterville Compressor Station	4.1	3.8	5.4	ppb	A
		NEXUS/Willow Run M&R Station	12.5	8.9	11.9	ppb	F
		Mainline Route (Michigan Portion)	12.5	8.9	11.9	ppb	F

Monitor Key

A: Lima Bath, 2850 Bible Road, Lima, Allen, Ohio
B: 6792 Raisen Center Highway, Tecumseh, Lenawee, Michigan
C: Eight Street And River Alley, Beaver Falls, Beaver, Pennsylvania
D: Chester - Allison Elementary School, 647 Railroad Street, Chester, Hancock, West Virginia
E: Towner St, South, Hospital, 555 Towner St, Ypsilanti, Washtenaw, Michigan
F: Allen Park, 14700 Goddard, Allen Park, Wayne, Michigan
G: Chippewa, Ballash Road, Medina, Ohio
H: Warren Wtp, 2323 Main Ave., Warren, Trumbull, Ohio
I: School, 500 Maryland, East Liverpool, Columbiana, Ohio
J: St. Theodosius, 2547 St Tikhon, Cleveland, Cuyahoga, Ohio
K: Galleria, 1301 E. 9th St., Cleveland, Cuyahoga, Ohio
L: Gt Craig, E. 14th & Orange, Cleveland, Cuyahoga, Ohio
M: Sheffield, 4706 Detroit Rd., Sheffield, Lorain, Ohio
N: Raps, 4208 Airport Highway, Toledo, Lucas, Ohio
O: Waterville, 200 South River Rd., Waterville, Lucas, Ohio

TABLE 9.2-4

Ambient Air Quality Concentrations Representative of NEXUS Project Facilities

Pollutant and Averaging Period	Rank	Project Component	2012	2013	2014	Units	Monitor ID
P: Toledo Water Filtration, 3040 York St., Toledo, Lucas, Ohio Q: 306 N. Yondota, Lucas, Ohio R: 23751 Fenkell St, Detroit, Wayne, Michigan S: Sears Bldg., 420 Market, Canton, Stark, Ohio T: East High School, 80 Brittain, Akron, Summit, Ohio U: Morley Health Bldg., 177 S. Broadway, Akron, Summit, Ohio V: Brookpark, 16900 Holland Rd., Brook Park, Cuyahoga, Ohio W: Barr School, 2180 Lake Breeze, Sheffield, Lorain, Ohio X: Alliance, 1175 West Vine, Alliance, Stark, Ohio							

TABLE 9.2-5

Attainment Status of NEXUS Project Facilities

Control Region	Facility	County, State	Attainment/ Unclassifiable	Nonattainment	Maintenance
Youngstown-Warren-Sharon, OH-PA	Mainline Route TGP Interconnecting Pipeline Hanoverton Compressor Station NEXUS/Kensington M&R Station NEXUS/Texas Eastern M&R Station NEXUS/TGP M&R Station	Columbiana, OH	SO_2, PM_{10}, $PM_{2.5}$, NO_2, CO, Pb, 2008 O_3		1997 O_3 a/
Canton – Massillon, OH	Mainline Route	Stark, OH	SO_2, PM_{10}, NO_2, CO, Pb, 2008 O_3		1997 O_3 a/, $PM_{2.5}$
Cleveland – Akron – Lorain, OH	Mainline Route	Summit, OH	SO_2, PM_{10}, NO_2, CO, Pb	2008 O_3	$PM_{2.5}$
	Mainline Route Wadsworth Compressor Station	Medina, OH			
	Mainline Route	Lorain, OH	SO_2, PM_{10}, NO_2, CO, Pb	2012 $PM_{2.5}$, 2008 O_3	
	Mainline Route	Wayne, OH	SO_2, PM_{10}, $PM_{2.5}$, NO_2, CO, Pb, O_3		
	Mainline Route	Huron, OH			
	Mainline Route NEXUS/Dominion East Ohio M&R Station	Erie, OH			
	Mainline Route Clyde Compressor Station	Sandusky, OH			
Toledo, OH	Mainline Route	Wood, OH	SO_2, PM_{10}, $PM_{2.5}$, NO_2, CO, Pb, 2008 O_3		1997 O_3 a/
	Mainline Route Waterville Compressor Station	Lucas, OH			
	Mainline Route	Henry, OH Fulton, OH	SO_2, PM_{10}, $PM_{2.5}$, NO_2, CO, Pb, O_3		
Detroit – Ann Arbor, MI	Mainline Route	Lenawee, MI	SO_2, PM_{10}, $PM_{2.5}$, NO_2, CO, Pb, 2008 O_3		1997 O_3 a/
	Mainline Route	Monroe, MI	SO_2, PM_{10}, NO_2, CO, Pb, 2008 O_3		1997 O_3 a/, $PM_{2.5}$
	Mainline Route NEXUS/Willow Run M&R Station	Washtenaw, MI			
	Mainline Route	Wayne, MI	PM_{10}, NO_2, Pb, 2008 O_3	2010 SO_2 b/	1997 O_3 a/, $PM_{2.5}$, CO c/

Notes:

a/ The 1997 O_3 standard was revoked on March 6, 2015 per 80 FR 12263. Note that with respect to general conformity applicability, areas that were designated as nonattainment or maintenance for the revoked 1997 8-hour ozone NAAQS, are no longer nonattainment or maintenance for the purposes of general conformity with respect to this pollutant. The EPA notice at 80 FR 12263 specifically indicates that when a specific NAAQS is revoked, general conformity requirements end with respect to that standard.

b/ Wayne County, MI is in partial nonattainment with the 2010 SO_2 standard limited to the area bounded on the east by the Michigan-Ontario border, on the south by the Wayne County-Monroe County border, on the west by Interstate 75 north to Southfield Road, Southfield Road to Interstate 94, and Interstate 94 north to Michigan Avenue, and on the north by Michigan Avenue to Woodward Avenue and a line on Woodward Avenue extended to the Michigan-Ontario border. No portion of the mainline goes through any of the designated SO_2 nonattainment area.

c/ Wayne County, MI is in partial maintenance with the CO standard limited to the area defined as follows: Lake St. Clair to 14 Mile Road to Kelly Road, N. to 15 Mile Road to Hayes Road, S. to 14 Mile Road to Clawson City boundary following N. Clawson City boundary to N. Royal Oak City boundary to 13 Mile Road to Evergreen Road to southern Beverly Hills City boundary to southern Bingham Farms City boundary to southern Franklin City boundary to Inkster Road, south to Pennsylvania Road, extending east to the Detroit River. No portion of the mainline goes through any of the designated CO maintenance area.

TABLE 9.2-6

Proposed Hanoverton Compressor Station Emissions Summary (TPY)

Maximum Potential Emissions

ID	Description	NO_X	CO	VOC	SO_2	PM / PM_{10} / $PM_{2.5}$	CO_2e	Hexane[1]	Total HAP
P001	Combustion Turbine #1	31.1	7.8	3.3	3.2	6.3	112,281	-	0.6
P002	Combustion Turbine #2	31.1	7.8	3.3	3.2	6.3	112,281	-	0.6
P003	Emergency Generator	1.3	2.6	1.2	0.0	0.0	576	0.0	0.7
P004	Gas Releases	-	-	24.6	-	-	19,114	0.7	2.0
P801	Equipment Leaks	-	-	10.1	-	-	1,419	0.2	1.2
P005	Separator Vessel #1	-	-	0.1	-	-	7	0.0	0.0
P006	Separator Vessel #2	-	-	0.1	-	-	7	0.0	0.0
P007	Separator Vessel #3	-	-	0.1	-	-	6	0.0	0.0
P008	Separator Vessel #4	-	-	0.6	-	-	18	0.0	0.0
P009	Separator Vessel #5	-	-	0.0	-	-	1	0.0	0.0
T001	Storage Tank #1	-	-	0.3	-	-	14	0.0	0.0
T002	Storage Tank #2	-	-	0.0	-	-	-	-	-
T003	Storage Tank #3	-	-	0.0	-	-	-	-	-
T004	Storage Tank #4	-	-	0.0	-	-	-	-	-
B001	Process Heater #1	0.7	0.4	0.2	0.0	0.0	554	0.0	0.0
B002	Process Heater #2	0.7	0.4	0.2	0.0	0.0	554	0.0	0.0
L001	Parts Washer	-	-	0.4	-	-	-	-	-
J001	Loading Operation	-	-	0.0	-	-	-	0.0	0.0
	Total	***65.0***	***19.1***	***44.5***	***6.4***	***12.6***	***246,832***	***1.0***	***5.3***

[1] Hexane(n-) emissions are presented for worst-case Individual HAP.

TABLE 9.2-7

Proposed Wadsworth Compressor Station Emissions Summary (TPY)

Maximum Potential Emissions

ID	Description	NO_X	CO	VOC	SO_2	PM / PM_{10} / $PM_{2.5}$	CO_2e	Hexane[1]	Total HAP
P001	Combustion Turbine	31.0	7.8	3.3	3.2	6.2	112,925	-	0.6
P002	Emergency Generator	1.0	1.9	0.9	0.0	0.0	432	0.0	0.5
P003	Gas Releases	-	-	19.8	-	-	15,401	0.6	1.6
P801	Equipment Leaks	-	-	6.3	-	-	997	0.1	0.8
P004	Separator Vessel #1	-	-	0.1	-	-	8	0.0	0.0
P005	Separator Vessel #2	-	-	0.1	-	-	8	0.0	0.0
P006	Separator Vessel #3	-	-	0.1	-	-	6	0.0	0.0
P007	Separator Vessel #4	-	-	0.6	-	-	18	0.0	0.0
P008	Separator Vessel #5	-	-	0.0	-	-	1	0.0	0.0
T001	Storage Tank #1	-	-	0.3	-	-	15	0.0	0.0
T002	Storage Tank #2	-	-	0.0	-	-	-	-	-
T003	Storage Tank #3	-	-	0.0	-	-	-	-	-
B001	Process Heater	0.7	0.4	0.2	0.0	0.0	554	0.0	0.0
L001	Parts Washer	-	-	0.4	-	-	-	-	-
J001	Loading Operation	-	-	0.0	-	-	1	0.0	0.0
	Total	***32.7***	***10.2***	***32.2***	***3.2***	***6.3***	***129,365***	***0.8***	***3.6***

[1] Hexane(n-) emissions are presented for worst-case Individual HAP.

TABLE 9.2-8

Proposed Clyde Compressor Station Emissions Summary (TPY)

Maximum Potential Emissions

ID	Description	NO_X	CO	VOC	SO_2	PM / PM_{10} / $PM_{2.5}$	CO_2e	Hexane[1]	Total HAP
P001	Combustion Turbine	31.1	7.8	3.3	3.2	6.3	112,238	-	0.6
P002	Emergency Generator	1.0	1.9	0.9	0.0	0.0	432	0.0	0.5
P003	Gas Releases	-	-	19.8	-	-	15,401	0.6	1.6
P801	Equipment Leaks	-	-	6.3	-	-	997	0.1	0.8
P004	Separator Vessel #1	-	-	0.1	-	-	8	0.0	0.0
P005	Separator Vessel #2	-	-	0.1	-	-	8	0.0	0.0
P006	Separator Vessel #3	-	-	0.1	-	-	6	0.0	0.0
P007	Separator Vessel #4	-	-	0.6	-	-	18	0.0	0.0
P008	Separator Vessel #5	-	-	0.0	-	-	1	0.0	0.0
T001	Storage Tank #1	-	-	0.3	-	-	15	0.0	0.0
T002	Storage Tank #2	-	-	0.0	-	-	-	-	-
T003	Storage Tank #3	-	-	0.0	-	-	-	-	-
B001	Process Heater	0.7	0.4	0.2	0.0	0.0	554	0.0	0.0
L001	Parts Washer	-	-	0.4	-	-	-	-	-
J001	Loading Operation	-	-	0.0	-	-	1	0.0	0.0
	Total	***32.8***	***10.2***	***32.2***	***3.2***	***6.3***	***129,678***	***0.8***	***3.6***

[1] Hexane(n-) emissions are presented for worst-case Individual HAP.

TABLE 9.2-9

Proposed Waterville Compressor Station Emissions Summary (TPY)

Maximum Potential Emissions

ID	Description	NO_X	CO	VOC	SO_2	PM / PM_{10} / $PM_{2.5}$	CO_2e	Hexane[1]	Total HAP
P001	Combustion Turbine	31.1	7.8	3.3	3.2	6.3	112,240	-	0.6
P002	Emergency Generator	1.0	1.9	0.9	0.0	0.0	432	0.0	0.5
P003	Gas Releases	-	-	19.8	-	-	15,401	0.6	1.6
P801	Equipment Leaks	-	-	6.3	-	-	997	0.1	0.8
P004	Separator Vessel #1	-	-	0.1	-	-	8	0.0	0.0
P005	Separator Vessel #2	-	-	0.1	-	-	8	0.0	0.0
P006	Separator Vessel #3	-	-	0.1	-	-	6	0.0	0.0
P007	Separator Vessel #4	-	-	0.6	-	-	18	0.0	0.0
P008	Separator Vessel #5	-	-	0.0	-	-	1	0.0	0.0
T001	Storage Tank #1	-	-	0.3	-	-	15	0.0	0.0
T002	Storage Tank #2	-	-	0.0	-	-	-	-	-
T003	Storage Tank #3	-	-	0.0	-	-	-	-	-
B001	Process Heater	0.7	0.4	0.2	0.0	0.0	554	0.0	0.0
L001	Parts Washer	-	-	0.4	-	-	-	-	-
J001	Loading Operation	-	-	0.0	-	-	1	0.0	0.0
	Total	***32.8***	***10.2***	***32.2***	***3.2***	***6.3***	***129,680***	***0.8***	***3.6***

[1] Hexane(n-) emissions are presented for worst-case Individual HAP.

TABLE 9.2-10

Estimated Potential Emissions from Combustion Sources at Project M&R Stations (TPY)

NO_X	CO	VOC	SO_2	$PM_{10}/PM_{2.5}$
15.0	1.9	0.1	0.0	0.2

TABLE 9.2-11

Estimated Potential Emissions from Non-Combustion Sources at Project M&R Stations (TPY)

	VOC	CO_2e
Gas Releases	1.3	1,783
Equipment Leaks	10.5	1,475
Storage Tanks	3.0	90
Liquid Loading	0.0	3
Total	14.8	3,351

TABLE 9.2-12

Estimated Actual Emissions from Proposed NEXUS Pipelines (TPY)

	VOC	CO_2e
Fugitives	0.1	76.0
Non-Routine	7.3	5,663
Total	7.4	5,739

TABLE 9.2-13

Fugitive Dust Emissions from Construction Activities (TPY)

Year	PM_{10}	$PM_{2.5}$
2017	1,443.1	151.8

Notes:
TPY = tons per year
PM_{10} = particulate matter with a diameter ≤ 10 microns
$PM_{2.5}$ = particulate matter with a diameter ≤ 2.5 microns

TABLE 9.2-14

Non-Road and On-Road Construction Vehicle Emissions of Criteria Pollutants and HAPs (TPY)

Year	NO_X	VOC	CO	SO_2	$PM_{10}/PM_{2.5}$	Total HAPs
2017	134.8	18.4	330.0	0.3	7.9	1.8

Notes:

TPY = tons per year
NO_X = nitrogen oxides
VOC = volatile organic compounds
CO = carbon monoxide
SO_2 = sulfur dioxide
PM_{10} = particulate matter with a diameter ≤ 10 microns
$PM_{2.5}$ = particulate matter with a diameter ≤ 2.5 microns
HAP = hazardous air pollutants

TABLE 9.2-15

Non-Road and On-Road Construction Vehicle Emissions of Greenhouse Gases (TPY)

Year	CO_2
2017	37,445

Notes:
TPY = tons per year
CO_2 = carbon dioxide

TABLE 9.2-16

Commuting Vehicles Emissions of Criteria Pollutants and HAPs (TPY)

Year	NO_X	VOC	CO	SO_2	$PM_{10}/PM_{2.5}$	Total HAPs
2017	4.7	1.5	48.2	0.03	0.1	0.8

Notes:
TPY = tons per year
NO_X = nitrogen oxides
VOC = volatile organic compounds
CO = carbon monoxide
SO_2 = sulfur dioxide
PM_{10} = particulate matter with a diameter ≤ 10 microns
$PM_{2.5}$ = particulate matter with a diameter ≤ 2.5 microns
HAP = hazardous air pollutants

TABLE 9.2-17

Commuting Vehicles Emissions of Greenhouse Gases (TPY)

Year	CO_2
2017	4,406

Notes:
TPY = tons per year
CO_2 = carbon dioxide

TABLE 9.2-18

Open Burning Emissions of Criteria Pollutants (TPY)

Year	NO_X	VOC	CO	SO_2	$PM_{10}/PM_{2.5}$
2017	8.9	7.8	319.9	Neg.	31.2

Notes:
TPY = tons per year
NO_X = nitrogen oxides
VOC = volatile organic compounds
CO = carbon monoxide
SO_2 = sulfur dioxide
PM_{10} = particulate matter with a diameter ≤ 10 microns
$PM_{2.5}$ = particulate matter with a diameter ≤ 2.5 microns
Neg. = negligible

TABLE 9.3-1

Summary of the Compressor Stations for the Proposed NEXUS Project

Facility Name	MP a/	Location (County, State, Etc.)	Summary of Compressor Station Equipment with Potential Noise Impact b/
Hanoverton Compressor Station	1.4	Columbiana County, OH Hanover Township, OH	New compressor station designed with two (2) Solar Model Titan 250 turbine-driven compressor units, each unit rated at 30,000 hp (ISO) and gas cooling.
Wadsworth Compressor Station	63.5	Medina County, OH Guilford Township, OH	New compressor station designed with one (1) Solar Model Titan 250 turbine-driven compressor unit rated at 30,000 hp (ISO) and gas cooling.
Clyde Compressor Station	134.0	Sandusky County, OH Townsend Township, OH	New compressor station designed with one (1) Solar Model Titan 250 turbine-driven compressor unit rated at 30,000 hp (ISO) and gas cooling.
Waterville Compressor Station	183.5	Lucas County, OH Waterville Township, OH	New compressor station designed with one (1) Solar Model Titan 250 turbine-driven compressor unit rated at 30,000 hp (ISO) and gas cooling.

a/ NEXUS mainline pipeline milepost rounded to the nearest tenth. b/ Each new compressor station will include: lube oil cooler(s), turbine exhaust system with exhaust stack for each compressor unit, turbine air intake system for each compressor unit, gas cooling, aboveground gas piping and a unit blowdown silencer for each compressor unit.

TABLE 9.3-2

Summary of the Planned M&R Stations for the Proposed NEXUS Project

Facility Name	MP	Location (County, State, Etc.)	Summary of M&R Station Equipment with Potential Noise Impact a/
NEXUS/TGP M&R Station	0.0 b/	Columbiana County, OH Franklin Township, OH	Three 16" ultrasonic metering runs and two 16" regulating runs. Regulator skid/piping and metering skid will be covered with an enclosure.
NEXUS/Kensington M&R Station and NEXUS/Texas Eastern M&R Station	0.0 c/ and 0.9 b/	Columbiana County, OH Hanover Township, OH	Both M&Rs located within the same property; Each M&R has three 16" ultrasonic metering runs, and two 16" regulating runs. Regulator skid/piping and metering skid will be covered with an enclosure.
NEXUS/Dominion East Ohio M&R Station	128.8	Erie County, OH Groton Township, OH	Two 10" ultrasonic metering runs and two 8" regulating runs. Regulator skid/piping and metering skid will be covered with an enclosure.
NEXUS/Willow Run M&R Station	255.2 c/	Washtenaw County, MI Ypsilanti Township, MI	Four 16" ultrasonic metering runs, three 16" monitor regulating runs. Regulator skid/piping and metering skid will be covered with an enclosure.

a/ Design/equipment anticipated at each M&R station for the Project.
b/ TGP Interconnecting Pipeline milepost rounded to the nearest tenth.
c/ NEXUS Mainline Route milepost rounded to the nearest tenth.

TABLE 9.3-3

Summary of the Planned Horizontal Directional Drill (HDD) Crossings for the NEXUS Project

HDD #	NAME (CROSSING AREA)	ENTRY MP a/	EXIT MP a/	Location (County, State)	Estimated Drilling Duration (days) b/
1	Wetland B15-31 HDD	7.9	8.4	Columbiana County, OH	71
2	Nimisila Reservoir HDD	41.1	40.8	Summit County, OH	16
3	Tuscarawas River HDD	47.8	48.4	Summit County, OH	89
4	Wetland C15-44 HDD	71.1	71.4	Medina County, OH	14
5	East Branch Black River HDD	86.9	86.5	Lorain County, OH	49
6	West Branch Black River HDD	92.5	92.2	Lorain County, OH	40
7	Vermilion River and Wetland C15-56 HDD	104.1	104.7	Huron County, OH	76
8	Interstate 80 HDD	110.3	110.1	Erie County, OH	39
9	Huron River HDD	116.8	117.3	Erie County, OH	61
10	Sandusky River HDD	146.1	145.7	Sandusky County, OH	57
11	Portage River HDD	162.7	162.3	Sandusky County, OH	47
12	Findlay Road HDD	180.1	179.8	Wood County, OH	14

TABLE 9.3-3

Summary of the Planned Horizontal Directional Drill (HDD) Crossings for the NEXUS Project

HDD #	NAME (CROSSING AREA)	ENTRY MP a/	EXIT MP a/	Location (County, State)	Estimated Drilling Duration (days) b/
13	Maumee River HDD	181.2	181.9	Wood & Lucas County, OH	82
14	River Raisin HDD	215.0	215.3	Lenawee County, MI	14
15	Saline River HDD	237.4	237.7	Washtenaw County, MI	14
16	Hydro Park HDD	250.7	251.1	Washtenaw County, MI	27
17	Interstate 94 HDD	251.5	251.8	Washtenaw County, MI	14

a/ Nexus Mainline Route milepost rounded to the nearest tenth. In locations where the enter milepost is larger than the exist milepost the direction of the HDD is from the higher milepost toward the lower milepost along the route.

b/ Estimated drilling duration is based on PRCI Installation of Pipelines by Horizontal Directional Drilling: An Engineering Design Guide (J.D. Hair & Associates, Inc., HDD Design Report, Revision 0, NEXUS Pipeline Project, October 21, 2015.)

TABLE 9.3-4

Noise Quality Analysis for the Hanoverton Compressor Station

Closest NSA	Distance and Direction of NSA to Site Center	Ambient L_{dn} (dBA) a/	Est'd L_{dn} of the Station during Operation (dBA)	Station L_{dn} + Ambient L_{dn} (dBA)	Change in the Ambient Sound Level (dB)
NSA #1	1,040 ft. (SSE)	46.4	51.0	52.3	5.9
NSA #2	1,680 ft. (W)	45.5	45.9	48.7	3.2
NSA #3	1,800 ft. (NE)	41.1	45.2	46.6	5.5
NSA #4	1,740 ft. (S)	45.5	45.6	48.5	3.0
NSA #5	1,900 ft. (SW)	45.5	44.7	48.1	2.6

a/ Ambient sound level based on recent sound survey conducted at the site of each facility.

TABLE 9.3-5

Noise Quality Analysis for the Wadsworth Compressor Station

Closest NSA	Distance and Direction of NSA to Site Center	Ambient L_{dn} (dBA) a/	Est'd L_{dn} of the Station during Operation (dBA)	Station L_{dn} + Ambient L_{dn} (dBA)	Change in the Ambient Sound Level (dB)
NSA #1	1,800 ft. (W)	56.7	44.5	57.0	0.3
NSA #2	1,840 ft. (WNW)	46.9	44.2	48.8	1.9
NSA #3	2,490 ft. (NE)	48.5	40.7	49.2	0.7

a/ Ambient sound level based on recent sound survey conducted at the site of each facility.

TABLE 9.3-6

Noise Quality Analysis for the Clyde Compressor Station

Closest NSA	Distance and Direction of NSA to Site Center	Ambient L_{dn} (dBA) a/	Est'd L_{dn} of the Station during Operation (dBA)	Station L_{dn} + Ambient L_{dn} (dBA)	Change in the Ambient Sound Level (dB)
NSA #1	1,450 ft. (NNW)	63.2	46.4	63.3	0.1
NSA #2	810 ft. (SW)	51.8	52.7	55.3	3.5
NSA #3	1,160 ft. (SE)	53.4	48.9	54.7	1.3

a/ Ambient sound level based on recent sound survey conducted at the site of each facility.

TABLE 9.3-7

Noise Quality Analysis for the Waterville Compressor Station

Closest NSA	Distance and Direction of NSA to Site Center	Ambient L_{dn} (dBA) a/	Est'd L_{dn} of the Station during Operation (dBA)	Station L_{dn} + Ambient L_{dn} (dBA)	Change in the Ambient Sound Level (dB)
NSA #1	1,390 ft. (E)	60.6	48.0	60.8	0.2
NSA #2	1,990 ft. (N)	48.6	43.8	49.9	1.3
NSA #3	3,790 ft. (W)	41.5	36.0	42.6	1.1
NSA #4	1,660 ft. (SE)	60.6	46.0	60.7	0.1

a/ Ambient sound level based on recent sound survey conducted at the site of each facility.

TABLE 9.3-8

Noise Quality Analysis for the Project M&R Stations

Respective M&R Station	Distance and Direction of Closest NSA to the M&R Station	Ambient L_{dn} (dBA) a/	Est'd L_{dn} due to the M&R Station (dBA)	M&R Station L_{dn} + Ambient L_{dn} (dBA)	Change in the Ambient Sound Level (dB)
NEXUS/TGP M&R Station (MR01)	850 ft. (W)	45.0	32.0	45.2	0.2
NEXUS/Kensington M&R Station (MR02) & NEXUS/Texas Eastern M&R Station (MR03)	700 ft. (NE)	60.0	35.5	60.0	0.0
NEXUS/Dominion East Ohio M&R Station (MR05)	270 ft. (W)	56.7	43.1	56.9	0.2
NEXUS/Willow Run M&R Station (MR04)	300 ft. (E)	54.2	42.9	54.5	0.3

a/ Ambient sound level based on recent sound survey conducted at the site of each facility.

TABLE 9.3-9

Noise Levels of Major Construction Equipment a/

Equipment Type	Sound Level at 50 Feet (dBA)
Trucks	85
Crane	85
Roller	85
Bulldozers	85
Pickup Trucks	55
Backhoes	80

a/ U.S. Department of Transportation, Federal Highway Administration. 2011. FHWA Highway Construction Noise Handbook. Available online at: http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm

TABLE 9.3-10

Noise Quality Analysis for HDDs with NSAs within ½ Mile of Entry and/or Exit Site (Assumes Standard Rig Employed)

HDD Segment (Entry or Exit Site)	Distance and Direction of the Closest NSA to HDD Site Center	Ambient L_{dn} (dBA) a/	Calculated L_{dn} of the HDD Operations (dBA)	L_{dn} of HDD Operations + Ambient L_{dn} (dBA)	Change in the Ambient Sound Level
HDD #1 (Entry)	600 ft. (NW)	43.3	64.3	64.2	20.9
HDD #1 (Exit)	1,260 ft. (E)	43.3	43.4	46.4	3.1
HDD #2 (Entry)	390 ft. (E)	41.6	68.3	68.3	26.7
HDD #2 (Exit)	850 ft. (NW)	40.3	47.3	48.1	7.8
HDD #3 (Entry)	450 ft. (NW)	42.6	66.9	67.0	24.4
HDD #3 (Exit)	830 ft. (NW)	43.3	49.4	50.4	7.1
HDD #4 (Entry)	1,670 ft. (WSW)	42.3	53.7	54.0	11.7
HDD #4 (Exit)	1,690 ft. (NW)	49.7	40.4	50.2	0.5
HDD #5 (Entry)	1,010 ft. (W)	41.2	58.0	58.1	16.9
HDD #5 (Exit)	1,550 ft. (SSE)	40.2	45.1	46.3	6.1
HDD #6 (Entry)	630 ft. (NW)	43.6	63.7	63.7	20.1
HDD #6 (Exit)	410 ft. (S)	41.1	53.6	53.9	12.8
HDD #7 (Entry)	460 ft. (NW)	43.0	66.7	66.8	23.8
HDD #7 (Exit)	490 ft. (S)	44.6	52.7	53.3	8.7
HDD #8 (Entry)	860 ft. (E)	53.0	60.6	61.3	8.3
HDD #8 (Exit)	740 ft. (W)	59.6	50.5	60.1	0.5
HDD #9 (Entry)	590 ft. (NE)	55.8	64.3	64.9	9.1
HDD #9 (Exit)	630 ft. (E)	56.4	50.3	57.3	0.9
HDD #10 (Entry)	350 ft. (SW)	56.2	69.3	69.5	13.3
HDD #10 (Exit)	1,040 ft. (WNW)	56.2	45.3	56.5	0.3
HDD #11 (Entry)	510 ft. (NE)	42.3	65.7	65.8	23.5
HDD #11 (Exit)	400 ft. (SW)	44.1	57.8	58.0	13.9
HDD #12 (Entry)	970 ft. (NE)	43.3	59.4	59.5	16.2
HDD #12 (Exit)	360 ft. (SW)	43.3	54.5	54.9	11.6
HDD #13 (Entry)	1,080 ft. (SW)	45.3	58.1	58.5	13.2
HDD #13 (Exit)	1,310 ft. (S)	43.6	44.8	47.3	3.7
HDD #14 (Entry)	540 ft. (NW)	39.4	65.2	65.2	25.8
HDD #14 (Exit)	1,080 ft. (S)	39.4	45.0	46.0	6.6
HDD #15 (Entry)	460 ft. (NW)	40.8	66.7	66.7	25.9
HDD #15 (Exit)	720 ft. (S)	46.3	49.0	50.8	4.5
HDD #16 (Entry)	1,300 ft. (NW)	49.0	52.5	54.1	5.1
HDD #16 (Exit)	870 ft. (NE)	53.1	47.1	54.1	1.0
HDD #17 (Entry)	220 ft. (W)	51.1	75.0	75.1	24.0
HDD #17 (Exit)	250 ft. (NW)	60.6	62.2	64.5	3.9

a/ Existing ambient sound level based on an ambient sound survey conducted at each HDD site.

TABLE 9.3-11

Noise Quality Analysis for HDDs that could Exceed the Sound Criterion at the Closest NSAs (Assumes Additional Noise Mitigation Measures Employed to Meet the Sound Criterion/Guideline)

HDD Segment (Entry or Exit Site)	Distance and Direction of the Closest NSA to HDD Site Center	Ambient L_{dn} (dBA) a/	Calculated L_{dn} of the HDD Operations (dBA)	L_{dn} of HDD Operations + Ambient L_{dn} (dBA)	Change in the Ambient Sound Level
HDD #1 (Entry)	600 ft. (NW)	43.3	52.1	52.7	9.4
HDD #2 (Entry)	390 ft. (E)	41.6	54.0	54.3	12.7
HDD #3 (Entry)	450 ft. (NW)	42.6	53.5	53.8	11.2
HDD #5 (Entry)	1,010 ft. (W)	41.2	49.6	50.2	9.0
HDD #6 (Entry)	630 ft. (NW)	43.6	49.7	50.7	7.1
HDD #7 (Entry)	460 ft. (NW)	43.0	54.3	54.6	11.6
HDD #8 (Entry)	860 ft. (E)	53.0	47.7	54.1	1.1
HDD #9 (Entry)	590 ft. (NE)	55.8	52.3	57.4	1.6
HDD #10 (Entry)	350 ft. (SW)	56.2	53.3	58.0	1.8
HDD #11 (Entry)	510 ft. (NE)	42.3	53.7	54.0	11.7
HDD #11 (Exit)	400 ft. (SW)	44.1	49.0	50.2	6.1
HDD #12 (Entry)	970 ft. (E)	43.3	49.5	50.5	7.2
HDD #13 (Entry)	1,080 ft. (SW)	45.3	48.7	50.3	5.0
HDD #14 (Entry)	540 ft. (NW)	39.4	53.1	53.3	13.9
HDD #15 (Entry)	460 ft. (NW)	40.8	51.1	51.5	10.7
HDD #17 (Entry)	220 ft. (W)	51.1	53.3	55.3	4.2
HDD #17 (Exit)	250 ft. (NW)	60.6	50.1	61.0	0.4

a/ Existing ambient sound level based on ambient sound survey(s) conducted at the HDD sites.

APPENDIX 9A

Air Permit Applications and Emission Calculations

PERMIT TO INSTALL AND OPERATE APPLICATION

NEXUS Gas Transmission > Columbiana, OH

Hanoverton Compressor Station

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July 2015

Project 143601.0141

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Environmental solutions delivered uncommonly well

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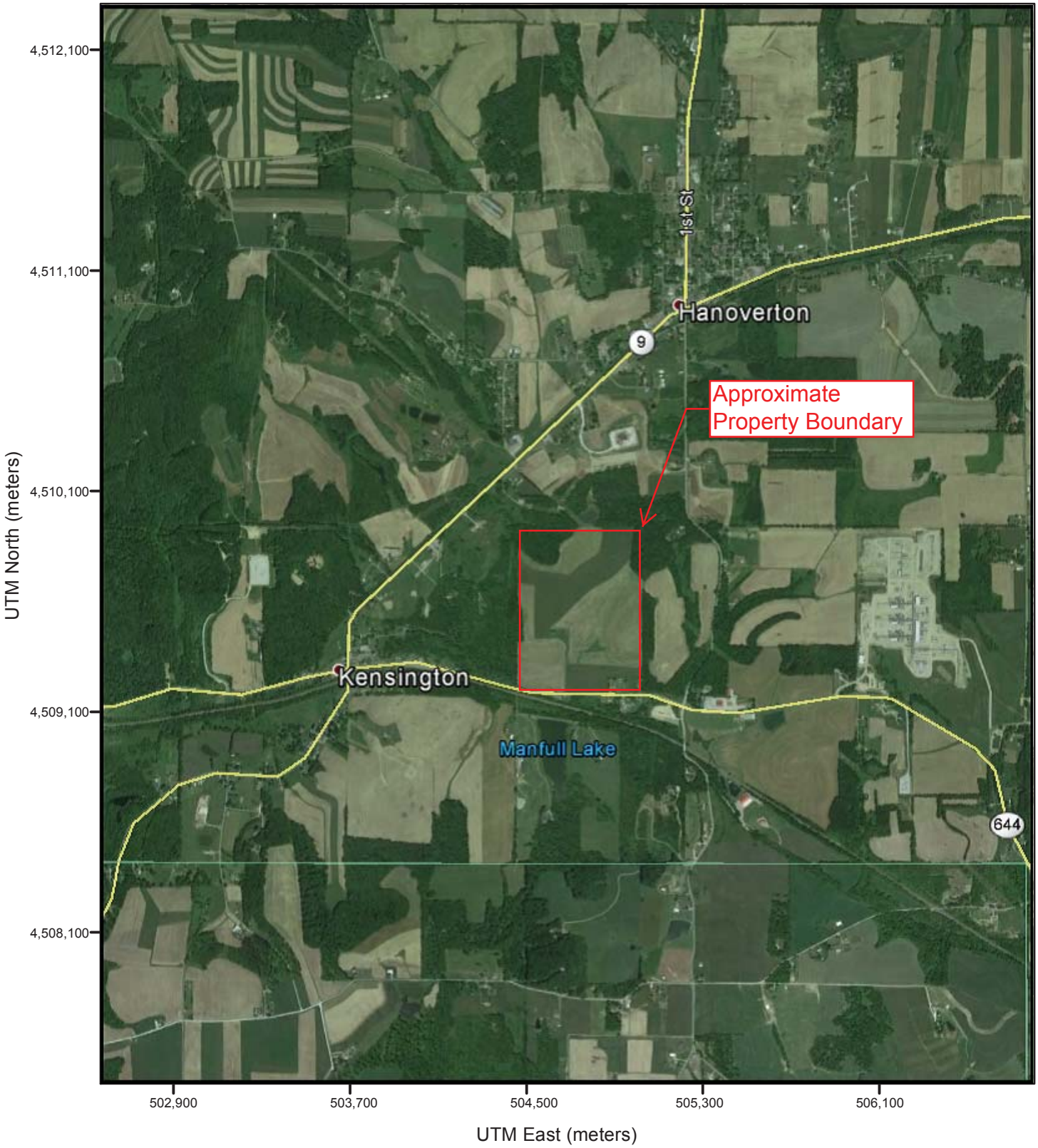
NEXUS Gas Transmission (NGT) plans to construct a new natural gas pipeline to facilitate the delivery of natural gas from Appalachian supplies to supply markets in Ohio, Michigan, Chicago, and Ontario. NGT proposes to construct and operate a natural gas compressor station (Hanoverton Compressor Station) in Columbiana County, Ohio to support the transmission of gas through the new pipeline. The purpose of the compressor station is to maintain line pressure and ensure natural gas continues to move at sufficient volumes for reliable service at delivery points. With this Permit to Install and Operate (PTIO) application, NGT is requesting approval for the construction and operation of this natural gas compressor station.

The primary Standard Industrial Classification (SIC) code of the proposed Hanoverton Compressor Station is 4922 (Natural Gas Transmission).

1.1. FACILITY LOCATION

The Hanoverton Compressor Station will be located in Columbiana County near Hanoverton, Ohio. Figure 1-1 is an area map that shows the site location relative to predominant geographical features such as highways and railroads.

Fig. 1-1. NEXUS Gas Transmission
Hanoverton Compressor Station
Area Map



Coordinate System: NAD83 UTM Zone 17N

Scale

0 1,000 2,000 3,000 4,000

Feet

0 500 1,000 1,500

Meters

Trinity Consultants

1.2. PROJECT DESCRIPTION

The Hanoverton Compressor Station will facilitate the delivery of natural gas along the NEXUS Gas Transmission (NGT) pipeline. NGT plans to install the following emission units during the construction of the Hanoverton Compressor Station. Each of the following emission units is listed with the proposed Ohio Environmental Protection Agency (Ohio EPA) Emission Unit Identification Number (EUID). Refer to Figure 1-2 for a process flow diagram describing the organization of these emission units.

- Combustion Turbines #1 and 2 (P001 and P002) – Two (2) new natural gas-fired Solar Titan 250 combustion turbines each sized to a nominal, NEMA-rated capacity of 26,000 horsepower (hp) and equipped with an oxidation catalyst.
- Emergency Generator (P003) – One (1) new natural gas-fired internal combustion engine rated at a maximum capacity of 1,175 hp intended to drive a generator to supply power to the facility during standby emergency situations. Because this engine qualifies for coverage under a Permit by Rule (PBR) in accordance with Ohio Administrative Code (OAC) 3745-31-03(A)(4)(b), the application described herein will not contain any application forms for this unit; rather, NGT will submit under separate cover a notification of intent to operate a new emergency engine under Ohio EPA's PBR program.
- Gas Releases (P004) – Periodic maintenance, routine operations, and pigging activities will occasionally necessitate the evacuation of equipment (e.g., turbines, vessels) directly to atmosphere.
- Equipment Leaks (P801) – Various equipment components, including valves, flanges, and connectors will be located throughout the compressor station that may result in fugitive emissions due to equipment leaks.
- Separator Vessel #1 (P005) – One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 530 gallons handling condensate liquids collected from the pipeline.
- Separator Vessel #2 (P006) - One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 530 gallons handling condensate liquids collected from the pipeline.
- Separator Vessel #3 (P007) - One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 400 gallons handling condensate liquids collected from the pipeline.
- Separator Vessel #4 (P008) - One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 317 gallons handling condensate liquids collected from the pipeline.
- Separator Vessel #5 (P009) - One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 43 gallons handling condensate liquids collected from the pipeline.
- Loading Operation (J001) – NGT will periodically transfer the condensate liquids collected in T001, the used lubricating oil collected in T002, and the oily water collected in T003 to tanker trucks for shipment off-site.

The Hanoverton Compression Station will also include the following additional *de minimis* sources under Ohio Administrative Code (OAC) 3745-15-05.

- Process Heaters #1 and 2 (B001 and B002) – Two (2) new natural gas-fired catalytic heaters each rated at a heat input capacity of 1.125 MMBtu/hr intended to provide heat to various streams at the facility.
- Parts Washer (L001) – One parts washer expected to require 120 gallons of makeup organic solvent per year.

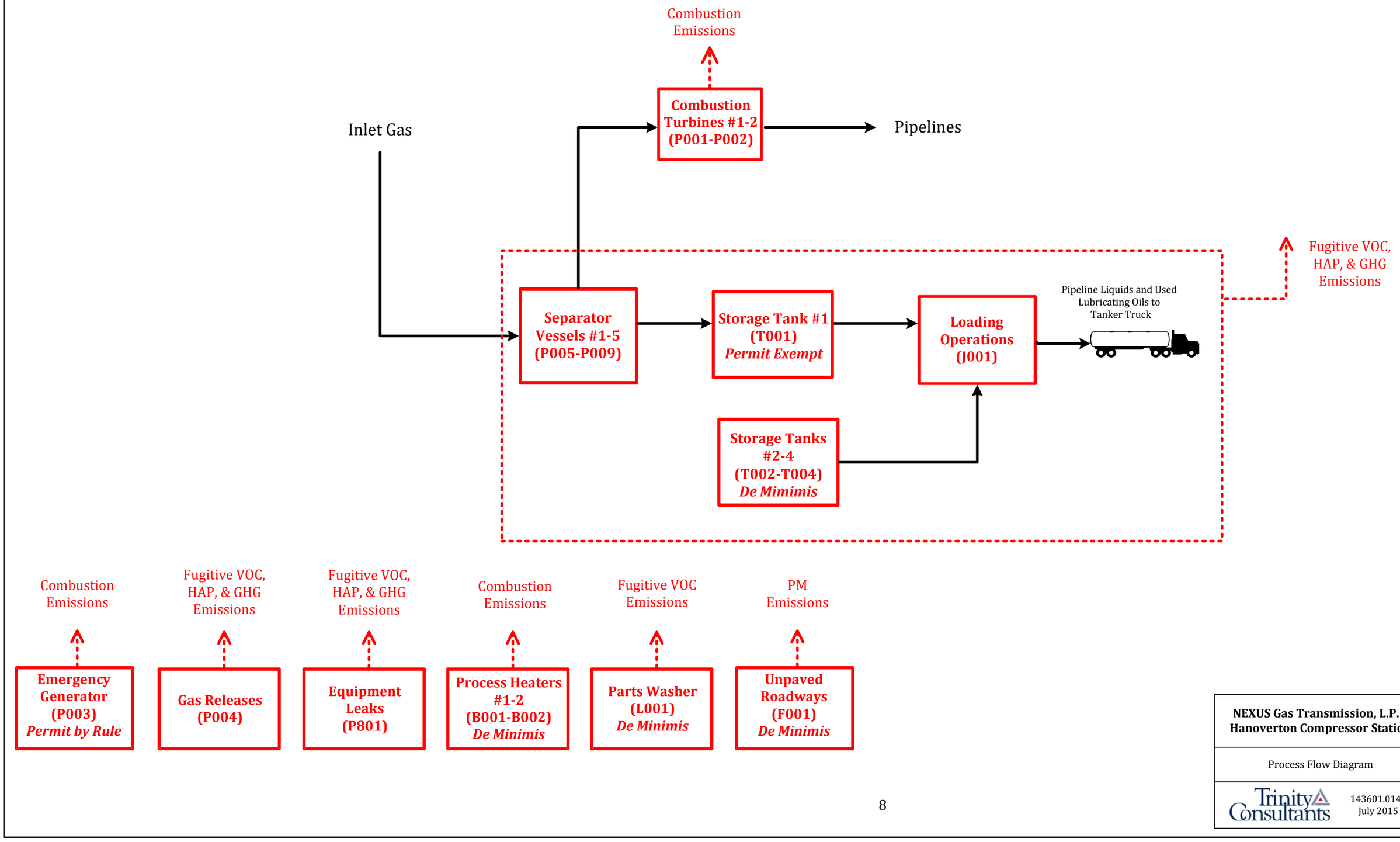
- Storage Tanks #2 and #3 (T002-T003) – Two (2) vertical fixed roof tanks each sized to a capacity of 570 gallons used to store lubricating oils for the turbines.
- Storage Tank #4 (T004) – One vertical fixed roof tank sized to a capacity of 3,000 gallons used to store oily water.
- Roadways (F001) – Vehicle traffic on facility roadways will result in fugitive emissions of particulate matter.

Additionally, the Hanoverton Compressor Station will include the following emissions sources considered exempt from permitting under OAC 3745-31-03(A)(1).

- Storage Tank #1 (T001) – One vertical fixed roof tank sized to a capacity of 2,000 gallons used to store condensate liquids collected from the pipeline and from station equipment. T001 will be equipped with submerged filling mechanisms and will be eligible for the permanent permitting exemption provided in OAC 3745-31-03(A)(1)(l)(iv).

NGT requests that the PTIO be issued for all non-exempt, non-*de minimis* emission units to be installed at the Hanoverton Compressor Station.

FIGURE 1-2. PROCESS FLOW DIAGRAM FOR THE HANOVERTON COMPRESSOR STATION



NEXUS Gas Transmission, L.P. – Hanoverton Compressor Station
Process Flow Diagram
Trinity Consultants 143601.0141 July 2015

1.3. PROJECT EMISSIONS QUANTIFICATION

This section provides a summary of the calculation methodology used to estimate potential emissions for the turbines, emergency generator, heaters, parts washer, piping components, gas releases, storage tanks and truck loading operations to be installed as part of the NEXUS project at the Hanoverton Compressor Station. Appendix B provides the detailed emission calculations for the project.

Table 1-1 provides a summary of the facility-wide potential annual emissions attributable to the installation of the Hanoverton Compressor Station, including particulate matter, particulate matter with an aerodynamic diameter of less than 10 microns, and particulate matter with an aerodynamic diameter of less than 2.5 microns ($PM/PM_{10}/PM_{2.5}$); nitrogen oxides (NO_X); sulfur dioxide (SO_2); carbon monoxide (CO); volatile organic compounds (VOC); greenhouse gases (i.e., carbon dioxide [CO_2], methane [CH_4], and nitrous oxide [N_2O]) expressed as carbon dioxide equivalents (CO_2e); total hazardous air pollutants (HAP); and hexane.

Table 1-1. Potential Emissions for the Hanoverton Compressor Station

EU ID	Emission Unit Description	Annual Emissions (tpy)							
		NO_X	CO	VOC	SO_2	PM/PM_{10} / $PM_{2.5}$	CO_2e [a]	Hexane	Total HAP
P001	Combustion Turbine #1	31.14	7.81	3.32	3.22	6.25	112,281	-	0.60
P002	Combustion Turbine #2	31.14	7.81	3.32	3.22	6.25	112,281	-	0.60
P003	Emergency Generator [b]	1.30	2.59	1.16	1.40E-03	0.02	576	0.01	0.70
P004	Gas Releases	-	-	24.60	-	-	19,114	0.72	2.03
P801	Equipment Leaks	-	-	10.13	-	-	1,419	0.18	1.21
P005	Separator Vessel #1	-	-	0.13	-	-	7	3.78E-03	8.20E-03
P006	Separator Vessel #2	-	-	0.13	-	-	7	3.78E-03	8.20E-03
P007	Separator Vessel #3	-	-	0.10	-	-	6	2.96E-03	6.40E-03
P008	Separator Vessel #4	-	-	0.60	-	-	18	0.02	0.04
P009	Separator Vessel #5	-	-	0.01	-	-	1	3.65E-04	8.00E-04
T001	Storage Tank #1 [d]	-	-	0.27	-	-	14	7.65E-03	0.02
T002	Storage Tank #2 [c]	-	-	2.00E-03	-	-	-	-	-
T003	Storage Tank #3 [c]	-	-	2.00E-03	-	-	-	-	-
T004	Storage Tank #4 [c]	-	-	8.00E-04	-	-	-	-	-
B001	Process Heater #1 [c]	0.71	0.43	0.17	2.80E-03	0.04	554	3.66E-02	0.04
B002	Process Heater #2 [c]	0.71	0.43	0.17	2.80E-03	0.04	554	3.66E-02	0.04
L001	Parts Washer [c]	-	-	0.41	-	-	-	-	-
J001	Loading Operation	-	-	0.01	-	-	1	2.69E-04	6.00E-04
Totals		65.00	19.07	44.52	6.45	12.60	246,833	1.02	5.29

a. Carbon dioxide equivalent (CO_2e) emissions. Represents the sum of carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4) emissions adjusted by each pollutant's global warming potential as identified in Table A-1 to 40 CFR 98, Subpart A.

b. This unit qualifies for coverage under a Permit by Rule pursuant to OAC 3745-31-03(A)(4)(b).

c. These units are classified as *de minimis* sources under OAC 3745-15-05.

d. This unit qualifies for permanent permit exemption pursuant to OAC 3745-31-03(A)(1)(l)(iv).

1.3.1. Turbine Emissions

Emissions are estimated for operation during normal steady-state operating conditions, and operation during startup and shutdown events as described in the following sections.[1]

1.3.1.1. Turbine Normal Steady-State Operation Hourly Emissions

Two new Solar turbines are proposed as part of this project. The turbines will utilize an oxidation catalyst to reduce potential emissions of CO and organic emissions and will utilize SoLoNO$_X$™ technology to reduce emissions of NO$_X$. Table 1-2 provides a summary of the uncontrolled emission factors used for each pollutant during normal steady-state operation.

Table 1-2. Turbine Pre-Control Emission Factors – Normal Operations

Pollutant	Emission Factor [a]	Source
NO$_X$	9 ppmvd at 15% O$_2$ for Titan 250	Vendor guaranteed emission rate
CO	25 ppmvd at 15% O$_2$	Vendor guaranteed emission rate
VOC	25 ppmvd of TOC at 15% O$_2$	Based on vendor data for TOC, scaled to VOC based on ratio of TOC:VOC in Table 3.1-2a of AP-42 (April 2000)
CH$_4$	25 ppmvd of TOC at 15% O$_2$	Based on vendor data for TOC, scaled to CH$_4$ based on ratio of TOC:CH$_4$ in Table 3.1-2a of AP-42 (April 2000)
PM$_{10}$/PM$_{2.5}$	0.0066 lb/MMBtu (HHV)	Table 3.1-2a of AP-42 (April 2000)
SO$_2$	0.0034 lb/MMBtu (HHV)	Table 3.1-2a of AP-42 (April 2000)
CO$_2$	53.06 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-1 (effective January 2014)
N$_2$O	0.0001 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-2 (effective January 2014)
Total HAPs	Multiple HAP factors	Table 3.1-3 of AP-42 (April 2000). Organic HAPs were scaled using vendor data and AP-42 emission rates for TOC

a. The emission factors provided in this table represent uncontrolled emissions (excluding add-on controls not inherent to the equipment) at temperatures above 0 °F.

Although the general publically available manufacturer's guarantee information currently states that the NO$_X$ guarantee is 15 ppmvd, for this project Solar® has guaranteed NO$_X$ emissions for the new Titan 250 units at 9 ppmvd (15 percent O$_2$) during steady-state operation at 50-100 percent engine load for all ambient temperatures above 0°F.

[1] NGT also evaluated emissions during cold weather operation (temperatures below 0°F). Due to the location of the Hanoverton Compressor Station, NGT has assumed 18 hours of potential low temperature operation.

In order to calculate hourly emissions during normal operation, the emission factors provided in the table above are converted to factors in pounds per million standard cubic feet (lb/MMscf) as described in subsequent sections.

1.3.1.2. Turbine Emission Factors – NO_X, CO, and TOC

NO_X, CO, and Total Organic Carbon (TOC)[2] emitted by the combustion turbines during normal operation are calculated based on the vendor-supplied emission rates provided in Table 1-2. Although TOC is not a criteria pollutant, it is used to derive the emission factors for VOC, methane (CH_4 – a greenhouse gas), and organic HAPs. Vendor data for several ambient temperatures and vendor literature for emissions were compiled to develop the data listed below:

- Fuel: Lower Heating Value (939.2 BTU/scf);
- Turbine Performance: Net Output Power (30,401 hp at 48.28 °F), Heat Input at LHV (194.61 MMBtu/hr), Heat Rate at LHV (6,401 BTU/hp-hr);
- Exhaust Parameters: Exhaust Temperature (863 °F), Water Fraction (6.40 %), O_2 Content (15.36 %, dry), Molecular Weight (28.53 lb/lb-mol), Flowrate (548,579 lb/hr and 309,691 acfm); and
- Vendor Supplied Emission Rates for NO_X, CO and UHC (9 ppmvd, 25 ppmvd, and 25 ppmvd @ 15% O_2).

Operating and emissions data at other ambient temperatures are estimated by fitting the vendor-provided data to a curve that best represents the data and interpolating/extrapolating to the desired temperatures. Since the effectiveness of the emissions control inherent in the turbine's combustor design (e.g., SoLoNO$_X$™) is only guaranteed at temperatures above 0 °F, the ppm values provided in Table 1-2 do not apply to sub-zero operating conditions. Further, the rated output power and the mass emission rates of NO_X, CO, and TOC at a given percent load decrease with increasing ambient temperature conditions (i.e., fuel consumption at 100 percent load is highest at lower ambient temperatures). As such, short-term, maximum hourly emission rates are estimated based on operating and emissions data at 0.01 °F to provide a conservative estimate. Annual emissions estimates are based on the annual average ambient conditions at the Hanoverton Compressor Station. As such, for annual emissions estimates, the operating data (turbine performance and exhaust gas parameters) are interpolated to estimate emissions at the average annual ambient temperature at the station (i.e., 48.28 °F).[3] The emission factor at a given ambient temperature is calculated as illustrated in Equation 1-1 through Equation 1-3:

[2] TOC would be the same as UHC (As defined in Section 1.1.1.1).

[3] A weighted daily average ambient temperature is used in estimating annual emissions for the Hanoverton Compressor Station and is based on meteorological information in USEPA's TANKS 4.09d database. To determine ambient temperatures, the three meteorological stations in closest proximity to the station are reviewed, and the station with the lowest ambient temperatures is conservatively selected. The weighted daily average ambient temperature is also adjusted to account for the proposed utilization limit. NEXUS interpolates the performance and exhaust parameters using operating data provided by the manufacturer at the following ambient temperatures: 0, 20, 40, 60, 80, and 100 °F.

Equation 1-1:

$$NO_x, CO, TOC\ EF\ (ppmw) = ppmvd, 15\%\ O_2 \times nonwater\% \times \frac{20.9 - (\ vol\%\ O_2, dry\ \times 100)}{20.9 - 15} = ppmw$$

Equation 1-2:

$$NO_x, CO, TOC\ hourly\ emissions\ \left(\frac{lb}{hr}\right) @\ T = \frac{ppmw}{1{,}000{,}000} \times \left[\frac{lb\ exhaust}{hr}\right]_T \times \frac{\frac{lb\ pollutant}{lbmol}}{\left[\frac{lb\ exhaust}{lbmol}\right]_T}$$

$$= \left[\frac{lb\ pollutant}{hr}\right]_T$$

Equation 1-3:

$$NO_x, CO, TOC\ EF\ @\ T = \left[\frac{lb}{hr}\right]_T \times \frac{1{,}000{,}000\ \frac{scf}{MMscf}}{\left[\frac{scf\ fuel}{hr}\right]_T} = \left[\frac{lb}{MMscf}\right]_T$$

Where: *EF = Emission factor*
T = ambient temperature
Maximum hourly emissions estimated at T = 0.01 °F
Annual average hourly emissions estimated at T = 48.28 °F

1.3.1.3. Turbine Emission Factors – VOC, CH_4, and HAPs

VOC, CH_4, and HAP emitted by the combustion turbines are calculated using the vendor-guaranteed TOC emission rate and AP-42 emission factors, as VOC, CH_4, and HAP are constituents of TOC. The TOC emission factor in terms of lb/MMscf at a given ambient temperature is calculated as outlined above in Section 1.3.1.2.

Standard emission factors for VOC, CH_4, HAP, and TOC from stationary gas turbines are provided in Chapter 3.1 of EPA's Compilation of Air Pollutant Emission Factors (AP-42). Table 3.1-2a of AP-42 (version dated April 2000) provides emission factors of 0.0021 lb VOC per MMBtu, 0.0086 lb CH_4 per MMBtu, and 0.011 lb TOC per MMBtu from natural gas-fired turbines. Table 3.1-3 of AP-42 (version dated April 2000) provides emission factors for HAPs emitted from natural gas fired turbines. These HAPs include:

- 1,3-butadiene;
- Acetaldehyde;
- Acrolein;
- Benzene;

- Ethylbenzene;
- Formaldehyde;
- Naphthalene;
- Polycyclic aromatic hydrocarbons (PAH);
- Propylene oxide;
- Toluene; and
- Xylenes.

A total HAP emission factor is calculated as the sum of all individual HAP emission factors.

Ratios of VOC, CH_4, and HAP to TOC from the AP-42 factors are applied to the TOC factor derived from vendor information to obtain emission factors for VOC, CH_4, and HAP. For normal operation, the uncontrolled VOC, CH_4, and HAP factors are derived as follows:

Equation 1-4:

$$VOC, CH_4, HAP\ EF = \frac{lb\ TOC_{(vendor\ guarantee)}}{MMscf} \times \frac{\left(\frac{lb\ pollutant_{(AP-42)}}{MMBtu} \times 1{,}020\ \frac{MMBtu}{MMscf}\right)}{\left(0.011 \frac{lb\ TOC_{(AP-42)}}{MMBtu} \times 1{,}020\ \frac{MMBtu}{MMscf}\right)} = \frac{lb}{MMscf}$$

The scaled emission factors were calculated as 0.0068 lb VOC/MMBtu and 0.0279 lb CH_4/MMBtu. Organic HAP emission factors are included in the emission calculations found in Appendix B.

1.3.1.4. Turbine Emission Factors – PM_{10}, $PM_{2.5}$, and SO_2

As indicated in Table 1-2, PM10, $PM_{2.5}$, and SO_2 emitted by the combustion turbines during normal operation are calculated based on the emission factors listed in Table 3.1-2a of AP-42 (version dated April 2000) for stationary gas turbines. The AP-42 emission factors are converted to lb/MMscf as follows:

Equation 1-5:

$$PM_{10}, PM_{2.5}, or\ SO_2\ EF = \frac{lb}{MMBtu} \times 1{,}020\ \frac{MMBtu}{MMscf} = \frac{lb}{MMscf}$$

It is conservatively assumed that PM = PM_{10} = $PM_{2.5}$.

1.3.1.5. Turbine Emission Factors – CO_2, N_2O, and CO_2e

Emission factors for CO_2 and nitrous oxides (N_2O) emitted by the combustion of natural gas are calculated based on the emission factors provided for pipeline natural gas combustion in 40 CFR 98, Subpart C, Tables C-1 and C-2 (effective January 2014), as follows:[4]

Equation 1-6:

$$CO_2\ EF = 53.06\frac{kg}{MMBtu} \times 2.2046\frac{lb}{kg} \times 1{,}026\frac{Btu}{scf} = 120{,}017.5\frac{lb\ CO_2}{MMscf}$$

A chemical reaction will occur as a result of the oxidation catalyst controlling CO emissions to produce CO_2. NGT quantified the additional CO_2 emissions using the following equation:

Equation 1-7:

$$CO_2\ Emissions\ \left(\frac{lb}{hr}\right) = CO_2\ EF\left(\frac{lb\ CO_2}{MMscf}\right) * Fuel\ Consumption\ \left(\frac{MMscf}{hr}\right) + [CO\ Emissions\left(\frac{lb\ CO}{hr}\right) * 95\%\ CO\ Control * \frac{Molecular\ Weight_{CO2}}{Molecular\ Weight_{CO}}]$$

Equation 1-8:

$$N_2O\ EF = 0.0001\frac{kg}{MMBtu} \times 2.2046\frac{lb}{kg} \times 1{,}026\frac{Btu}{scf} = 0.23\frac{lb\ N_2O}{MMscf}$$

Total GHG emissions in terms of CO_2 equivalents (CO_2e) are equal to the sum of all individual GHGs emitted by the turbines, accounting for the respective global warming potential of each GHG. The global warming potentials (GWPs) used to calculate CO_2e emissions for each pollutant emitted by the Project are contained in Table 1-3.

Table 1-3. Applicable Global Warming Potentials

Pollutant [a]	GWP [b]
CO_2	1
CH_4	25
N_2O	298

a. Only those GHGs for which quantifiable emissions increases are expected due to this project are listed.

[4] Note that emission factors utilized the corresponding natural gas heating value from the same subpart or reference (Part 98 for GHG, AP-42 for other factors). In this way, the factors and heating value are consistent with each other, although slightly different heating values were reference for different factors.

b. GWPs are based on a 100-year time horizon, as identified in Table A-1 to 40 CFR Part 98, Subpart A as amended on November 29, 2013, and effective January 1, 2014, to incorporate revised GWPs as published in the Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Report (AR4). See 78 Fed Reg 71903-71981.

As such, the CO_2e factor is derived as follows:

Equation 1-9:

$$CO_2e\ EF = \left(\frac{lb\ CO_2}{MMscf} \times 1\ GWP\right) + \left(\frac{lb\ CH_4}{MMscf} \times 25\ GWP\right) + \left(\frac{lb\ N_2O}{MMscf} \times 298\ GWP\right) = \frac{lb\ CO_2e}{MMscf}$$

1.3.2. Turbine Startup and Shutdown Operation Hourly Emissions

Emissions during startups and shutdowns are calculated based on vendor-specified transient operation profiles which are used to determine the maximum pound per startup or shutdown event as described in further detail in the following sections.

1.3.2.1. Turbine Startup Operation

The startup process for the turbine is estimated to take approximately nine minutes from the initiation of startup to normal operation (startup sequence ends at approximately 50 percent load for most Solar® turbines). This includes approximately three minutes of ignition-idle operation and six minutes of loading/thermal stabilization operation. [5]

Table 1-4 provides a summary of the emission factors used for each pollutant during the ignition-idle and loading/thermal stabilization phases of each startup event per turbine type. It is assumed that the oxidation catalyst will not yet have a measureable destruction or removal efficiency (DRE) during startup, as it is designed to meet control specifications only during normal operation. It is also assumed that the SoLoNO$_X$™ will not result in reduced NO$_X$ during startup.

[5] These are referred to as "Step 2" and "Step 3", respectively in the emissions calculations in Appendix B. Step 1 of turbine startup includes energizing the starter and observing the RPM until the ignition range is reached. During Step 1, ignition and combustion have not yet occurred in the turbine, and thus the turbine combustor is not yet a source of air emissions.

Table 1-4. Solar® Titan 250-30002S4 Pre-Control Emission Factors – Startup Operation

Pollutant	Ignition-Idle Phase Emission Factor from Source [a]	Loading/Thermal Stabilization Phase Emission Factor from Source [a]	Source
NO_X	50 ppmvd at 15% O_2	50 ppmvd at 15% O_2	Based on vendor data
CO	2,000 ppmvd at 15% O_2	1,013 ppmvd at 15% O_2	Based on vendor data
VOC	200 ppmvd TOC at 15% O_2 0.011 lb_{TOC}/MMBtu (HHV) : 0.0021 lb_{VOC}/MMBtu (HHV)	110 ppmvd TOC at 15% O_2 0.011 lb_{TOC}/MMBtu (HHV) : 0.0021 lb_{VOC}/MMBtu (HHV)	Based on vendor data for TOC, scaled to VOC based on ratio of TOC:VOC in Table 3.1-2a of AP-42 (April 2000)
CH_4	200 ppmvd TOC at 15% O_2 0.0086 lb/MMBtu (HHV) CH_4	110 ppmvd TOC at 15% O_2 0.0086 lb/MMBtu (HHV) CH_4	Based on vendor data for TOC, scaled to CH_4 based on ratio of TOC:CH_4 in Table 3.1-2a of AP-42 (April 2000)
$PM_{10}/PM_{2.5}$	Same as normal operation		
SO_2	Same as normal operation		
CO_2	Same as normal operation		
N_2O	Same as normal operation		
Total HAPs	200 ppmvd TOC at 15% O_2 Multiple HAP factors	110 ppmvd TOC at 15% O_2 Multiple HAP factors	Based on vendor data for TOC, scaled to HAP based on ratio of TOC:HAP in Table 3.1-2a of AP-42 (April 2000)

a. The emission factors provided in this table represent uncontrolled emissions. The Solar® Titan 250 turbine will be equipped with oxidation catalyst, however it is assumed that the catalyst does not have a DRE during startups.

All pollutants emitted by the combustion turbines during startup events are calculated based on the same methodology that is used to calculate emissions during normal operation (i.e., the techniques described in Section 1.3.1).[6] However, rather than calculate a lb/MMscf emission factor, pounds per startup event (lb/event) are calculated for each pollutant based on the fuel consumed during the 3-minute ignition-idle phase and during the 6-minute loading/thermal stabilization phase as follows:

[6] NEXUS will not operate any control device to reduce emissions of NO_X from the turbines; however, NO_X emission rates during startup events may nevertheless differ from the emission rates observed during normal operation given that the low-NO_X burners are designed to operate at optimal combustion temperatures which may not be achieved until the end of the startup sequence.

Equation 1-10:

$$EF\ during\ SU\ event = ppmvw_{S2-i} \times \frac{Exhaust\ Mass\ Flow}{10^6} \times \frac{MW_{pol}}{MW_{ex}} \times \frac{3\ min}{60\ min} + ppmvw_{S3-i} \times \frac{Exhaust\ Mass\ Flow}{10^6} \times \frac{MW_{pol}}{MW_{ex}} \times \frac{6\ min}{60\ min} = \frac{lb\ Pollutant\ i}{event}$$

Where: EF is the emission factor for pollutant "i"

For example:

$$CO\ EF\ during\ SU\ event = 1{,}137 \times \frac{273{,}526}{10^6} \times \frac{28.01}{28.66} \times \frac{3\ min}{60\ min} + 687.92 \times \frac{348{,}147}{10^6} \times \frac{28.01}{28.62} \times \frac{6\ min}{60\ min} = 38.64$$

1.3.2.2. Turbine Shutdown Operation

The shutdown process for each turbine is estimated to take approximately 8.5 minutes from normal operation to shutdown for a Solar® Titan 250. The shutdown event consists of loading/thermal stabilization operation. The calculation for shutdowns is similar to that for startups as shown in Table 1-4, utilizing the same emission rates identified during loading/thermal stabilization for startup.

1.3.3. Turbine Annual Potential Emissions

The emission factors described in the previous sections are multiplied by the following activity data to estimate annual potential emissions:

- **Normal, Steady State Operation:** Annual fuel consumption as estimated from vendor-provided turbine parameters at the annual average ambient temperature for the Hanoverton Compressor Station. Annual potential to emit (PTE) estimates assume 100% utilization (8,760 hours per year). CO, VOC, and HAP PTE estimates take the control efficiency of the proposed oxidation catalyst into account. Further, since an oxidation catalyst provides more complete conversion of CO to CO_2, the controlled portion of the CO emissions is added back to the CO_2 emissions rate. Note however, that this increase is a small fraction of the overall CO_2 emissions.

  NO_X PTE estimates are based on the project-specific emissions guarantee of the proposed SoLoNO$_X$™ combustion technology.
- **Startup/Shutdown Operation:** The number of startup and shutdown events is conservatively estimated at 260 startup events and 260 shutdown events per year for each turbine. No credit for control by the oxidation catalyst is accounted for in the estimation of startup emissions even though the oxidation catalyst inlet temperature should reach the effective temperature very quickly. However, it is assumed that the oxidation catalyst will be operational during shutdown since the oxidation catalyst

inlet temperature would not be expected to drop below the effective temperature until the feed of fuel is discontinued.

- **Low Temperature Operation:** Fuel consumption during low temperature operation as estimated by extrapolating vendor-provided turbine parameters to an ambient temperature of 0°F. NGT has estimated emissions by assuming that the temperature will drop below 0°F for 17 hours per year and that the temperature will drop below 20°F for an additional one (1) hour per year.

For some pollutants (e.g., particulate matter), emission rates from the combustion turbine are higher during normal steady-state operation than they are during startup and shutdown. However, for other pollutants (e.g., CO), emission rates may be higher during startup and shutdown than during normal operation. Although emission concentration may be higher, load is typically lower during startup and shutdown such that short-term mass emission rate may still be lower. This varies, however, per pollutant. Therefore, for the sake of conservatism, maximum annual emissions for the turbine are the maximum of potential combinations of normal, startup (SU), and shutdown (SD) operation as summarized in the equations below.

Equation 1-11:

$$Normal\ \frac{ton}{yr} = Average\ Normal\ \frac{lb}{hr} \times \frac{8{,}760\ hr \times \%\ utilization}{yr} \times \frac{ton}{2{,}000\ lb}$$

Equation 1-12:

$$Normal\ with\ Startup\ (SU)\ and\ Shutdown(SD)\ \frac{ton}{yr} = \max[normal\ \frac{ton}{yr},$$
$$startup\ \frac{ton}{yr} + \ shutdown\ \frac{ton}{yr} + \left(normal\ \frac{ton}{yr} \times \left\{1 - \frac{startup\ hrs \mp shutdown\ hrs}{8{,}760\ \times\ \%\ utilization}\right\}\right)]$$

Equation 1-13:

$$Normal, SU, SD, and\ Low\ Temp(LT)\ \frac{ton}{yr}$$
$$= \ startup\ \frac{ton}{yr} + shutdown\ \frac{ton}{yr} + low\ temp\ \frac{ton}{yr}$$
$$+ \left(normal\ \frac{ton}{yr} \times \left\{1 - \frac{startup\ hrs \mp shutdown\ hrs \mp low\ temp\ hrs}{8760\ \times\ \%\ utilization}\right\}\right)]$$

Equation 1-14:

$$Normal\ \ and\ Low\ Temp(LT)\ \frac{ton}{yr} = low\ \frac{ton}{yr} + \ normal\ \frac{ton}{yr}\ x\ \left[1 - \left\{\frac{low\ temp\ hrs}{8{,}760\ \times\ \%\ utilization}\right\}\right]$$

Equation 1-15:

$$Annual\ PTE\ \left(\frac{ton}{yr}\right)_{Pollutant\ i} = \text{MAX}\left[Normal\left(\frac{ton}{yr}\right), Normal\ with\ SU, SD\ \left(\frac{ton}{yr}\right), Normal\ with\ SU, SD, LT\ \left(\frac{ton}{yr}\right)\right]_i$$

1.3.4. Natural Gas Heater Emissions

NGT is proposing to install two (2) fuel gas heaters each rated at 0.750 MMBtu/hr. Table 1-5 provides information on the emission factors used to calculate emissions from the heaters.

Table 1-5. Cameron Heater Emission Factors

Pollutant	Emission Factor from Source	Source
NO_X	80 ppmvd at 3% O_2	Vendor specified emission rate
CO	200 ppmvd at 3% O_2	Vendor specified emission rate
TOC	140 ppmvd at 3% O_2	Vendor specified emission rate
VOC	0.035 lb/MMBtu	Table 1.4-3 of AP-42 (July 1998), scaled using the vendor guarantee and AP-42 emission rates for TOC
CH_4	0.00996 lb/MMBtu	Table 1.4-2 of AP-42 (July 1998), scaled using the vendor guarantee and AP-42 emission rates for TOC
$PM_{10}/PM_{2.5}$	7.60 lb/MMscf	Table 1.4-2 of AP-42 (July 1998)
SO_2	0.60 lb/MMscf	Table 1.4-2 of AP-42 (July 1998)
CO_2	53.06 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-1 (effective January 2014)
N_2O	0.0001 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-2 (effective January 2014)
Total HAPs	Multiple HAP factors	Table 1.4-3 of AP-42 (July 1998), scaled using the vendor guarantee and AP-42 emission rates for TOC

In order to calculate hourly emissions, the emission factors provided in Table 1-5 are converted to units of lb/MMscf. These converted factors are multiplied by each heater's hourly fuel consumption in scf/hr to obtain hourly emissions. Fuel consumption is calculated from the heat output of the heaters assuming a thermal efficiency of 70 percent and a natural gas heating value of 1,020 Btu/scf. Annual potential emissions are calculated based on average hourly fuel consumption. Maximum hourly potential emissions are calculated based on maximum hourly fuel consumption, assuming an overload capability of 105 percent. The following sections summarize the methods used to obtain lb/MMscf emission factors for each pollutant emitted from the new heaters.

1.3.4.1. Heater Emissions Factors – NO_X, CO, and TOC

NO_X, CO, and TOC emitted by the heaters are calculated based on vendor-specified emission rates and vendor-specified fuel consumption for the heaters. NO_X, CO, and TOC factors are derived as follows:

Equation 1-16:[7]

$$NO_x, CO, TOC\ EF = ppmvd, 3\%\ O_2 \times \frac{lb/MMBtu}{ppmvd,3\%\ O_2} \times 1{,}020\,\frac{MMBtu}{MMscf} = \frac{lb}{MMscf}$$

1.3.4.2. Heater Emissions Factors – VOC, CH_4, and HAPs

VOC, CH_4, and HAP emissions are calculated using the TOC emission rate and AP-42 emission factors. Standard emission factors for TOC, VOC, CH_4, and HAP from natural gas fired heaters are provided in Chapter 1.4 of AP-42. Table 1.4-2 (version dated July 1998) provides a CH_4 emission factor for natural gas-fired external combustion sources. Instead, the TOC and VOC factors used in the calculations differ slightly from the factors provided in AP-42 Table 1.4-2. TOC and VOC factors are calculated as the sum of the factors for all speciated organic compounds listed in AP-42 Table 1.4-3 which are TOCs and VOCs, respectively. Table 1.4-3 of AP-42 (version dated July 1998) provides emission factors for the HAPs emitted from natural gas fired external combustion units.

Using the same ratio method used to calculate CH_4 and HAP emitted from turbines (detailed in Section 1.3.1.3), ratios for CH_4, HAP, and VOC emitted from heaters are based on the vendor-specified TOC emission rate.

1.3.4.3. Heater Emissions Factors – PM_{10}, $PM_{2.5}$, and SO_2

PM_{10} and $PM_{2.5}$ emitted by the heaters are calculated based on the emission factors listed in Table 1.4-2 of AP-42 (version dated July 1998) for natural gas fired external combustion sources. The total PM emission factor of 7.6 lb/MMscf, which includes filterable and condensable particulate, is used. It is assumed that all particulate emitted from natural gas combustion is less than 2.5 microns in diameters, so that PM equals PM_{10} and $PM_{2.5}$. The SO_2 emission factor of 0.6 lb/MMscf from Table 3.2-2 of AP-42 is used directly.

1.3.4.4. Heater Emission Factors – CO_2, N_2O, and CO_2e

CO_2 and N_2O emitted by the heaters are calculated based on the emission factors listed in 40 CFR 98, Subpart C, Tables C-1 and C-2. Equation 1-6 and Equation 1-8 show how factors in lb/MMscf are derived for these pollutants. GHGs emitted from the heaters include CO_2, CH_4, and N_2O. CO_2e emissions are calculated using the GWPs provided in Table 1-3.

1.3.5. Emergency Generator Emissions

NGT is proposing to install one new Waukesha (1,175 bhp) four stroke lean burn natural gas fired emergency generator or equivalent. The emergency generator potential emissions are calculated using 500

[7] Conversion factors in units of lb/MMBtu over ppmvd, 3% O_2 are obtained from the North American Combustion Handbook.

hours per year, which includes maintenance and testing, based on standard guidance from USEPA.[8] Table 1-6 provides information on the emission factors used to calculate emissions from the emergency generator.

Table 1-6. Waukesha Emergency Generator Emission Factors

Pollutant	Emission Factor from Source	Source
NO_X	2.0 g/bhp-hr	NSPS Subpart JJJJ
CO	4.0 g/bhp-hr	NSPS Subpart JJJJ
VOC	1.0 g/bhp-hr	VOC (without formaldehyde): NSPS Subpart JJJJ Table 3.2-2 of AP-42 (July 2000)
CH_4	1.0 g VOC/bhp-hr 1.25 lb/MMBtu (HHV)	VOC: NSPS Subpart JJJJ Table 3.2-2 of AP-42 (July 2000)
$PM_{10}/PM_{2.5}$	0.00999 lb/MMBtu (HHV)	Table 3.2-2 of AP-42 (July 2000)
SO_2	0.000588 lb/MMBtu (HHV)	Table 3.2-2 of AP-42 (July 2000)
CO_2	53.06 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-1 (effective January 2014)
N_2O	0.0001 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-2 (effective January 2014)
Total HAPs	1.0 g VOC/bhp-hr Multiple HAP factors	VOC: NSPS Subpart JJJJ Table 3.2-2 of AP-42 (July 2000)

In order to calculate hourly emissions, the emission factors provided in Table 1-6 are converted to factors in lb/MMscf. These converted factors are multiplied by the generator's hourly fuel consumption in scf/hr to obtain hourly emissions. The following sections summarize the methods used to obtain lb/MMscf emission factors for each pollutant emitted from the new emergency generator.

1.3.5.1. Emergency Generator Emission Factors – NO_X, CO, and VOC

NO_X, CO, and VOC emitted by the emergency generator are calculated based on the emission limits established under NSPS Subpart JJJJ in grams per brake horsepower-hour (g/bhp-hr) for emergency engines greater than 130 hp installed on and after January 1, 2009.[9]

The VOC emission limit of 1.0 g/bhp-hr in NSPS Subpart JJJJ excludes formaldehyde.[10] A VOC factor inclusive of formaldehyde is calculated using the relative emissions of formaldehyde and VOC provided in Table 3.2-2 of AP-42 (version dated July 2000). A VOC factor is calculated as the sum of the factors for all trace organic compounds listed in Table 3.2-2 which are VOCs. Formaldehyde emissions are proportional to VOC emissions, because formaldehyde is a constituent of VOC. The VOC factor is adjusted to account for formaldehyde as follows:

[8] NGT will limit the operation of the emergency engine for maintenance checks and readiness testing to no more than 100 hr/yr as per 40 CFR 60.4243(d)(2), to be defined as an emergency engine under NSPS Subpart JJJJ.

[9] Per Table 1 to Subpart JJJJ of Part 60.

[10] Per footnote "d" of Table 1 to Subpart JJJJ of Part 60.

Equation 1-17:

$$VOC\ EF = \frac{1.0\ g\ VOC\ (without\ formaldehyde)}{bhp-hr} \times \frac{\left(\frac{0.119\ lb\ VOC}{MMBtu}\right)}{\left(\frac{0.119\ lb\ VOC}{MMBtu} - \frac{0.0528\ lb\ formaldehyde}{MMBtu}\right)}$$
$$= 1.79\ \frac{g}{bhp-hr}$$

Vendor-specified power output and fuel consumption for the engine are used to convert the g/bhp-hr factors to a lb/MMBtu emission factor.

NO_X, CO, and VOC factors are derived as follows:

Equation 1-18:

$$NO_x, CO, VOC\ EF = \frac{g}{bhp-hr} \times \frac{lb}{453.6\ g} \times hp \times \frac{hr}{scf\ fuel} \times \frac{1{,}000{,}000\ scf}{MMscf} = \frac{lb}{MMscf}$$

1.3.5.2. Emergency Generator Emission Factors – CH_4 and HAP

CH_4 and HAP emissions are calculated using the VOC emission rate and AP-42 emission factors. Standard emission factors for VOC, CH_4, and HAP from natural gas fired engines are provided in Chapter 3.2 of AP-42. Table 3.2-2 (version dated July 2000) provides emission factors for VOC, CH_4, and HAPs from four stroke lean burn natural gas-fired engines.

Using the same ratio method used to calculate CH_4 and HAP emitted from turbines (detailed in 1.3.1.3), the ratio of CH_4 and HAP emitted from engines is based on the VOC emission rate from NSPS Subpart JJJJ.

1.3.5.3. Emergency Generator Emission Factors – PM_{10}, $PM_{2.5}$, and SO_2

PM_{10} and $PM_{2.5}$ emitted by the emergency generator are calculated based on the emission factors listed in Table 3.2-2 of AP-42 (version dated July 2000) for natural gas fired engines. PM_{10} and $PM_{2.5}$ emission factors are calculated as the sum of the filterable and condensable PM emission factors. The SO_2 emission factor utilized is also obtained from Table 3.2-2 of AP-42.

1.3.5.4. Emergency Generator Emission Factors – CO_2, N_2O, and CO_2e

CO_2 and N_2O emitted by the emergency generator are calculated based on the emission factors listed in 40 CFR 98, Subpart C, Tables C-1 and C-2 (effective January 1, 2014). GHGs emitted from the engine include CO_2, CH_4, and N_2O. CO_2e emissions are calculated using the GWPs provided in Table 1-3.

1.3.6. Miscellaneous Support Equipment

Fugitive emissions and gas releases at the Hanoverton Compressor Station will occur as a result of the proposed project. The methodologies used to calculate this potential increase are described in the following sections.

1.3.6.1. Emissions from Piping Components

Fugitive emissions from equipment leaks will occur during operation of the Hanoverton Compressor Station due to the installation of equipment and piping components. While the design is not yet final, component counts were estimated based on data from similar sized compressor stations. Components will include flanges, connectors, valves, open-ended lines, compressor seals, pump seals, etc.

Potential emissions are calculated from the piping components using emission factors from EPA's Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017), Table 2-4 (November 1995) which provides leak emission factors for oil and gas production operations. Gas service factors are used for components in natural gas service, light oil service factors are used for components in pipeline liquids service (e.g. condensate), and heavy oil service factors are used for components in oil service (e.g. oils on-site). Since an emission factor is not provided for leaks from pump seals in heavy oil service in Table 2-4, the average SOCMI without ethylene emission factor for pumps in heavy oil service from Table 2-1 is used to estimate emissions. Annual emissions are conservatively calculated assuming that the components are in continuous gas/liquid/oil service as follows:

Equation 1-19:

$$\text{Total Gas Emissions} = \#\ of\ components \times \frac{\frac{kg}{hr}}{component} \times \frac{8{,}760\ hrs}{yr} \times \frac{1{,}000\ g}{kg} \times \frac{lb}{453.6\ g} \times \frac{2{,}000\ ton}{lb}$$

$$= \frac{tons}{yr}$$

The equation above is used to calculate total fugitive gas emitted from the piping components at the Hanoverton Compressor Station. Emissions of individual VOCs, GHGs, and HAPs are calculated by multiplying the total fugitive gas emissions from piping components in gas, pipeline liquid, and oil service by the weight percent of each pollutant in gas, pipeline liquids, and oil. Gas, pipeline liquid, and oil compositions are engineering estimates based on available worst case data to be conservative.[11, 12]

1.3.6.2. Emissions from Gas Releases

Gas releases due to periodic blowdown of the new turbine-driven compressor units and other events occur with station operation. The majority of emissions from gas release events are associated with routine operations such as startup and shutdown, reduced pressure demand events, or maintenance activities. The potential volume of gas emitted was estimated in standard cubic feet per year based on the design data for other compressor stations. Emissions of individual VOCs, GHGs, and HAPs are calculated by multiplying the total gas emissions from gas releases by the weight percent of each pollutant in the natural gas compressed at the facility.[13]

[11] Oil is assumed to be 100 percent VOC and contain no GHGs or HAPs. Pipeline liquids composition is based on the composition of residual liquids following flashing, calculated based on a laboratory analysis of flashing from an operation in Atlanta, Texas in April 2009.

[12] Natural gas composition is conservatively estimated based on an extended gas analysis taken from a representative metering station.

[13] Ibid.

1.3.6.3. Emissions from Separator Vessels and Condensate Storage Tanks

Although stabilized condensate has no flashing losses, flashing losses do occur when the pressure of a liquid is decreased or the temperature is increased. At the Hanoverton Compressor Station, flashing losses occur at pipeline liquids storage tanks and include VOCs, GHGs, and HAPs. Total flashing losses are calculated based on a flash gas rate and a representative flash gas density. The flash gas rate is calculated based on a liquids input rate and a flash factor.[14] Emissions of individual VOCs, GHGs, and HAPs are calculated from total flashing losses using a representative pipeline liquids compositions.

Working and breathing losses occur at all tanks at the Hanoverton Compressor Station, including pipeline liquid tanks, lubricating oil tanks, and oil-water separators. Working and breathing losses include VOCs, GHGs, and HAPs and are calculated with EPA's TANKS 4.09d program using maximum potential throughputs for each tank.

1.3.6.4. Emissions from Truck Loading

Emissions occur during the loading of volatile organic liquids into tanker trucks and include VOCs, GHGs, and HAPs. Total loading losses are calculated based on calculation methods for submerged filling provided in AP-42 Section 5.2 (version dated January 1995). Emissions of individual VOCs, GHGs, and HAPs are calculated from total loading losses using representative pipeline liquids and lubricating oil compositions.

1.3.6.5. Parts Washer Emissions

NGT is proposing to install a new remote reservoir parts washer. Potential emissions from the parts washer are calculated based on the physical and chemical properties of a worst-case representative solvent used in the parts washer and the maximum throughput of the parts washer. In order to conservatively calculate potential emissions, it is assumed that all volatile organic compounds in the solvent are emitted to the atmosphere and that the VOC content is 100 percent. The maximum throughput of the parts washer will be 120 gallons of solvent per year, based on past experience and the addition of a safety factor. A worst-case specific gravity is assumed based on typical solvents used.

Potential VOC emissions from the parts washer are calculated as follows:

Equation 1-20:

$$VOC = 120\frac{gal\ solvent}{year} \times (0.82\ \times 8.34\frac{lb}{gal})\ \times 1\frac{lb\ VOC}{lb\ solvent} = 0.4103\frac{tons\ VOC}{yr}$$

[14] The liquids input rate is determined based on operator experience with the incorporation of a safety factor, and the flash factor in standard cubic foot per barrel (scf/bbl) was determined in a laboratory analysis of a gas sample taken from Atlanta, Texas.

This section of the permit application includes a discussion of potentially applicable federal and state air quality permitting and regulatory requirements.

2.1. FEDERAL REGULATORY APPLICABILITY

2.1.1. Prevention of Significant Deterioration Applicability

The applicability of the Prevention of Significant Deterioration (PSD) permitting program is evaluated for proposed construction, reconstruction, and modification projects that result in an emission increase of a regulated New Source Review (NSR) pollutant for which the area is in attainment with the National Ambient Air Quality Standards (NAAQS). Columbiana County has been designated as "attainment" or "unclassifiable" for all regulated NSR pollutants.[15] Natural gas compressor stations are not among the 28 listed source categories in OAC 3745-31-01(NNN)(2)(a); therefore the facility is subject to the PSD major source threshold of 250 tpy provided in OAC 3745-31-01(NNN)(2)(b). As demonstrated in Table 1-1, the proposed Hanoverton Compressor Station will be a minor source of criteria pollutants with respect to the PSD permitting program.

2.1.2. GHG Tailoring Rule Applicability

Additionally, the final PSD and Title V Greenhouse Gas (GHG) Tailoring Rule was published in the Federal Register on June 3, 2010 (75 FR 31514) but was ultimately overturned on June 23, 2014 by the US Supreme Court.[16] Under the formerly effective rule, GHGs could, as of July 1, 2011, become "subject to regulation" under the PSD program for construction projects that would result in potential GHG emissions of 100,000 tpy carbon dioxide equivalents (CO_2e) or more. However, the June 23, 2014 Supreme Court Decision clarifies that construction projects cannot trigger major NSR for GHGs unless major NSR is otherwise triggered for criteria pollutants.[17] Furthermore, in accordance with OAC 3745-31-34(C)(2), Ohio EPA's permit to install permitting requirements for GHGs cease to be effective if a federal court issues a ruling limiting the administrator's authority to regulate GHGs under the Clean Air Act.

[15] Attainment designations for Ohio counties are established in 40 CFR 81.336.

[16] As defined in 40 CFR 98.6, regulated GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).

[17] On June 23, 2014, the U.S. Supreme Court issued its decision in *Utility Air Regulatory Group v. EPA* (No. 12-1146). The Court said that EPA may not treat greenhouse gases as an air pollutant for purposes of determining whether a source is a major source required to obtain a PSD or Title V permit. The Court also said that PSD permits that are otherwise required (based on emissions of other pollutants) may continue to require limitations on greenhouse gases emissions based on the application of Best Available Control Technology (BACT). EPA is currently evaluating the implications of the Court's decision and awaiting further action by the U.S. Courts. [adapted from 7/24/14 letter from Janet G. McCabe, U.S. EPA, Acting Administrator, to Regional Administrators, "Next Steps and Preliminary Views on the Application of Clean Air Act Permitting Programs to Greenhouse Gases Following the Supreme Court's Decision in *Utility Air Regulatory Group v. Environmental Protection Agency*].

2.1.2.1. Ohio EPA GHG Permitting Status

On June 23, 2014, the U.S. Supreme Court issued a decision addressing stationary source permitting requirements for greenhouse gases (GHGs).[18] Subsequently, on July 24, 2014, Janet McCabe, Acting Assistant Administrator, Office of Air and Radiation, U.S. EPA issued preliminary guidance concerning the impact of the decision on various aspects of the court decision.[19] The Supreme Court decision and subsequent U.S. EPA guidance changes how Ohio EPA permits GHG sources. Ohio EPA has issued Engineering Guide #85 that discusses the revised approach Ohio EPA will use to regulate GHGs through the air pollution permitting program.[20] Therefore, emission of GHGs do not trigger permitting for the proposed project.

2.1.3. Title V Operating Permit Program Applicability

The Title V operating permit program consolidates state and federal requirements applicable to major sources into a single comprehensive operating permit for the purposes of facilitating ongoing compliance. In accordance with OAC 3745-77, sources with a PTE of 100 tpy or more for criteria pollutants, 25 tpy or more for total HAP, or 10 tpy or more for individual HAP are considered major sources for which applicants must obtain a Title V operating permit.

As mentioned previously, the final PSD and Title V Greenhouse Gas (GHG) Tailoring Rule was published in the Federal Register on June 3, 2010 (75 FR 31514) but was ultimately overturned on June 23, 2014 by the U.S. Supreme Court. Under the formerly effective rule, GHGs could, as of July 1, 2011, become "subject to regulation" under the Title V program for facilities that have a GHG potential to emit of 100,000 tpy CO_2e or more.

U.S. EPA has since issued guidance following the U.S. Supreme Court ruling indicating that, "EPA will no longer apply or enforce federal regulatory provisions or provisions of the EPA-approved Title V programs that require a stationary source to obtain a title V permit solely because the source emits or has the potential to emit greenhouse gases above the major source thresholds." EPA also clarifies in this guidance that, "The EPA also does not intend to continue applying regulations that would require Title V programs submitted for approval by the EPA to require that such sources obtain Title V permits."[21]

Furthermore, in accordance with OAC 3745-77-11(D)(2), Ohio EPA's Title V permitting requirements for greenhouse gases cease to be effective if a federal court issues a ruling limiting the administrator's authority to regulate greenhouse gases under the Clean Air Act**. As a result, the GHG PTE for Hanoverton Compressor Station cannot trigger major source applicability under the Title V permitting program.**

Finally, Table 1-1 shows that facility-wide emissions will not exceed Title V thresholds for criteria pollutants or HAP; therefore, NGT will not be required to obtain a Title V operating permit for the Hanoverton Compressor Station.

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[18] http://www.supremecourt.gov/opinions/13pdf/12-1146_4g18.pdf

[19] http://www.epa.gov/nsr/documents/20140724memo.pdf

[20] A copy of this guidance can be found on the web at: http://epa.ohio.gov/dapc/engineer/eguides.aspx.

[21] U.S. EPA memorandum from Ms. Janet G. McCabe to U.S. EPA Regional Administrators dated July 24, 2014.

2.1.4. New Source Performance Standards

NSPS require new, modified, or reconstructed sources in specified source categories to control emissions to the level achievable by the best demonstrated technology as specified in the applicable provisions. Any source subject to an NSPS is also subject to the general provisions of NSPS Subpart A, except as noted.

2.1.4.1. 40 CFR 60, Subpart A - General Provisions – Applicable

All affected sources subject to source specific NSPS are subject to the general provisions of NSPS Subpart A unless specifically excluded by the source-specific NSPS. Subpart A requires initial notification, performance testing, recordkeeping and monitoring, provides reference methods, and mandates general control device requirements for all other subparts as applicable.

2.1.4.2. 40 CFR 60, Subpart D – Fossil-Fuel-Fired Steam Generators – Not Applicable

NSPS Subpart D applies to fossil fuel-fired steam generating units with a heat input capacity greater than or equal to 250 MMBtu/hr that have been constructed or modified since August 17, 1971. The rule defines a fossil fuel-fired steam generating unit as:[22]

> *A furnace or boiler used in the process of burning fossil fuel for the purpose of producing steam by heat transfer.*

The combustion turbines will not be subject to Subpart D, because:

1. Each turbine has a heat input capacity less than 250 MMBtu/hr;
2. The turbines do not burn fossil fuel for the purpose of producing steam; and

Per 40 CFR 60.40(e), units that are subject to 40 CFR 60 Subpart KKKK, which includes the Hanoverton Compressor Station's combustion turbines, are not subject to 40 CFR 60 Subpart D.

2.1.4.3. 40 CFR 60, Subpart Da – Electrical Utility Steam Generating Units – Not Applicable

This regulation applies to electric utility steam generating units with a heat input capacity greater than 250 MMBtu/hr for which construction, reconstruction, or modification commenced after September 18, 1978. Since the NEXUS Gas Transmission combustion turbines will neither generate steam nor produce electricity for sale to the grid, and since each turbine will have a heat input capacity less than 250 MMBtu/hr, the units are not subject to Subpart Da. Furthermore, per 40 CFR 60.40Da(e)(1) units that meet the applicability requirements of and are subject to 40 CFR 60 Subpart KKKK, which includes the Hanoverton Compressor Station combustion turbines, are not subject to 40 CFR 60 Subpart Da.

[22] 40 CFR 60.41

2.1.4.4. 40 CFR 60, Subpart Db - Industrial Commercial – Institutional Steam Generating Units – Not Applicable

NSPS Subpart Db provides standards for steam generating units with a heat input capacity greater than 100 MMBtu/hr that commenced construction, reconstruction, or modification after June 19, 1984. The term "steam generating unit" is defined under this regulation as:[23]

> *A device that combusts any fuel and produces steam or heats water or any other heat transfer medium.*

The combustion turbines will each have a heat input capacity greater than 100 MMBtu/hr; however, as previously stated, the units are not steam generating units. Furthermore, per 40 CFR 60.40b(i) units that meet the applicability requirements of 40 CFR 60 Subpart KKKK, which includes the Hanoverton Compressor Station's combustion turbines, are not subject to 40 CFR 60 Subpart Db.

2.1.4.5. 40 CFR 60, Subpart Dc – Small Industrial-Commercial-Institutional Steam Generating Units- Not Applicable

NSPS Subpart Dc applies to steam generating units for which construction, modification, or reconstruction is commenced after June 9, 1989 and that have a maximum design heat input capacity of greater than or equal to 10 MMBtu/hr and less than or equal to 100 MMBtu/hr. The Process Heaters #1 and 2 (B001 and B002) are each sized to a maximum heat input capacity less than 10 MMBtu/hr. As each heater will have a heat input capacity well below 10 MMBtu/hr, they are not subject to Subpart Dc.

2.1.4.6. 40 CFR 60, Subpart Kb – Volatile Organic Liquid Storage Vessels Constructed, Reconstructed, or Modified after July 23, 1984 – Not Applicable

Affected sources under 40 CFR 60, Subpart Kb (NSPS Kb) include all storage vessels with capacities of at least 75 cubic meters (m^3) (19,813 gallons) storing volatile organic liquids (VOL) constructed, reconstructed, or modified after July 23, 1984.

The Separator Vessels #1-5 (P005-P009) and the Storage Vessels #1-4 (T001-T004) are each sized to a nominal storage capacity less than 19,813 gallons which is less than the NSPS threshold; therefore, Subpart Kb is not applicable.

2.1.4.7. 40 CFR 60, Subpart GG – Stationary Gas Turbines – Not Applicable

NSPS Subpart GG applies to gas-fired combustion turbines constructed or modified after October 3, 1977 with heat input equal to or greater than 10 MMBtu/hr based on lower heating value. However, NSPS Subpart GG has been superseded by a newer subpart (KKKK) that exempts subject units from NSPS Subpart GG [40 CFR 60.4305(b)]. The proposed combustion turbines at the Hanoverton Compressor Station are subject to the requirements of NSPS KKKK (refer to the discussion in Section 2.1.4.11 below) and are, therefore, exempt from NSPS Subpart GG.

[23] 40 CFR 60.41b

2.1.4.8. 40 CFR 60, Subpart KKK – Equipment Leaks of VOC from Onshore Natural Gas Processing Plants – Not Applicable

NSPS Subpart KKK applies to equipment leaks from natural gas processing plants that were constructed after June 20, 1984 but before August 23, 2011. The facility is not a natural gas processing plant (as defined in 40 CFR 60.631). Therefore, this subpart does not apply.

2.1.4.9. 40 CFR 60, Subpart LLL – SO_2 Emissions from Onshore Natural Gas Processing Plants – Not Applicable

NSPS Subpart LLL applies to onshore natural gas processing facilities that contain sweetening units that commence construction or modification after January 20, 1984. The Hanoverton Compressor Station is not a natural gas processing plant and will not contain any sweetening units, as defined in 40 CFR 60.641, and therefore is not subject to this subpart.

2.1.4.10. 40 CFR 60, Subpart JJJJ – Spark Ignition Internal Combustion Engines - Applicable

NSPS Subpart JJJJ establishes requirements for owners or operators of spark ignition internal combustion engines that commence construction, modification, or reconstruction after June 12, 2006 (the date the engine is ordered constitutes construction). The spark ignition internal combustion engine (P003) used at this facility will be considered an emergency stationary internal combustion engine, as defined by 40 CFR 60.4248, and will be constructed and manufactured after the dates mentioned above; therefore, it is subject to the provisions of NSPS Subpart JJJJ.

Per 40 CFR 60.4233(e) the unit will meet the emission standards specified in Table 1 of Subpart JJJJ. NGT will ensure that the engine satisfies the monitoring requirements specified in 40 CFR 60.4237(a) by installing a non-resettable hour meter. NGT will also ensure that the Emergency Generator (P003) satisfies the compliance requirements for periodic testing and maintenance specified in 40 CFR 60.4243(b)(2), the operational restrictions for emergency engines in 40 CFR 60.4243(d), and the notification, reporting and recordkeeping requirements specified in 40 CFR 60.4245.

2.1.4.10.1. *Emission Limits*

The emergency generator will be subject to the following emissions standards from Table 1 of Subpart JJJJ (emergency engines greater than 130 hp):[24]

- NO_X: 2.0 g/hp-hr or 160 ppmvd @15% O_2
- CO: 4.0 g/hp-hr or 540 ppmvd @15% O_2
- VOC: 1.0 g/hp-hr or 86 ppmvd @15% O_2

2.1.4.10.2. *Testing*

NGT will comply with the requirements for a non-certified generator pursuant to 40 CFR 60.4243(a)(2)(iii), including conducting an initial performance test within one year of startup and subsequent tests every 8,760 hours or three (3) years, whichever comes first. 40 CFR 60.4245(d) requires the submittal of a copy of the performance test within 60 days of its completion.

[24] 40 CFR 60.4233(e) Emission standards for operators of stationary SI ICE with a maximum engine power greater than 100 HP

2.1.4.10.3. *Monitoring, Recordkeeping, and Reporting*

Since the engine will be used as an emergency generator, a non-resettable hour meter is required.[25] Per 40 CFR 60.4243(d), emergency engines are allowed to be operated according to the following time constraints:

There is no time limit on use in emergency situations.
The emergency ICE can operate for up to 100 hours per year total for the following reasons:

- Maintenance checks and readiness testing, provided that the tests are recommended by federal, state, or local government, the manufacturer, the vendor, the regional transmission organization or equivalent balancing authority and transmission operator, or the insurance company associated with the engine;
- Emergency demand response for periods specified in 40 CFR 60.4243(d)(2)(ii); and
- Periods where there is a deviation of voltage or frequency of 4 percent or greater below standard voltage or frequency.

The emergency ICE can operate for up to 50 hours per year in non-emergency situations. The 50 hours of operation in non-emergency situations are counted as part of the 100 hours per year for maintenance and testing and emergency demand response described in the previous bullet point.

NGT will track the engine's run time and the reason for use in order to demonstrate compliance with the run time requirements.[26]

Initial notification is required for this engine, which is a non-certified RICE greater than 500 hp[27]. Since performance testing is required, advanced notification and results reporting are required, in addition to semiannual compliance reports.

2.1.4.11. 40 CFR 60, Subpart KKKK – Stationary Combustion Turbines - Applicable

NSPS Subpart KKKK applies to combustion turbines constructed, modified, or reconstructed after February 18, 2005 with heat input equal to or greater than 10 MMBtu/hr based on the higher heating value of the fuel [40 CFR 60.4305(a)]. The proposed combustion turbines for the Hanoverton Compressor Station have heat inputs greater than 10 MMBtu/hr. Therefore, the combustion turbines are subject to NSPS Subpart KKKK. As provided in 40 CFR 60.4305(b), the combustion turbines are exempt from NSPS Subpart GG. The applicable requirements for each pollutant are outlined in the following subsections.

2.1.4.11.1. *NO_X Emission Limits*

Units subject to the requirements of Subpart KKKK must meet the emissions standards listed in Table 1 of the subpart [40 CFR 60.4320(a)]. New turbines firing natural gas with a heat input capacity greater than 50 MMBtu/hr and less than 850 MMBtu/hr are required to limit NO_X emissions to less than 25 ppm at 15 percent (%) O_2 [Table 1 to Subpart KKKK of Part 60]. The proposed combustion turbines at the

[25] 40 CFR 60.4237(a)

[26] 40 CFR 60.4245(b)

[27] 40 CFR 60.4245(c)

Hanoverton Compressor Station are designed with maximum NO_X emissions of 9 ppm at 15% O_2, which is lower than the applicable NSPS emission limits.

- NO_X Emissions:[28,29]
  - 25 ppm at 15% O_2; OR
  - 150 ng/J (1.2 lb/MWh) of useful output

2.1.4.11.2. *SO_2 Emission Limits*

In accordance with 40 CFR 60.4330(a), each combustion turbine must comply with one of the following:

1. Limit emissions to less than 110 nanograms per Joule (ng/J) of SO_2 (0.90 lb/MWh) gross output; or
2. Burn fuel which contains total potential sulfur emissions equal to or less than 26 ng/J of SO_2 (0.060 lb/MMBtu HHV) heat input.

The SO_2 limits will be met by firing only pipeline quality natural gas in the combustion turbine, which will satisfy the requirements of 40 CFR 60.4330(a)(2).

2.1.4.11.3. *Monitoring and Testing Requirements*

Pursuant to 40 CFR 60.4333(a), both new turbines, their air pollution control equipment, and their monitoring equipment will be maintained in a manner that is consistent with good air pollution control practices for minimizing emissions. This requirement applies at all times including during startup, shutdown, and malfunction.

Since the turbines will not be equipped with water or steam injection, NGT will perform the required initial and annual performance testing to demonstrate compliance with the NO_X emission limit.[30] If the results of a NO_X performance test are under 75% of the NO_X emissions limits, then the Hanoverton Compressor Station will only be required to perform the performance tests for that turbine every two years (no more than 26 calendar months following the previous performance test), provided that subsequent performance test results are less than 75% of the emission limit. If the results of subsequent performance tests indicate NO_X emissions greater than 75% of the limit, then annual performance testing for NO_X will resume.[31] The Hanoverton Compressor Station may also choose to install, calibrate, and maintain continuous emissions monitoring systems (CEMS) for NO_X on the turbines and operate them in accordance with NSPS Subpart A and Subpart KKKK, in which case NO_X performance testing will not be required.[32] However, at this time the Hanoverton Compressor Station elects not to install CEMS and plans to verify compliance using stack tests.

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[28] 40 CFR 60.4320(a) and Table 1 to Subpart KKKK

[29] Subpart KKKK, Table 1 also includes a NO_X limit of 150 ppmvd at 15% O_2 or 8.7 lb/MWh for turbine operation at temperatures less than 0°F and turbine operation at loads less than 75% of peak load which the new turbine will meet.

[30] Per 40 CFR 60.8(a), the initial NO_X performance tests for the new/modified turbines are required to be conducted within 60 days after achieving the maximum production rate (i.e. the turbine's maximum rated heat output), but no later than 180 days after initial startup.

[31] 40 CFR 60.4340(a)

[32] 40 CFR 60.4340(b)(1)

For compliance with the SO_2 emission limit, facilities are required to perform regular determinations of the total sulfur content of the combustion fuel and to conduct initial and annual compliance demonstrations. The total sulfur content of gaseous fuel combusted in the turbines must be determined and recorded once per operating day or using a custom schedule as approved by Ohio EPA;[33] however, the Hanoverton Compressor Station can elect to opt out of this provision of the rule by using a fuel that is demonstrated not to exceed potential sulfur emissions of 0.060 lb/MMBtu SO_2.[34] This demonstration can be made using one of the following methods:

1. By using a purchase contract specifying that the fuel sulfur content for the natural gas is less than or equal to 20 grains of sulfur per 100 standard cubic feet and results in potential emissions not exceeding 0.060 lb/MMBtu.
2. By using representative fuel sampling data which show that the sulfur content of the fuel does not exceed 0.060 lb SO_2/MMBtu heat input. At a minimum, the amount of fuel sampling data specified in Section 2.3.1.4 or 2.3.2.4 of Appendix D to Part 75 is this chapter is required.

Pursuant to 40 CFR 60.4365(a), in order to demonstrate continuous compliance with the applicable 0.060 lb/MMBtu potential SO_2 emissions limit, the Hanoverton Compressor Station, will obtain a current tariff sheet for the fuel specifying that the maximum total sulfur content for natural gas use is 20 grains of sulfur or less per 100 scf and potential sulfur emissions are less than 26 ng SO_2/J (0.060 lb SO_2/MMBtu) heat input for continental areas.

2.1.4.11.4. *Reporting Requirements*

Pursuant to 40 CFR 60.4375(b), since the Hanoverton Compressor Station will be conducting annual performance testing in accordance with 40 CFR 60.4340(a), a written report of the results of each performance test will be submitted to Ohio EPA and the USEPA before the close of business on the 60th day following the completion of the performance test.

Per 40 CFR 60.7(a)(1), the Hanoverton Compressor Station will submit notification of the date construction of each new turbines commenced. The submittal will be postmarked by no later than 30 days after the commencement of construction date. Per 40 CFR 60.7(a)(3), the submittal of the notification of the actual date of initial startup of each new turbine will be postmarked by no later than 15 days after the initial startup date.

2.1.4.12. 40 CFR 60, Subpart KKKK – Stationary Combustion Turbines – Proposed Amendments - Applicable

On August 29, 2012, U.S. EPA published proposed amendments to the Standards of Performance for Stationary Combustion Turbines established in 40 CFR 60, Subpart KKKK (NSPS KKKK).[35] These proposed amendments have yet to be finalized and are not currently effective, but because the effective date will be established as the proposal date (i.e., August 29, 2012) once finalized, the following section evaluates the applicability of the amended standards of NSPS KKKK. NGT requests that the PTIO for the Hanoverton

[33] 40 CFR 60.4370(b) and (c)

[34] 40 CFR 60.4365

[35] 77 FR 52564

Compressor Station include language acknowledging the proposed amendments to NSPS KKKK and clarifying that the affected combustion turbines will comply with the final effective requirements of NSPS KKKK upon promulgation.

According to the amended provisions of 40 CFR 60.4305(a), affected sources under NSPS KKKK include stationary combustion turbines constructed, modified, or reconstructed after February 18, 2005, rated at a heat input of at least 10 MMBtu/hr. The proposed combustion turbines for the Hanoverton Compressor Station have heat inputs greater than 10 MMBtu/hr. Therefore, the combustion turbines are subject to NSPS Subpart KKKK. The applicable requirements for each pollutant under the proposed rule are outlined in the following subsections.

2.1.4.12.1. *NO_X Emission Limits*

In accordance with the amended standards of 40 CFR 60.4320(a) and (c), NGT must identify for each hour of operation the NO_X emission standard applicable to new mechanical drive turbines firing only natural gas with a heat input capacity greater than 50 MMBtu/hr as provided in Table 2-1. These NO_X limits are applicable to each combustion turbine during all periods of operation including startups, shutdowns, and malfunctions as specified in 40 CFR 60.4320(e).

Table 2-1. NO_X Emission Standards for Various Operating Scenarios

Operating Scenario	Heat Input Limit (lb/MMBtu)	NO_X Conc. Limit (ppmvd)
At least 75% of base load	0.093	25
Less than 75% of base load or during Startup or Shutdown	0.59	150

a. These limits are established in Table 1 of the proposed amendments to NSPS KKKK.

NGT will not use water injection, steam injection, or post-combustion controls to reduce NO_X emissions from the combustion turbines. Therefore, in accordance with 40 CFR 60.4333(c)(2) and 4340(a)(1), NGT will demonstrate compliance with the applicable emissions limitation by conducting stack tests pursuant to the requirements of 40 CFR 60.4333(b) and 4400. The required frequency of stack tests will depend on the result of the initial test.

2.1.4.12.2. *SO_2 Emission Limits*

In accordance with 40 CFR 60.4330(a) and (g), each combustion turbine must comply with one of the following:

1. Limit emissions to less than 110 ng/J of SO_2 (0.90 lb/MWh) gross output; or
2. Burn fuel which contains total potential sulfur emissions equal to or less than 26 ng/J of SO_2 (0.060 lb/MMBtu HHV) heat input.

NGT may establish compliance by either monitoring the total sulfur content of the fuel in accordance with 40 CFR 60.4360 and 60.4365 or demonstrate that the natural gas does not exceed 0.060 lb SO_2/MMBtu heat input using one of the methods identified in 40 CFR 60.4370.

If NGT elects to demonstrate compliance with the SO_2 limitations using the procedures in 40 CFR 60.4370, personnel at the Hanoverton Compressor Station must maintain on-site records (e.g., purchase contracts, tariff sheets, or transportation contracts) documenting that the total sulfur content of the natural gas combusted in the turbines does not exceed 0.060 lb/MMBtu or must maintain representative fuel sampling data collected in accordance with Section 2.3.1.4 or 2.3.2.4 in Appendix D to 40 CFR 75 documenting that the fuel meets the requirements to be considered either pipeline natural gas or natural gas.

2.1.4.13. 40 CFR 60, Subpart OOOO – Crude Oil and Natural Gas Production, Transmission, and Distribution – Not Applicable

NSPS Subpart OOOO establishes emission standards and compliance schedules for the control of VOC and SO_2 emissions from affected facilities that commence construction, modification or reconstruction after August 23, 2011. Affected facilities include certain units and operations located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment. "Custody transfer" is defined under 40 CFR 60.5430 as the transfer of natural gas after processing and/or treatment in the producing operations, or from storage vessels or automatic transfer facilities or other such equipment, including product loading racks, to pipelines or any other forms of transportation. "Natural gas transmission" is defined under 40 CFR 60.5430 as the pipelines used for long distance transport of natural gas (excluding processing). Specific equipment used in natural gas transmission includes the land, mains, valves, meters, boosters, regulators, storage vessels, dehydrators, compressors, and their driving units and appurtenances, and equipment used for transporting gas from a production plant, delivery point of purchased gas, gathering system, storage area, or other wholesale source of gas to one or more distribution area(s). NGT will gain custody of natural gas from production operations, or at "the point of custody transfer." NGT and its operations, including the Hanoverton Compressor Station, will be located in the natural gas transmission segment.[36]

Affected facilities include storage vessels located in the natural gas transmission and storage segment that have the potential for VOC emissions equal to or greater than 6 tpy per 40 CFR 60.5365(e). This requirement specifies that,

> *"The potential for VOC emissions must be calculated using a generally accepted model or calculation methodology, based on the maximum average daily throughput determined for a 30-day period of production prior to the applicable emission determination deadline specified in this section. The determination may take into account requirements under a legally and practically enforceable limit in an operating permit or other requirement established under a Federal, State, local or tribal authority."*

The Separator Vessels #1-5 (P005-P009) and the Storage Vessels #1-4 (T001-T004) each will have an annual potential to emit VOC that is less than 6 tpy, and are therefore not subject to the requirements of this subpart.

[36] The Hanoverton Compressor Station will be classified as a natural gas transmission facility, with a SIC code of 4922, and a NAICS code of 486210.

2.1.4.14. Non-Applicability of All Other NSPS

NSPS standards are developed for particular industrial source categories and the applicability of a particular NSPS to a facility can be readily ascertained based on the industrial source category covered. All other NSPS are categorically not applicable to the proposed project.

2.1.5. National Emission Standards for Hazardous Air Pollutants

National Emission Standards for Hazardous Air Pollutants (NESHAPs), located in 40 CFR 63 of the Federal Code of Regulations, are typically applicable to specific categories of sources that have the potential to emit Hazardous Air Pollutants (HAPs) in levels greater than 10 tpy for any individual HAP or 25 tpy for any combination of HAP (i.e., major HAP sources). Emissions and operational limitations provided in the NESHAPs are established on the basis of a Maximum Achievable Control Technology (MACT) determination for a particular major source category.

Furthermore, generally available control technology (GACT)-based NESHAPs (located in 40 CFR 63) require area (i.e., non-major) sources to control emissions to the level achievable by the use of generally available control technologies or management practices to reduce emissions of HAP.

The Hanoverton Compressor Station will operate as an area (i.e., non-major) source of HAP as demonstrated in Table 1-1. Each potentially applicable subpart of 40 CFR Part 63 is discussed in the subsections below.

2.1.5.1. 40 CFR 63, Subpart A – General Provisions - Applicable

NESHAP Subpart A, *General Provisions*, contains national emission standards for HAP defined in Section 112(b) of the Clean Air Act. All affected sources, which are subject to another NESHAP, are subject to the general provisions of NESHAP Subpart A, unless specifically excluded by the source-specific NESHAP.

2.1.5.2. 40 CFR 63, Subpart T – Halogenated Solvent Cleaning – Not Applicable

NESHAP Subpart T is applicable to the use of halogenated solvent cleaners at both major and area sources of HAP. The parts washer will not use solvent cleaners containing halogens. Therefore, NESHAP Subpart T does not apply.

2.1.5.3. 40 CFR 63, Subpart HH – Oil and Natural Gas Production Facilities – Not Applicable

MACT Subpart HH applies to emission points at oil and natural gas production facilities that are HAP major or HAP area sources and that process, upgrade, or store either hydrocarbon liquids or natural gas prior to the point of custody transfer. For area sources, the affected source includes each triethylene glycol (TEG) dehydration unit located at a facility that meets the criteria specified in paragraph (a) of the regulation. Also, the natural gas production facility to which the rule applies ends at the point that the natural gas enters a facility in the natural gas transmission and storage category per 63.760(a)(3). The Hanoverton Compressor Station will not operate a TEG dehydration unit and the station is considered a natural gas transmission and storage facility; therefore, NESHAP Subpart HH does not apply.

2.1.5.4. 40 CFR 63, Subpart HHH – Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities – Not Applicable

MACT Subpart HHH applies to natural gas transmission and storage facilities that transport or store natural gas prior to entering the pipeline to a local distribution company or to a final end user and are major sources of HAP emissions. The proposed Hanoverton Compressor Station is an area source for HAP; therefore, this subpart is not applicable.

2.1.5.5. 40 CFR 63, Subpart YYYY – Stationary Combustion Turbines - Not Applicable

MACT Subpart YYYY establishes emission limitations and operating limits for HAP emissions from stationary combustion turbines located at major sources of HAP. The proposed Hanoverton Compressor Station is not a major source of HAP; therefore, the combustion turbines at the Hanoverton Compressor Station are not subject to Subpart YYYY.

2.1.5.6. 40 CFR 63, Subpart ZZZZ – Reciprocating Internal Combustion Engines (RICE) - Applicable

The NESHAP found in 40 CFR 63, Subpart ZZZZ (RICE NESHAP) was designed to regulate emissions from stationary reciprocating internal combustion engines at both major and area sources of hazardous air pollutants. The proposed emergency generator engine is classified as a new RICE because it will be constructed after June 12, 2006 and located at an area source of HAP [40 CFR 63.6590(a)(2)(iii)]. Subpart ZZZZ requires all new spark-ignition RICE located at an area source of HAP to comply with NSPS Subpart JJJJ with no additional applicable requirements under the RICE NESHAP [40 CFR 63.6590(c)(1)]. The Emergency Generator (P003) will meet the requirements under the RICE NESHAP by complying with NSPS Subpart JJJJ for spark ignition RICE (refer to the discussion in Section 2.1.4.10).

2.1.5.7. 40 CFR 63, Subpart DDDDD – Industrial, Commercial, and Institutional Boilers and Process Heaters at Major Sources of HAP Emissions - Not Applicable

MACT Subpart DDDDD establishes emission limits, operational standards, and compliance demonstration requirements for HAP emissions from industrial, commercial, and institutional boilers and process heaters at major sources of HAP emissions. The Hanoverton Compressor Station is not a major source of HAP emissions; therefore, this regulation is not applicable.

2.1.5.8. 40 CFR 63, Subpart JJJJJJ – Industrial, Commercial, and Institutional Boilers at Area Sources of HAP Emissions - Not Applicable

The provisions of 40 CFR 63, Subpart JJJJJJ establish emission limits, operational standards, and energy assessment requirements for HAP emissions from industrial, commercial, and institutional boilers at area sources of HAP emissions. According to 40 CFR 63.11194(a)(2), affected sources include the collection of all new industrial, commercial, and institutional boilers within a subcategory (e.g., coal, biomass, oil). The proposed Process Heaters #1 and 2 (B001 and B002) are natural gas fired catalytic style heaters and do not meet the definition of industrial, commercial, or institutional boilers as defined in 40 CFR 63.11237; therefore, this regulation is not applicable.

2.1.5.9. Non-Applicability of All Other NESHAP

NESHAP standards are developed for particular industrial source categories, and the applicability of a particular NESHAP to a facility can be readily ascertained based on the industrial source covered. All other NESHAP are categorically not applicable to the proposed project.

2.2. STATE REGULATORY APPLICABILITY

2.2.1. OAC 3745-17-07 – Control of Visible Particulate Emissions from Stationary Sources - *Applicable*

OAC 3745-17-07(A) limits visible particulate emissions from all stacks to less than 20 percent opacity, as a 6-minute average, except during periods of startup, shutdown, and malfunction. However, visible emissions may exceed 20 percent opacity, as a 6-minute average, but not for more than 6 consecutive minutes in any 1-hour period. Visible emissions may not exceed 60 percent opacity, as a 6-minute average, at any time. The exhaust stacks associated with the Combustion Turbines #1 and 2 (P001 and P002) and Emergency Generator (P003) will be subject to this visible emissions standards.

2.2.2. OAC 3745-17-10 – Restrictions on Particulate Emissions from Fuel Burning Equipment - *Not Applicable*

Pursuant to OAC 3745-17-10(A), OAC 3745-17-10 applies to facilities in which fuel, including any product or by-product of a manufacturing process, is burned for the primary purpose of producing heat or power by indirect heat transfer. The proposed Combustion Turbines #1 and 2 (P001 and P002) and Emergency Generator (P003) will not be subject to the requirements of this rule given that these units do not produce heat or power by indirect heat transfer.

2.2.3. OAC 3745-17-11 – Restrictions of Particulate Emissions from Industrial Processes - *Applicable*

The emission limits of OAC 3745-17-11 apply to any operation, process, or activity that releases or may release particulate emissions into the ambient air. Pursuant to OAC 3745-17-11(B)(4), particulate emission from any stationary gas turbine shall not exceed 0.04 pounds per million British thermal units (lb/MMBtu) of actual heat input. Combustion Turbines #1 and 2 (P001 and P002) will be subject to this emissions standard.

Additionally, OAC 3745-17-11(B)(5)(b) limits particulate emissions from large (i.e., greater than 600 hp) stationary internal combustion engines to 0.062 lb/MMBtu of heat input. The Emergency Generator (P003) will be subject to this emissions standard.

2.2.4. OAC 3745-18-06 – General SO_2 Emission Limit Provisions - *Not Applicable*

The emission limits of OAC 3745-18-06 apply to any operation, process, or activity that releases or may release SO_2 emissions into the ambient air. Per OAC 3745-18-06(A), stationary gas turbines and stationary IC engines are exempt from OAC 3745-18-06(D), (F), and (G) during any calendar day in which natural gas is the only fuel burned. The proposed Combustion Turbines #1 and 2 (P001 and P002) and Emergency

Generator (P003) will burn pipeline quality natural gas only, and are therefore exempt from the requirements of OAC 3745-18-06.

2.2.5. OAC 3745-21-09(L) – Storage of Petroleum Liquids in Fixed Roof Tanks - *Not Applicable*

The provisions of OAC 3745-21-09(L) prohibit the storage of any petroleum liquid with a true vapor pressure (TVP) greater than 1.52 actual pounds per square inch (psia) in fixed roof tanks unless such tanks meet the specified design requirements. Fixed roof tanks with capacities less than 40,000 gallons are exempt from the requirements of OAC 3745-21-09(L)(1) pursuant to OAC 3745-21-09(L)(2)(a). The Separator Vessels #1-5 (P005-P009) and the Storage Vessels #1-4 (T001-T004) are each sized to a nominal storage capacity less than 40,000 gallons. Therefore, OAC 3741-21-09(L) is not applicable.

2.2.6. OAC 3745-21-21 – Storage of Volatile Organic Liquids in Fixed Roof Tanks and External Floating Roof Tanks - *Not Applicable*

The Hanoverton Compressor Station is not located in any of the counties affected by this rule; therefore, the storage vessels are not subject to the standards of OAC 3745-21-21.

2.2.7. OAC 3745-110-03 – RACT Requirements and/or Limitations for Emissions of NO_X from Stationary Sources – *Applicable*

The emission limitations in OAC 3745-110-03 apply to any new stationary source of NO_X emissions that meets the conditions in OAC 3745-110-02(A)(2). The Combustion Turbines #1 and 2 (P001 and P002) and Emergency Generator (P003) will be new stationary sources that meet the conditions in OAC 3745-110-02 (A)(2).

In accordance with OAC 3745-110-03(K)(2), the Emergency Generator (P003) will be exempt from the emission standards of OAC 3745-110-03 given that NGT will maintain a monthly log of emergency and non-emergency operating hours per month.

Additionally, the emission limitation applicable to Combustion Turbines #1 and 2 (P001 and P002) under standards of NSPS KKKK is more stringent than the limit established in OAC 3745-110-03(E)(1)(c). Therefore, NGT will comply with the requirements of NSPS KKKK applicable to P001 and P002 rather than the standards of OAC 3745-110-03 pursuant to OAC 3745-110-02(A)(2)(b).

Pursuant to the provisions added to Ohio Revised Code (ORC) 3704 as a result of Senate Bill 265, sources modified or constructed after August 3, 2009, are to have rule-based best available technology (BAT) limits established by Ohio EPA for specific source categories. However, Ohio EPA has yet to promulgate the rule-based BAT limits. To address this regulatory gap, the Ohio EPA's Division of Air Pollution Control (DAPC) released a memo (February 2014 Memo) indicating that permits filed on or after August 3, 2009, must go through an interim case-by-case BAT procedure.[37]

The first step in determining BAT, according to the February 2014 Memo, is to review MACT, GACT, BACT, and LAER applicability. The next step is to determine whether the operations are of the type and size that are regulated by Reasonable Available Control Technology (RACT) requirements for VOC emissions.

The third step in the BAT analysis is to determine BAT on a case-by-case basis by: 1) reviewing past BAT determinations, and 2) determining the format for the BAT limit, which should be expressed in one of the following ways:

(1) Work practices;
(2) Source design characteristics or design efficiency of applicable air contaminant control devices;
(3) Raw material specifications or throughput limitations averaged over a 12-month rolling period; or
(4) Monthly allowable emissions averaged over a 12-month rolling period.

Furthermore, the existing "less than 10 tpy" BAT exemption pursuant to OAC 3745-31-05(A)(3)(a)(ii) is not currently approved as part of Ohio's State Implementation Plan (SIP). Ohio EPA is currently in the process of revising the procedures for specifying BAT for sources that have potential emissions less than 10 tpy. In the interim, Ohio EPA is establishing BAT for these sources based on the guidance presented in the February 2014 memo.[38]

3.1. COMBUSTION TURBINES BAT

Combustion Turbines #1 and 2 (P001 and P002) are expected to generate emissions of gaseous pollutants (e.g., CO, VOC, NO_X, and SO_2) and particulate matter through the combustion of natural gas. **NGT is requesting that the use of the oxidation catalyst as a control device on the combustion turbines be considered as BAT.** Section 2.1.4.11 describes the emission limitations that apply to the turbines under NSPS KKKK including a NO_X limitation of 25 ppm at 15% O_2. In accordance with footnote 5 of the February 2014 memo, applicants may evaluate NSPS limitations when identifying and requesting appropriate limits as BAT. Therefore, NGT proposes that compliance with NSPS KKKK satisfies the requirement to establish BAT for emissions of NO_X from Combustion Turbines #1 and 2 (P001 and P002).

[37] Ohio EPA Memo from Mike Hopkins, Assistant Chief, Permitting, DAPC, to Permit Writers and Reviewers "BAT Requirements for Permits Issued On or After February 7, 2014" dated February 7, 2014, which supersedes the BAT guidance issued on August 30, 2013. Ohio's BAT policy will be in place only until such time when the Ohio EPA develops and promulgates rules that define BAT in accordance with Ohio Revised Code (ORC) 3704.03(T) requirements.

[38] Question 34 of the February 2014 Memo.

Notwithstanding the guidance presented in the February 2014 Memo, NGT is proposing the use of the control device be accompanied by short-term and annual emissions limits of controlled pollutants (CO and VOC), as shown in Table 3-1. Refer to Appendix C for a formal request of the establishment of BAT in this format. Additionally, NGT is requesting as BAT for the remaining uncontrolled pollutants (SO_2 and PM) monthly limits as rolling, 12-month averages as specified in Table 3-2.

3.2. GAS RELEASES BAT

The evacuation of piping during maintenance and routine operations results in the release of gases directly to the atmosphere. In accordance with Item 4.f of the February 2014 memo, NGT requests as BAT for gas releases a monthly VOC limit as a rolling, 12-month average as specified in Table 3-2.

3.3. EQUIPMENT LEAKS BAT

Various piping components, including valves, connectors, flanges, and open-ended lines may result in fugitive emissions due to leaks. In accordance with Item 4.f of the February 2014 memo, NGT requests as BAT for the equipment leaks a monthly VOC limit as a rolling, 12-month average as specified in Table 3-2.

3.4. SEPARATOR VESSELS BAT

Separator Vessels #1 through 5 (P005-P009) will generate emissions of VOC through flashing, working, and standing losses. In accordance with Item 4.f of the February 2014 memo, NGT requests as BAT for each storage vessel a monthly VOC limit as a rolling, 12-month average as specified in Table 3-2.

3.5. TRUCK LOADING OPERATION BAT

The loading of pipeline liquids and used lubricating oils into tank trucks via the truck loading operation will generate emissions of VOC. In accordance with Item 4.f of the February 2014 memo, NGT requests as BAT for the truck loading operation a monthly VOC limit as a rolling, 12-month average as specified in Table 3-2. As described in Item 4.f of the February 2014 Memo, monitoring, recordkeeping, and reporting requirements will not be necessary to support this BAT limit given that potential VOC emissions will not exceed 1 tpy.

3.6. SUMMARY OF SELECTED BAT EMISSION LIMITS

Tables 3-1 and 3-2 summarize the requested BAT limits for each emission unit at the Hanoverton Compressor Station.

Table 3-1. Summary of Proposed Historical Format BAT Limits

EU ID	Emission Unit Description	CO		VOC	
		(lb/hr)	(tpy)	(lb/hr)	(tpy)
P001	Combustion Turbine #1	13.15	7.81	1.65	3.32
P002	Combustion Turbine #2	13.15	7.81	1.65	3.32

Table 3-2. Summary of Proposed BAT Limits

EU ID	Emission Unit Description	Emission Limits (ton/month, averaged over 12-month rolling period)			
		VOC	NO_X	SO_2	PM
P001	Combustion Turbine #1		2.60	0.27	0.52
P002	Combustion Turbine #2		2.60	0.27	0.52
P004	Gas Releases	2.05			
P801	Equipment Leaks	0.84			
P005	Separator Vessel #1	0.01			
P006	Separator Vessel #2	0.01			
P007	Separator Vessel #3	8.56E-03			
P008	Separator Vessel #4	0.05			
P009	Separator Vessel #5	1.06E-03			
J001	Loading Operation	8.33E-04			

Air dispersion modeling is sometimes necessary to demonstrate that a source will not: 1) violate Ohio EPA's policy whereby no new source exceeds the Ohio Acceptable Incremental Impact (AII) levels (i.e., consumes more than half of the available PSD increments), or 2) causes ground-level concentrations that exceed Ohio EPA's Maximum Allowable Ground Level Concentrations (MAGLCs) for toxic air pollutants.[39] This section of the PTIO application describes the analysis that was conducted to address Ohio modeling requirements for the installation of the Hanoverton Compressor Station.

4.1. REGULATED NSR POLLUTANT MODELING ANALYSIS

Engineering Guide #69: Air Dispersion Modeling Guidance (Engineering Guide #69) requires that increases in allowable emissions of regulated NSR pollutants from all new or modified sources be evaluated to determine whether the increases in allowable emissions exceed the Ohio modeling significant emission rates (SERs). For each regulated NSR pollutant for which the increase in allowable emissions exceeds the applicable SER, an air dispersion modeling analysis is required to demonstrate that the ambient incremental impact (AII) is less than the Ohio AII levels (one half of any PSD increment). Table 4-1 lists the Ohio modeling SERs and the corresponding Ohio AII levels.

Table 4-1. Ohio Modeling Significant Emission Rates

Pollutant	Ohio Modeling SER (tpy)	Project Increase (tpy)	Modeling Required? (Y/N)	Ohio Acceptable Incremental Impact (g/m^3)
PM_{10}	15	12.6	N	8.5 – Annual
				15 – 24-hr
$PM_{2.5}$	10	12.6	Y	2 – Annual
				4.5 – 24-hr
NO_2	40	65	Y	12.5 – Annual
				188 – 1-hr
SO_2	40	6.45	N	10 – Annual
				45.5 – 24-hr
				256 – 3-hr
				196 – 1-hr
CO	100	19.07	N	2,500 – 8-hr
				10,000 – 1-hr

As demonstrated in Table 1-1, the installation of the Hanoverton Compressor Station results in emissions of NO_X and $PM_{2.5}$ exceeding the respective Ohio modeling SERs. Therefore, NGT must demonstrate via air dispersion modeling that the proposed project will not result in ambient incremental impacts exceeding the Ohio AII levels for these pollutants. NGT will submit under separate cover a report to describe the analysis that was conducted to address Ohio modeling requirements for the proposed site.

[39] Engineering Guide #69: Air Dispersion Modeling Guidance, Ohio EPA Air Quality Modeling and Planning Section, 2014, Pg. 4.

4.2. AIR TOXICS MODELING ANALYSIS

Item 1 of Ohio EPA's Engineering Guide #69 requires air dispersion modeling for each toxic pollutant for which the increase in allowable emissions exceeds one (1) tpy.[40] The air dispersion modeling must demonstrate that the ambient incremental impact is less than the Maximum Allowable Ground Level Concentrations (MAGLCs) established in accordance with Ohio EPA guidance as required by ORC 3704.03(F)(4)(b).[41]

Table 1-1 and Appendix B demonstrate that the project will result in an increase of hexane and toluene emissions (toxic air pollutants) in quantities exceeding one (1) tpy. However, Ohio EPA specifies in Item 4.2 of Engineering Guide #69 that sources of toxic pollutants from sources emitting air contaminants solely from the combustion of fossil fuel are not required to be evaluated in an air quality analysis in support of a state-only permit. Therefore, the process heaters are not required to be evaluated for air toxics.

After excluding the process heaters, toluene remains the only toxic air pollutant for which project increases exceed one (1) tpy. Approximately half of the total, facility-wide toluene emissions originate from gas releases (P004). These gas releases are intermittent events that rarely exceed three (3) minutes in total duration. On March 1, 2011, U.S. EPA issued guidance for applicants conducting air dispersion modeling analyses to demonstrate compliance with short-term air quality standards.[42] This memorandum clarifies that intermittent sources may be excluded from short-term modeling analyses given that inclusion of such sources would involve the excessively conservative assumption that the intermittent source would operate during the same single hour as the worst-case meteorological conditions. Specifically,

EPA believes that existing modeling guidelines provide sufficient discretion for reviewing authorities to exclude certain types of intermittent emissions from compliance demonstrations for the 1-hour NO_2 standard under these circumstances.

Because compliance with Ohio EPA's MAGLCs is evaluated using the absolute highest-first-high modeled concentration over a one-hour averaging period, the format of these MAGLCs could be considered to be even more stringent than the probabilistic format of the 1-hour NO_2 standard referenced in U.S. EPA's March 1, 2011 memorandum. NGT has therefore excluded gas releases from the air toxics modeling analysis given that these releases are truly intermittent.

After excluding gas releases from the air toxics modeling analysis, potential emissions of each individual toxic air contaminant emitted from the Hanoverton Compressor Station will not exceed one (1) ton per year, and an air toxics modeling analysis will not be required as part of this application.

[40] Air toxic pollutants include any pollutant listed in OAC 3745-114-01.

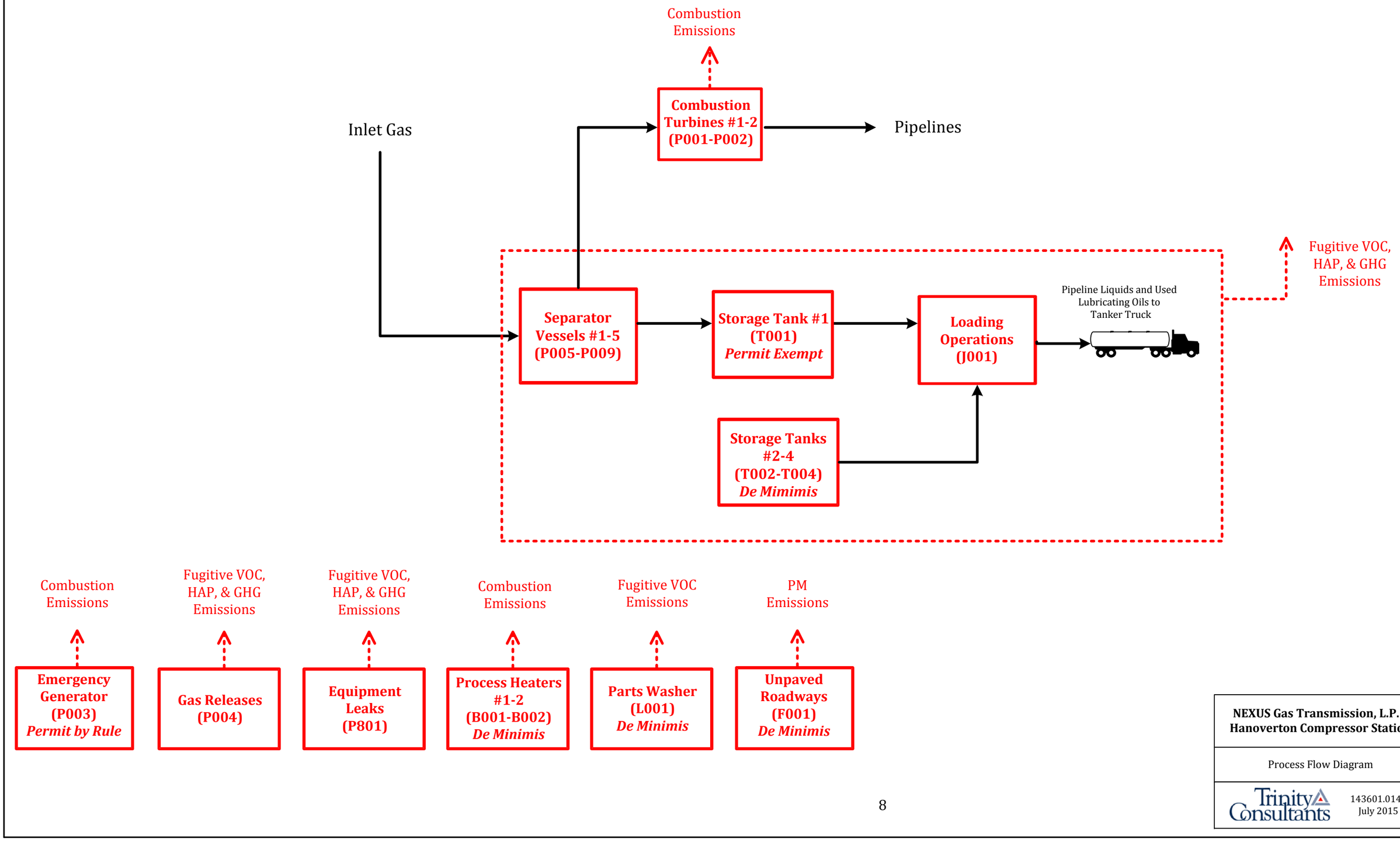
[41] ORC 3704.03(F)(4)(b) requires that applicable MAGLCs be determined in accordance with Option A: Review of New Sources of Air Toxic Emissions, Ohio EPA Air Quality Modeling and Planning Section (May 1986).

[42] Tyler Fox, Leader, U.S. EPA Air Quality Modeling Group, "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard." March 1, 2011

APPENDIX A

Process Flow Diagram

FIGURE 1-2. PROCESS FLOW DIAGRAM FOR THE HANOVERTON COMPRESSOR STATION



NEXUS Gas Transmission, L.P. – Hanoverton Compressor Station
Process Flow Diagram
Trinity Consultants 143601.0141 July 2015

APPENDIX B

Emission Calculations Documentation

TABLE A-1
Potential to Emit
Basis
After Permitting Activity

Emission Source				Rated Capacity	Operational Limits								Data Sources
ID	FIN	EPN	Description		Short-Term -- Material Flow		Short-Term -- Capacity		Annual Material Flow		Annual Utilization		
HANO TBC 01	HANO TBC 01	HANO TBC 01	Turbine	26,000 bhp (NEMA)	Natural Gas	234,728 scfh	Power Output	33,900 bhp	Natural Gas	1,857,659,582 scf/yr	Runtime	8,760 hrs/yr	TABLE B-1Ac
HANO TBC 01	HANO TBC 01	HANO TBC 01	Turbine	26,000 bhp (NEMA)	Natural Gas	234,728 scfh	Power Output	33,900 bhp	Natural Gas	1,857,659,582 scf/yr	Runtime	8,760 hrs/yr	TABLE B-1Ac
HANO ENGEN 01	HANO ENGEN 01	HANO ENGEN 01	IC Engine	1,175 bhp	Natural Gas	9,076 scfh	Power Output	1,175 bhp	Natural Gas	4,538,086 scf/yr	Runtime	500 hrs/yr	TABLE C-1A
HANO FHTR 01	HANO FHTR 01	HANO FHTR 01	Boilers/Heaters	0.750 MMBTU/hr (output)	Natural Gas	1,050 scfh	Heat Input	1.071 MMBTU/hr	Natural Gas	9,201,681 scf/yr	Runtime	8,760 hrs/yr	TABLE D-1A
HANO FHTR 01	HANO FHTR 01	HANO FHTR 01	Boilers/Heaters	0.750 MMBTU/hr (output)	Natural Gas	1,050 scfh	Heat Input	1.071 MMBTU/hr	Natural Gas	9,201,681 scf/yr	Runtime	8,760 hrs/yr	TABLE D-1A
HANO SV V1S	HANO SV V1S	HANO SV V1S	Separator Vessel	530 gal (accumulation)	Pipeline Liquids	530 gal/hr			Pipeline Liquids	71 gal/yr	Runtime	N/A	TABLE F-2
HANO SV V1D	HANO SV V1D	HANO SV V1D	Separator Vessel	530 gal (accumulation)	Pipeline Liquids	530 gal/hr			Pipeline Liquids	71 gal/yr	Runtime	N/A	TABLE F-3
HANO SV V1C12	HANO SV V1C12	HANO SV V1C12	Separator Vessel	400 gal (accumulation)	Pipeline Liquids	400 gal/hr			Pipeline Liquids	53 gal/yr	Runtime	N/A	TABLE F-4
HANO SV V2	HANO SV V2	HANO SV V2	Separator Vessel	317 gal (accumulation)	Pipeline Liquids	317 gal/hr			Pipeline Liquids	4,000 gal/yr	Runtime	N/A	TABLE F-5
HANO SV V4SD	HANO SV V4SD	HANO SV V4SD	Separator Vessel	43 gal (accumulation)	Pipeline Liquids	43 gal/hr			Pipeline Liquids	6 gal/yr	Runtime	N/A	TABLE F-6
HANO TK V5	HANO TK V5	HANO TK V5	Storage Tank	2,000 gal	Pipeline Liquids	2,000 gal/hr			Pipeline Liquids	4,000 gal/yr	Runtime	N/A	TABLE F-7
HANO TK OIL1	HANO TK OIL1	HANO TK OIL1	Storage Tank	570 gal	Oil	570 gal/hr			Oil	208,050 gal/yr	Runtime	N/A	TABLE F-8
HANO TK OIL2	HANO TK OIL2	HANO TK OIL2	Storage Tank	570 gal	Oil	570 gal/hr			Oil	208,050 gal/yr	Runtime	N/A	TABLE F-9
HANO TK OW1	HANO TK OW1	HANO TK OW1	Storage Tank	3,000 gal	Oily Water	3,000 gal/hr			Oily Water	36,000 gal/yr	Runtime	N/A	TABLE F-10
HANO TL PL	HANO TL PL	HANO TL PL	Truck Loading	150 gal/min	Pipeline Liquids	2,000 gal/hr			Pipeline Liquids	4,000 gal/yr	Runtime	N/A	TABLE F-11
HANO TL OIL	HANO TL OIL	HANO TL OIL	Truck Loading	150 gal/min	Oil	1,140 gal/hr			Oil	13,680 gal/yr	Runtime	N/A	TABLE F-12
HANO TL OW	HANO TL OW	HANO TL OW	Truck Loading	150 gal/min	Oily Water	3,000 gal/hr			Oily Water	36,000 gal/yr	Runtime	N/A	TABLE F-13
HANO GR	WATE GR ST	WATE GR ST	Gas Release Events	Natural Gas	Natural Gas	7,610,000 scfh			Natural Gas	36,550,000 scf/yr	Runtime	N/A	TABLE G-1a
	WATE GR PL	WATE GR PL	Gas Release Events	Natural Gas									
HANO PC	WATE PC NG	WATE PC NG	Piping Components	Natural Gas	Valves: 1,023; Connectors: 3,232; Flanges: 715; Open-Ended Lines: 18; Pump Seals: 0; Other (blowdown valves, relief valves, and compressor seals): 108								TABLE H-1a
	WATE PC PL	WATE PC PL	Piping Components	Pipeline Liquids	Valves: 165; Connectors: 1,048; Flanges: 245; Open-Ended Lines: 22; Pump Seals: 3; Other (blowdown valves, relief valves, and compressor seals): 3								TABLE H-2a
	WATE PC OIL	WATE PC OIL	Piping Components	Oil	Valves: 118; Connectors: 556; Flanges: 188; Open-Ended Lines: 0; Pump Seals: 12; Other (blowdown valves, relief valves, and compressor seals): 4								TABLE H-3a
HANO PW	HANO PW	HANO PW	Parts Washer	Remote Reservoir	Solvent	N/A	Solvent Make-up	0.329 gal/hr	Solvent Make-up	120 gal/yr	Runtime	N/A	TABLE I-1

TABLE A-1
Potential to Emit
Emissions
After Permitting Activity

Emission Source				Rated Capacity	Potential to Emit (tpy)										Data
ID	FIN	EPN	Description		CO_{2-e}	NO_X	CO	$PM_{10/2.5}$	SO_2	VOC (Total)	HAP (Total)	Benzene	Formaldehyde	Hexane (n-)	Sources
HANO TBC 01	HANO TBC 01	HANO TBC 01	Turbine	26,000 bhp (NEMA)	112,281	31.1434	7.8125	6.2529	3.2212	3.3166	0.5963	0.0190	0.1323		TABLE B-1Aj
HANO TBC 01	HANO TBC 01	HANO TBC 01	Turbine	26,000 bhp (NEMA)	112,281	31.1434	7.8125	6.2529	3.2212	3.3166	0.5963	0.0190	0.1323		TABLE B-1Aj
HANO ENGEN 01	HANO ENGEN 01	HANO ENGEN 01	IC Engine	1,175 bhp	576	1.2952	2.5904	0.0231	0.0014	1.1610	0.7020	0.0043	0.5134	0.0108	TABLE C-1A
HANO FHTR 01	HANO FHTR 01	HANO FHTR 01	Boilers/Heaters	0.750 MMBTU/hr (output)	554	0.7076	0.4313	0.0350	0.0028	0.1663	0.0383	0.0000	0.0015	0	TABLE D-1A
HANO FHTR 01	HANO FHTR 01	HANO FHTR 01	Boilers/Heaters	0.750 MMBTU/hr (output)	554	0.7076	0.4313	0.0350	0.0028	0.1663	0.0383	0.0000	0.0015	0	TABLE D-1A
HANO SV V1S	HANO SV V1S	HANO SV V1S	Separator Vessel	530 gal (accumulation)	7					0.1309	0.0082	0.0020		0	TABLE F-2
HANO SV V1D	HANO SV V1D	HANO SV V1D	Separator Vessel	530 gal (accumulation)	7					0.1309	0.0082	0.0020		0	TABLE F-3
HANO SV V1C12	HANO SV V1C12	HANO SV V1C12	Separator Vessel	400 gal (accumulation)	6					0.1027	0.0064	0.0015		0	TABLE F-4
HANO SV V2	HANO SV V2	HANO SV V2	Separator Vessel	317 gal (accumulation)	18					0.5971	0.0359	0.0076		0	TABLE E-4a & TABLE F-5
HANO SV V4SD	HANO SV V4SD	HANO SV V4SD	Separator Vessel	43 gal (accumulation)	1					0.0127	0.0008	0.0002		0	TABLE F-6
HANO TK V5	HANO TK V5	HANO TK V5	Storage Tank	2,000 gal	14					0.2650	0.0165	0.0040		0	TABLE F-7
HANO TK OIL1	HANO TK OIL1	HANO TK OIL1	Storage Tank	570 gal						0.0020					TABLE F-8
HANO TK OIL2	HANO TK OIL2	HANO TK OIL2	Storage Tank	570 gal						0.0020					TABLE F-9
HANO TK OW1	HANO TK OW1	HANO TK OW1	Storage Tank	3,000 gal						0.0008					TABLE F-10
HANO TL PL	HANO TL PL	HANO TL PL	Truck Loading	150 gal/min	1					0.0093	0.0006	0.0001		0	TABLE F-11
HANO TL OIL	HANO TL OIL	HANO TL OIL	Truck Loading	150 gal/min						0.0002					TABLE F-12
HANO TL OW	HANO TL OW	HANO TL OW	Truck Loading	150 gal/min						0.0005					TABLE F-13
HANO GR	WATE GR ST	WATE GR ST	Gas Release Events	Natural Gas	19,114					24.5981	2.0333	0.7175		0.7157	TABLE G-1a
	WATE GR PL	WATE GR PL	Gas Release Events	Natural Gas											
HANO PC	WATE PC NG	WATE PC NG	Piping Components	Natural Gas	1,419					1.8267	0.1510	0.0533		0.0531	TABLE H-1a
	WATE PC PL	WATE PC PL	Piping Components	Pipeline Liquids	0					7.2495	1.0557	0.1046		0.1229	TABLE H-2a
	WATE PC OIL	WATE PC OIL	Piping Components	Oil						1.0504					TABLE H-3a
HANO PW	HANO PW	HANO PW	Parts Washer	Remote Reservoir						0.4103					TABLE I-1
TOTAL					246,832	64.9971	19.0781	12.5988	6.4492	44.5159	5.2876	0.9349	0.7810	1.0188	

TABLE B-1Aa
Ambient Temperature, Start Model, and Utilization Data
PTE - 100% Fuel Utilization at 100% Power Output

Month	#Days	Daily Average	Weighted Daily Average
JAN	31.00	23.55	2.00
FEB	28.50	25.90	2.02
MAR	31.00	36.30	3.08
APR	30.00	47.25	3.88
MAY	31.00	57.45	4.87
JUN	30.00	66.15	5.43
JUL	31.00	70.25	5.96
AUG	31.00	68.75	5.83
SEP	30.00	62.10	5.10
OCT	31.00	51.20	4.34
NOV	30.00	41.00	3.37
DEC	31.00	29.45	2.50
Annual	365.50	48.28	**48.37**

Low Temperature Data	
Below 0˚F Hours	18 hrs/yr
Below -20˚F Hours	1 hrs/yr

NOTES
1. Please refer to TABLE B-0.

Start Model and Utilization	
Utilization	100.00%
Start Model	TET - High
Starts	260.00 starts/yr

TABLE B-1Ab
Manufacturer's Operating and Emissions Data
Normal Operations
PTE - 100% Fuel Utilization at 100% Power Output

Parameters			Curve Fitting			Vendor Data						
Ambient	Temperature	°F	-20.00	-20.00	48.28	-0.01	0.01	20.00	40.00	60.00	80.00	100.00
	Altitude	ft	0	0	0	0	0	0	0	0	0	0
	Pressure	psia	14.702	14.702	14.702	14.702	14.702	14.702	14.702	14.702	14.702	14.702
	Relative Humidity	%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$	0.0003	0.0003	0.0038	0.0006	0.0006	0.0013	0.0028	0.0058	0.0124	0.0262
Fuel	Lower Heating Value (LHV)	BTU/scf	939.2	939.2	939.2	939.2	939.2	939.2	939.2	939.2	939.2	939.2
	Higher Heating Value (HHV)	BTU/scf	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6
Turbine	Net Output Power	hp	35,209	35,209	30,401	33,900	33,900	32,592	31,146	29,151	26,280	23,613
	Fuel Consumption	scf/hr	238,158	238,158	207,211	229,429	229,429	220,709	211,595	200,266	185,977	173,041
	Heat Input at LHV	MMBTU/hr	223.68	223.68	194.61	215.48	215.48	207.29	198.73	188.09	174.67	162.52
	Heat Input at HHV	MMBTU/hr	248.53	248.53	216.24	239.42	239.42	230.32	220.81	208.99	194.08	180.58
	Heat Rate at LHV	BTU/hp-hr	6,353	6,353	6,401	6,356	6,356	6,360	6,381	6,452	6,646	6,883
	Heat Rate at HHV	BTU/hp-hr	7,059	7,059	7,113	7,063	7,063	7,067	7,090	7,169	7,385	7,647
Exhaust	Temperature	°F	830	830	863	839	839	848	858	873	897	924
	Water Fraction	%, by vol	5.94%	5.94%	6.40%	6.00%	6.00%	6.06%	6.25%	6.70%	7.61%	9.28%
	Non-Water Fraction	%, by vol	94.06%	94.06%	93.60%	94.00%	94.00%	93.94%	93.75%	93.30%	92.39%	90.72%
	O_2 Content	%, by vol (dry)	15.13%	15.13%	15.36%	15.20%	15.20%	15.27%	15.33%	15.39%	15.43%	15.44%
	Molecular Weight	lb/lb-mol	28.60	28.60	28.53	28.59	28.59	28.58	28.55	28.50	28.39	28.21
	Flow Rate	lb/hr	607,028	607,028	548,579	591,246	591,246	575,480	557,800	533,101	498,286	464,319
		scfm (1 atm, 68°F)	136,511	136,511	123,602	132,949	132,949	129,440	125,614	120,237	112,851	105,846
		acfm	333,391	333,391	309,691	326,960	326,960	320,535	313,439	303,438	289,926	277,339
NO_X Emissions		lb/lb-mol	46.01	46.01	46.01	46.01	46.01	46.01	46.01	46.01	46.01	46.01
		ppmvd, 15% O_2	120	9	9	9	9	9	9	9	9	9
		ppmvw	110.39	8.28	7.92	8.17	8.17	8.07	7.97	7.84	7.71	7.56
		lb/hr	107.80	8.08	7.00	7.78	7.78	7.47	7.16	6.75	6.23	5.72
CO Emissions		lb/lb-mol	28.01	28.01	28.01	28.01	28.01	28.01	28.01	28.01	28.01	28.01
		ppmvd, 15% O_2	150	25	25	25	25	25	25	25	25	25
		ppmvw	137.98	23.00	21.99	22.70	22.70	22.41	22.13	21.78	21.41	20.99
		lb/hr	82.03	13.67	11.84	13.15	13.15	12.64	12.11	11.41	10.53	9.68
UHC Emissions		lb/lb-mol	18.37	18.37	18.37	18.37	18.37	18.37	18.37	18.37	18.37	18.37
		ppmvd, 15% O_2	75	25	25	25	25	25	25	25	25	25
		ppmvw	68.99	23.00	21.99	22.70	22.70	22.41	22.13	21.78	21.41	20.99
		lb/hr	26.90	8.97	7.77	8.63	8.63	8.29	7.94	7.49	6.91	6.35

NOTES

1. Operating and emissions data was provided by the manufacturer for the following ambient temperatures: 0°F, 20°F, 40°F, 60°F, 80°F, and 100°F.
   Specific Humidity is estimate using curve fitting equation: $6.15E\text{-}04e^{3.75E\text{-}02T}$
   All other parameter values estimated using cubic spline.
2. Pollutant concentrations (ppmvd at 15% O2) for 0°F and -20°F based on information provided in a document published by the manufacturer.
3. Ambient pressure and humidity will vary. However, it is believed that any variation would not affect compliance with the proposed emission representations.
4. The heating value of the natural gas used to fuel the turbine will vary. However, it is believed that any variation would not affect compliance with the proposed emission representations.

TABLE B-1Ab
Manufacturer's Operating and Emissions Data
Normal Operations
PTE - 100% Fuel Utilization at 100% Power Output

Vendor Data												
Make:	Solar											
Model:	250-30002S4											
Rate	30,000 hp (ISO)											
Capacity:	26,000 hp (NEMA)											
Load:	100%											
Ambient	Temperature	°F				-0.01	0.01	20.00	40.00	60.00	80.00	100.00
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$				0.0006	0.0006	0.0014	0.0031	0.0066	0.0133	0.0253
Fuel	Lower Heating Value (LHV)	BTU/scf				939.2	939.2	939.2	939.2	939.2	939.2	939.2
Turbine	Net Output Power	hp				33,900	33,900	32,592	31,146	29,151	26,280	23,613
	Heat Input at LHV	MMBTU/hr				215.48	215.48	207.29	198.73	188.09	174.67	162.52
Exhaust	Temperature	°F				839	839	848	858	873	897	924
	Water Fraction	%				6.00%	6.00%	6.06%	6.25%	6.70%	7.61%	9.28%
	O_2 Content	% (dry)				15.20%	15.20%	15.27%	15.33%	15.39%	15.43%	15.44%
	Molecular Weight	lb/lb-mol				28.59	28.59	28.58	28.55	28.50	28.39	28.21
	Flow Rate	lb/hr				591,246	591,246	575,480	557,800	533,101	498,286	464,319
		acfm				326,960	326,960	320,535	313,439	303,438	289,926	277,339
Guaranteed	NO_X	ppmvd, 15% O_2	120	9		9	9	9	9	9	9	9
Emissions	CO	ppmvd, 15% O_2	150	25		25	25	25	25	25	25	25
	UHC	ppmvd, 15% O_2	75	25		25	25	25	25	25	25	25

TABLE B-1Ac
Gas-Fired Turbines
Emission Estimates
Normal Operations
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar				
Model	250-30002S4				
Normal Operating Load	100%				
Fuel	Natural Gas				
Fuel Higher Heating Value (HHV)	1,020 BTU/scf			1,020 BTU/scf	
Ambient Temperature	48.28 °F			0.01 °F	
Power Output	30,401 bhp (mech.)			33,900 bhp (mech.)	
	22,671 kW (elec.)			25,280 kW (elec.)	
Heat Rate at HHV	7,113 BTU/hp-hr			7,063 BTU/hp-hr	
Operating Hours	8,760 hrs/yr				
Fuel Consumption	211,997 scfh			234,728 scfh	
	1,857.090 MMscf/yr				
Heat Input at HHV	216.24 MMBTU/hr			239.42 MMBTU/hr	
	1,894,231 MMBTU/yr	Average	Maximum		Maximum
NO_X	33.03 lb/MMscf	7.0025 lb/hr	30.6710 tpy	33.13 lb/MMscf	7.7768 lb/hr
CO	55.86 lb/MMscf	11.8416 lb/hr	51.8664 tpy	56.03 lb/MMscf	13.1510 lb/hr
SO_2	3.47 lb/MMscf	0.7352 lb/hr	3.2202 tpy	3.47 lb/MMscf	0.8140 lb/hr
$PM_{10/2.5}$	6.73 lb/MMscf	1.4272 lb/hr	6.2510 tpy	6.73 lb/MMscf	1.5802 lb/hr
$CO_{2\text{-}e}$	120,801 lb/MMscf	25,609 lb/hr	112,169 tpy	120,803 lb/MMscf	28,356 lb/hr
CO_2	120,017 lb/MMscf	25,443 lb/hr	111,442 tpy	120,017 lb/MMscf	28,171 lb/hr
N_2O	0.23 lb/MMscf	0.0480 lb/hr	0.2100 tpy	0.23 lb/MMscf	0.0531 lb/hr
TOC (Total)	36.64 lb/MMscf	7.7669 lb/hr	34.0192 tpy	36.75 lb/MMscf	8.6257 lb/hr
Methane	28.64 lb/MMscf	6.0723 lb/hr	26.5968 tpy	28.73 lb/MMscf	6.7438 lb/hr
Ethane	1.00 lb/MMscf	0.2118 lb/hr	0.9278 tpy	1.00 lb/MMscf	0.2352 lb/hr
VOC (Total)	6.99 lb/MMscf	1.4828 lb/hr	6.4946 tpy	7.02 lb/MMscf	1.6467 lb/hr
VOC (non-HAP)	3.57 lb/MMscf	0.7574 lb/hr	3.3174 tpy	3.58 lb/MMscf	0.8411 lb/hr
HAP (Total)	3.42 lb/MMscf	0.7254 lb/hr	3.1772 tpy	3.43 lb/MMscf	0.8056 lb/hr
Acetaldehyde	1.33E-01 lb/MMscf	0.0282 lb/hr	0.1237 tpy	1.34E-01 lb/MMscf	0.0314 lb/hr
Acrolein	2.13E-02 lb/MMscf	0.0045 lb/hr	0.0198 tpy	2.14E-02 lb/MMscf	0.0050 lb/hr
Benzene	4.00E-02 lb/MMscf	0.0085 lb/hr	0.0371 tpy	4.01E-02 lb/MMscf	0.0094 lb/hr
Biphenyl					
Butadiene (1,3-)	1.43E-03 lb/MMscf	0.0003 lb/hr	0.0013 tpy	1.44E-03 lb/MMscf	0.0003 lb/hr
Carbon Tetrachloride					
Chlorobenzene					
Chloroform					
Dichloropropene (1,3-)					
Ethylbenzene	1.07E-01 lb/MMscf	0.0226 lb/hr	0.0990 tpy	1.07E-01 lb/MMscf	0.0251 lb/hr
Ethylene Dibromide					
Formaldehyde	2.36E+00 lb/MMscf	0.5013 lb/hr	2.1958 tpy	2.37E+00 lb/MMscf	0.5568 lb/hr
Hexane (n-)					
Methanol					
Methylene Chloride					
Methylnaphthalene (2-)					
Naphthalene	4.33E-03 lb/MMscf	0.0009 lb/hr	0.0040 tpy	4.34E-03 lb/MMscf	0.0010 lb/hr
PAH	7.33E-03 lb/MMscf	0.0016 lb/hr	0.0068 tpy	7.35E-03 lb/MMscf	0.0017 lb/hr
Phenol					
Propylene Oxide	9.66E-02 lb/MMscf	0.0205 lb/hr	0.0897 tpy	9.69E-02 lb/MMscf	0.0227 lb/hr
Styrene					
Tetrachloroethane (1,1,2,2-)					
Toluene	4.33E-01 lb/MMscf	0.0918 lb/hr	0.4020 tpy	4.34E-01 lb/MMscf	0.1019 lb/hr
Trichloroethane (1,1,2-)					
Trimethylpentane (2,2,4-)					
Vinyl Chloride					
Xylenes	2.13E-01 lb/MMscf	0.0452 lb/hr	0.1979 tpy	2.14E-01 lb/MMscf	0.0502 lb/hr

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Manufacturer provided operating and emissions data (TABLE B-1Ab).
3. The annual emissions are based on a representative annual average ambient temperature (TABLE B-1Aa).
   Maximum hourly emissions are based on an ambient temperature of 0°F.
4. NOX, CO, and TOC (Total) emission factor based on Vendor Guarantee.
5. CO2 and N2O emission factors based on 40 CFR 98, Subpart C, Table C-1 and 40 CFR 98, Subpart C, Table C-2, respectively.
6. SO2 emission factor based on AP-42, Section 3.1 (Revised 4/00), Table 3.1-2a.
7. PM10/2.5 emission factor based on AP-42, Section 3.1 (Revised 4/00), Table 3.1-2a, not Solar's PIL 171 dated 06/01/2012 (173% greater).
8. Methane, Ethane, and VOC (Total) emissions based on scaling of AP-42, Section 3.1 (Revised 4/00), Table 3.1-2a using Vendor Guarantee.
   Speciated VOC (non-HAP) emissions based on scaling of AP-42, Section 3.1 (Revised 4/00), Table 3.1-2a using Vendor Guarantee.
   $EF_{Scaled} = (EF_{AP42})(EF_{TOC}/EF_{TOC\text{-}AP42})$

TABLE B-1Ad
Manufacturer's Operating and Emissions Data
Startup/Shutdown Step 2: Iginition-Idle
PTE - 100% Fuel Utilization at 100% Power Output

Parameters			Interpolated	Vendor Data					
Ambient	Temperature	°F	48.28	0.01	20.00	40.00	60.00	80.00	100.00
	Altitude	ft	0	0	0	0	0	0	0
	Pressure	psia	14.702	14.702	14.702	14.702	14.702	14.702	14.702
	Relative Humidity	%	60%	60%	60%	60%	60%	60%	60%
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$	0.0038	0.0006	0.0013	0.0028	0.0058	0.0124	0.0262
Fuel	Lower Heating Value (LHV)	BTU/scf	939.2	939.2	939.2	939.2	939.2	939.2	939.2
	Higher Heating Value (HHV)	BTU/scf	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6
Turbine	Net Output Power	hp	3,043	3,390	3,259	3,115	2,915	2,628	2,361
	Fuel Consumption	scf/hr	66,436	68,761	67,920	66,983	65,503	63,511	60,796
	Heat Input at LHV	MMBTU/hr	62.40	64.58	63.79	62.91	61.52	59.65	57.10
	Heat Input at HHV	MMBTU/hr	69.33	71.76	70.88	69.90	68.36	66.28	63.44
	Heat Rate at LHV	BTU/hp-hr	20,505	19,050	19,573	20,196	21,105	22,698	24,185
	Heat Rate at HHV	BTU/hp-hr	22,783	21,167	21,748	22,440	23,450	25,220	26,872
Exhaust	Temperature	°F	838	737	779	821	861	900	935
	Water Fraction	%, by vol	4.40%	3.58%	3.81%	4.18%	4.80%	5.91%	7.72%
	Non-Water Fraction	%, by vol	95.60%	96.42%	96.19%	95.82%	95.20%	94.09%	92.28%
	O_2 Content	%, by vol (dry)	17.39%	17.64%	17.53%	17.43%	17.33%	17.20%	17.11%
	Molecular Weight	lb/lb-mol	28.66	28.74	28.72	28.68	28.62	28.50	28.30
	Flow Rate	lb/hr	273,526	301,815	289,208	277,244	263,781	230,080	214,821
		scfm (1 atm, 68°F)	61,346	67,517	64,740	62,117	59,234	51,881	48,805
		acfm	150,719	153,006	151,860	150,647	148,141	133,583	128,897
NO_X Emissions		lb/lb-mol	46.01	46.01	46.01	46.01	46.01	46.01	46.01
		ppmvd, 15% O_2	50	50	50	50	50	50	50
		ppmvw	28.43	26.64	27.47	28.18	28.80	29.50	29.64
		lb/hr	12.48	12.87	12.73	12.53	12.21	10.96	10.35
CO Emissions		lb/lb-mol	28.01	28.01	28.01	28.01	28.01	28.01	28.01
		ppmvd, 15% O_2	2,000	2,000	2,000	2,000	2,000	2,000	2,000
		ppmvw	1,137.00	1,065.52	1,098.85	1,127.10	1,152.08	1,180.11	1,185.56
		lb/hr	303.96	313.42	309.94	305.18	297.42	266.85	252.07
UHC Emissions		lb/lb-mol	18.37	18.37	18.37	18.37	18.37	18.37	18.37
		ppmvd, 15% O_2	200	200	200	200	200	200	200
		ppmvw	113.70	106.55	109.88	112.71	115.21	118.01	118.56
		lb/hr	19.94	20.56	20.33	20.02	19.51	17.50	16.53

NOTES

1. Footnotes 1 thru 4 of TABLE B-1Ab.

TABLE B-1Ad
Manufacturer's Operating and Emissions Data
Startup/Shutdown Step 2: Iginition-Idle
PTE - 100% Fuel Utilization at 100% Power Output

Vendor Data									
Make:	Solar								
Model:	250-30002S4								
Rate Capacity:	30,000 hp (ISO)								
	26,000 hp (NEMA)								
Load:	10%								
Ambient	Temperature	°F		0.01	20.00	40.00	60.00	80.00	100.00
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$		0.0006	0.0014	0.0031	0.0066	0.0133	0.0253
Fuel	Lower Heating Value (LHV)	BTU/scf		939.2	939.2	939.2	939.2	939.2	939.2
Turbine	Net Output Power	hp		3,390	3,259	3,115	2,915	2,628	2,361
	Heat Input at LHV	MMBTU/hr		64.58	63.79	62.91	61.52	59.65	57.10
Exhaust	Temperature	°F		737	779	821	861	900	935
	Water Fraction	%		3.58%	3.81%	4.18%	4.80%	5.91%	7.72%
	O_2 Content	% (dry)		17.64%	17.53%	17.43%	17.33%	17.20%	17.11%
	Molecular Weight	lb/lb-mol		28.74	28.72	28.68	28.62	28.50	28.30
	Flow Rate	lb/hr		301,815	289,208	277,244	263,781	230,080	214,821
		acfm		153,006	151,860	150,647	148,141	133,583	128,897
Estimated Emissions	NO_X	ppmvd, 15% O_2		50	50	50	50	50	50
	CO	ppmvd, 15% O_2		2,000	2,000	2,000	2,000	2,000	2,000
	UHC	ppmvd, 15% O_2		200	200	200	200	200	200

TABLE B-1Ae
Manufacturer's Operating and Emissions Data
Startup/Shutdown Step 3: Loading/Thermal Stabilization
PTE - 100% Fuel Utilization at 100% Power Output

Parameters			Interpolated	Vendor Data					
Ambient	Temperature	°F	48.28	0.01	20.00	40.00	60.00	80.00	100.00
	Altitude	ft	0	0	0	0	0	0	0
	Pressure	psia	14.702	14.702	14.702	14.702	14.702	14.702	14.702
	Relative Humidity	%	60%	60%	60%	60%	60%	60%	60%
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$	0.0038	0.0006	0.0013	0.0028	0.0058	0.0124	0.0262
Fuel	Lower Heating Value (LHV)	BTU/scf	939.2	939.2	939.2	939.2	939.2	939.2	939.2
	Higher Heating Value (HHV)	BTU/scf	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6
Turbine	Net Output Power	hp	7,607	8,475	8,148	7,787	7,288	6,570	5,903
	Fuel Consumption	scf/hr	101,617	106,846	104,546	102,609	99,872	95,848	90,503
	Heat Input at LHV	MMBTU/hr	95.44	100.35	98.19	96.37	93.80	90.02	85.00
	Heat Input at HHV	MMBTU/hr	106.04	111.50	109.10	107.08	104.22	100.02	94.44
	Heat Rate at LHV	BTU/hp-hr	12,546	11,841	12,051	12,376	12,870	13,702	14,399
	Heat Rate at HHV	BTU/hp-hr	13,940	13,156	13,390	13,751	14,301	15,224	15,999
Exhaust	Temperature	°F	897	796	838	880	921	960	984
	Water Fraction	%, by vol	5.12%	4.28%	4.52%	4.90%	5.51%	6.55%	8.28%
	Non-Water Fraction	%, by vol	94.88%	95.72%	95.48%	95.10%	94.49%	93.45%	91.72%
	O_2 Content	%, by vol (dry)	16.68%	16.94%	16.83%	16.72%	16.62%	16.54%	16.51%
	Molecular Weight	lb/lb-mol	28.62	28.69	28.67	28.64	28.57	28.46	28.27
	Flow Rate	lb/hr	348,147	389,910	370,850	354,836	338,013	318,919	299,026
		scfm (1 atm, 68°F)	78,212	87,321	83,036	79,645	76,029	72,024	68,003
		acfm	200,924	207,638	204,052	202,052	198,781	193,628	185,907
NO_X Emissions		lb/lb-mol	46.01	46.01	46.01	46.01	46.01	46.01	46.01
		ppmvd, 15% O_2	50	50	50	50	50	50	50
		ppmvw	33.95	32.12	32.93	33.69	34.27	34.53	34.12
		lb/hr	19.01	20.09	19.60	19.20	18.66	17.80	16.61
CO Emissions		lb/lb-mol	28.01	28.01	28.01	28.01	28.01	28.01	28.01
		ppmvd, 15% O_2	1,013	1,013	1,013	1,013	1,013	1,013	1,013
		ppmvw	687.92	650.81	667.21	682.52	694.36	699.56	691.33
		lb/hr	234.43	247.74	241.74	236.85	230.10	219.57	204.82
UHC Emissions		lb/lb-mol	18.37	18.37	18.37	18.37	18.37	18.37	18.37
		ppmvd, 15% O_2	110	110	110	110	110	110	110
		ppmvw	74.70	70.67	72.45	74.11	75.40	75.96	75.07
		lb/hr	16.70	17.65	17.22	16.87	16.39	15.64	14.59

NOTES

1. Footnotes 1 thru 4 of TABLE B-1Ab.

TABLE B-1Ae
Manufacturer's Operating and Emissions Data
Startup/Shutdown Step 3: Loading/Thermal Stabilization
PTE - 100% Fuel Utilization at 100% Power Output

Vendor Data									
Make:	Solar								
Model:	250-30002S4								
Rate	30,000 hp (ISO)								
Capacity:	26,000 hp (NEMA)								
Load:	24%								
Ambient	Temperature	°F		0.01	20.00	40.00	60.00	80.00	100.00
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$		0.0006	0.0014	0.0031	0.0066	0.0133	0.0253
Fuel	Lower Heating Value (LHV)	BTU/scf		939.2	939.2	939.2	939.2	939.2	939.2
Turbine	Net Output Power	hp		8,475	8,148	7,787	7,288	6,570	5,903
	Heat Input at LHV	MMBTU/hr		100.35	98.19	96.37	93.80	90.02	85.00
Exhaust	Temperature	°F		796	838	880	921	960	984
	Water Fraction	%		4.28%	4.52%	4.90%	5.51%	6.55%	8.28%
	O_2 Content	% (dry)		16.94%	16.83%	16.72%	16.62%	16.54%	16.51%
	Molecular Weight	lb/lb-mol		28.69	28.67	28.64	28.57	28.46	28.27
	Flow Rate	lb/hr		389,910	370,850	354,836	338,013	318,919	299,026
		acfm		207,638	204,052	202,052	198,781	193,628	185,907
Estimated	NO_X	ppmvd, 15% O_2		50	50	50	50	50	50
Emissions	CO	ppmvd, 15% O_2		1,013	1,013	1,013	1,013	1,013	1,013
	UHC	ppmvd, 15% O_2		110	110	110	110	110	110

TABLE B-1Af
Gas-Fired Turbines
Emission Estimates
Startup
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar				
Model	250-30002S4				
Fuel	Natural Gas				
Ambient Temperature	48.28 °F			0.01 °F	
Maximum Event Frequency		2 events/hr	260 events/yr		2 events/hr
Maximum Startup Time		18.00 min/hr	39 hrs/yr		18.00 min/hr
Fuel Consumption		26,967 scf/hr	3.51 MMscf/yr		28,245 scf/hr
		Average	Maximum		Maximum
NO_X	2.5248 lbs/event	5.0496 lb/hr	0.3282 tpy	2.6522 lbs/event	5.3044 lb/hr
CO	38.6406 lbs/event	77.2812 lb/hr	5.0233 tpy	40.4455 lbs/event	80.8909 lb/hr
SO_2	0.0468 lbs/event	0.0935 lb/hr	0.0061 tpy	0.0490 lbs/event	0.0980 lb/hr
$PM_{10/2.5}$	0.0908 lbs/event	0.1815 lb/hr	0.0118 tpy	0.0951 lbs/event	0.1901 lb/hr
CO_{2-e}	1,671 lbs/event	3,343 lb/hr	217 tpy	1,750 lbs/event	3,501 lb/hr
CO_2	1,618 lbs/event	3,237 lb/hr	210 tpy	1,695 lbs/event	3,390 lb/hr
N_2O	0.0030 lbs/event	0.0061 lb/hr	0.0004 tpy	0.0032 lbs/event	0.0064 lb/hr
TOC (Total)	2.6665 lbs/event	5.3330 lb/hr	0.3466 tpy	2.7924 lbs/event	5.5848 lb/hr
Methane	2.0847 lbs/event	4.1694 lb/hr	0.2710 tpy	2.1831 lbs/event	4.3663 lb/hr
Ethane	0.0727 lbs/event	0.1454 lb/hr	0.0095 tpy	0.0762 lbs/event	0.1523 lb/hr
VOC (Total)	0.5091 lbs/event	1.0181 lb/hr	0.0662 tpy	0.5331 lbs/event	1.0662 lb/hr
VOC (non-HAP)	0.2600 lbs/event	0.5200 lb/hr	0.0338 tpy	0.2723 lbs/event	0.5446 lb/hr
HAP (Total)	0.2490 lbs/event	0.4981 lb/hr	0.0324 tpy	0.2608 lbs/event	0.5216 lb/hr
Acetaldehyde	9.70E-03 lbs/event	0.0194 lb/hr	0.0013 tpy	1.02E-02 lbs/event	0.0203 lb/hr
Acrolein	1.55E-03 lbs/event	0.0031 lb/hr	0.0002 tpy	1.62E-03 lbs/event	0.0032 lb/hr
Benzene	2.91E-03 lbs/event	0.0058 lb/hr	0.0004 tpy	3.05E-03 lbs/event	0.0061 lb/hr
Biphenyl					
Butadiene (1,3-)	1.04E-04 lbs/event	0.0002 lb/hr	0.0000 tpy	1.09E-04 lbs/event	0.0002 lb/hr
Carbon Tetrachloride					
Chlorobenzene					
Chloroform					
Dichloropropene (1,3-)					
Ethylbenzene	7.76E-03 lbs/event	0.0155 lb/hr	0.0010 tpy	8.12E-03 lbs/event	0.0162 lb/hr
Ethylene Dibromide					
Formaldehyde	1.72E-01 lbs/event	0.3442 lb/hr	0.0224 tpy	1.80E-01 lbs/event	0.3605 lb/hr
Hexane (n-)					
Methanol					
Methylene Chloride					
Methylnaphthalene (2-)					
Naphthalene	3.15E-04 lbs/event	0.0006 lb/hr	0.0000 tpy	3.30E-04 lbs/event	0.0007 lb/hr
PAH	5.33E-04 lbs/event	0.0011 lb/hr	0.0001 tpy	5.58E-04 lbs/event	0.0011 lb/hr
Phenol					
Propylene Oxide	7.03E-03 lbs/event	0.0141 lb/hr	0.0009 tpy	7.36E-03 lbs/event	0.0147 lb/hr
Styrene					
Tetrachloroethane (1,1,2,2-)					
Toluene	3.15E-02 lbs/event	0.0630 lb/hr	0.0041 tpy	3.30E-02 lbs/event	0.0660 lb/hr
Trichloroethane (1,1,2-)					
Trimethylpentane (2,2,4-)					
Vinyl Chloride					
Xylenes	1.55E-02 lbs/event	0.0310 lb/hr	0.0020 tpy	1.62E-02 lbs/event	0.0325 lb/hr

NOTES

1. Emissions of NOx, CO, and UHC are estimated using information provided in TABLE B-1Ad and TABLE B-1Ae.

	48.28 °F		0.01 °F	
	Step 2	Step 3	Step 2	Step 3
Duration	3.00 min/event	6.00 min/event	3.00 min/event	6.00 min/event
NO_X	0.6241 lb/event	1.9007 lb/event	0.6435 lb/event	2.0086 lb/event
CO	15.1978 lb/event	23.4428 lb/event	15.6711 lb/event	24.7743 lb/event
UHC	0.9968 lb/event	1.6697 lb/event	1.0279 lb/event	1.7645 lb/event
Fuel	3,322 scf/event	10,162 scf/event	3,438 scf/event	10,685 scf/event

2. Footnotes 4 thru 8 of TABLE B-1Ac.
3. The frequency of startup events was provided by Technical Services.

TABLE B-1Ag
Gas-Fired Turbines
Emission Estimates
Shutdown
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar				
Model	250-30002S4				
Fuel	Natural Gas				
Ambient Temperature	48.28 °F			0.01 °F	
Maximum Event Frequency		2 events/hr	260 events/yr		2 events/hr
Maximum Startup Time		17.00 min/hr	36.83 hrs/yr		17.00 min/hr
Fuel Consumption		28,791 scf/hr	3.74 MMscf/yr		30,273 scf/hr
		Average	Maximum		Maximum
NO_X	2.6926 lbs/event	5.3853 lb/hr	0.3500 tpy	2.8456 lbs/event	5.6911 lb/hr
CO	33.2106 lbs/event	66.4213 lb/hr	4.3174 tpy	35.0970 lbs/event	70.1940 lb/hr
SO_2	0.0499 lbs/event	0.0998 lb/hr	0.0065 tpy	0.0525 lbs/event	0.1050 lb/hr
$PM_{10/2.5}$	0.0969 lbs/event	0.1938 lb/hr	0.0126 tpy	0.1019 lbs/event	0.2038 lb/hr
CO_{2-e}	1,775 lbs/event	3,550 lb/hr	231 tpy	1,867 lbs/event	3,733 lb/hr
CO_2	1,728 lbs/event	3,455 lb/hr	225 tpy	1,817 lbs/event	3,633 lb/hr
N_2O	0.0033 lbs/event	0.0065 lb/hr	0.0004 tpy	0.0034 lbs/event	0.0068 lb/hr
TOC (Total)	2.3654 lbs/event	4.7307 lb/hr	0.3075 tpy	2.4997 lbs/event	4.9994 lb/hr
Methane	1.8493 lbs/event	3.6986 lb/hr	0.2404 tpy	1.9543 lbs/event	3.9087 lb/hr
Ethane	0.0645 lbs/event	0.1290 lb/hr	0.0084 tpy	0.0682 lbs/event	0.1363 lb/hr
VOC (Total)	0.4516 lbs/event	0.9031 lb/hr	0.0587 tpy	0.4772 lbs/event	0.9544 lb/hr
VOC (non-HAP)	0.2307 lbs/event	0.4613 lb/hr	0.0300 tpy	0.2438 lbs/event	0.4875 lb/hr
HAP (Total)	0.2209 lbs/event	0.4418 lb/hr	0.0287 tpy	0.2335 lbs/event	0.4669 lb/hr
Acetaldehyde	8.60E-03 lbs/event	0.0172 lb/hr	0.0011 tpy	9.09E-03 lbs/event	0.0182 lb/hr
Acrolein	1.38E-03 lbs/event	0.0028 lb/hr	0.0002 tpy	1.45E-03 lbs/event	0.0029 lb/hr
Benzene	2.58E-03 lbs/event	0.0052 lb/hr	0.0003 tpy	2.73E-03 lbs/event	0.0055 lb/hr
Biphenyl					
Butadiene (1,3-)	9.25E-05 lbs/event	0.0002 lb/hr	0.0000 tpy	9.77E-05 lbs/event	0.0002 lb/hr
Carbon Tetrachloride					
Chlorobenzene					
Chloroform					
Dichloropropene (1,3-)					
Ethylbenzene	6.88E-03 lbs/event	0.0138 lb/hr	0.0009 tpy	7.27E-03 lbs/event	0.0145 lb/hr
Ethylene Dibromide					
Formaldehyde	1.53E-01 lbs/event	0.3053 lb/hr	0.0198 tpy	1.61E-01 lbs/event	0.3227 lb/hr
Hexane (n-)					
Methanol					
Methylene Chloride					
Methylnaphthalene (2-)					
Naphthalene	2.80E-04 lbs/event	0.0006 lb/hr	0.0000 tpy	2.95E-04 lbs/event	0.0006 lb/hr
PAH	4.73E-04 lbs/event	0.0009 lb/hr	0.0001 tpy	5.00E-04 lbs/event	0.0010 lb/hr
Phenol					
Propylene Oxide	6.24E-03 lbs/event	0.0125 lb/hr	0.0008 tpy	6.59E-03 lbs/event	0.0132 lb/hr
Styrene					
Tetrachloroethane (1,1,2,2-)					
Toluene	2.80E-02 lbs/event	0.0559 lb/hr	0.0036 tpy	2.95E-02 lbs/event	0.0591 lb/hr
Trichloroethane (1,1,2-)					
Trimethylpentane (2,2,4-)					
Vinyl Chloride					
Xylenes	1.38E-02 lbs/event	0.0275 lb/hr	0.0018 tpy	1.45E-02 lbs/event	0.0291 lb/hr

NOTES

1. Emissions of NOx, CO, and UHC are estimated using information provided in TABLE B-1Ad and TABLE B-1Ae.

	48.28 °F		0.01 °F	
	Step 2	Step 3	Step 2	Step 3
Duration	0.00 min/event	8.50 min/event	0.00 min/event	8.50 min/event
NO_X	0.0000 lb/event	2.6926 lb/event	0.0000 lb/event	2.8456 lb/event
CO	0.0000 lb/event	33.2106 lb/event	0.0000 lb/event	35.0970 lb/event
UHC	0.0000 lb/event	2.3654 lb/event	0.0000 lb/event	2.4997 lb/event
Fuel	0 scf/event	14,396 scf/event	0 scf/event	15,137 scf/event

2. Footnotes 4 thru 8 of TABLE B-1Ac.
3. The frequency of startup events was provided by Technical Services.

TABLE B-1Ah
Gas-Fired Turbines
Emission Estimates
Low Temperatures
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar					
Model	250-30002S4					
Normal Operating Load	100%					
Fuel	Natural Gas					
Fuel Higher Heating Value (HHV)	1,020 BTU/scf			1,020 BTU/scf		
Ambient Temperature	-20.00 °F			-20.00 °F		
Power Output	35,209 bhp (mech.)			35,209 bhp (mech.)		
	26,256 kW (elec.)			26,256 kW (elec.)		
Heat Rate at HHV	7,059 BTU/hp-hr			7,059 BTU/hp-hr		
Operating Hours	17 hrs/yr			1 hrs/yr		
Fuel Consumption	243,658 scfh			243,658 scfh		
	4.142 MMscf/yr			0.244 MMscf/yr		
Heat Input at HHV	248.53 MMBTU/hr	0°F ≥ T > -20°F		248.53 MMBTU/hr	T ≤ -20°F	
	4,225 MMBTU/yr	Hourly	Annual	249 MMBTU/yr	Hourly	Annual
NO_X	33.18 lb/MMscf	8.0848 lb/hr	0.0687 tpy	442.41 lb/MMscf	107.7979 lb/hr	0.0539 tpy
CO	56.11 lb/MMscf	13.6719 lb/hr	0.1162 tpy	336.67 lb/MMscf	82.0316 lb/hr	0.0410 tpy
SO_2	3.47 lb/MMscf	0.8450 lb/hr	0.0072 tpy	3.47 lb/MMscf	0.8450 lb/hr	0.0004 tpy
$PM_{10/2.5}$	6.73 lb/MMscf	1.6403 lb/hr	0.0139 tpy	6.73 lb/MMscf	1.6403 lb/hr	0.0008 tpy
CO_{2-e}	120,804 lb/MMscf	29,435 lb/hr	250 tpy	122,243 lb/MMscf	29,785 lb/hr	15 tpy
CO_2	120,017 lb/MMscf	29,243 lb/hr	249 tpy	120,017 lb/MMscf	29,243 lb/hr	15 tpy
N_2O	0.23 lb/MMscf	0.0551 lb/hr	0.0005 tpy	0.23 lb/MMscf	0.0551 lb/hr	0.0000 tpy
TOC (Total)	36.80 lb/MMscf	8.9674 lb/hr	0.0762 tpy	110.41 lb/MMscf	26.9023 lb/hr	0.0135 tpy
Methane	28.77 lb/MMscf	7.0109 lb/hr	0.0596 tpy	86.32 lb/MMscf	21.0327 lb/hr	0.0105 tpy
Ethane	1.00 lb/MMscf	0.2446 lb/hr	0.0021 tpy	3.01 lb/MMscf	0.7337 lb/hr	0.0004 tpy
VOC (Total)	7.03 lb/MMscf	1.7120 lb/hr	0.0146 tpy	21.08 lb/MMscf	5.1359 lb/hr	0.0026 tpy
VOC (non-HAP)	3.59 lb/MMscf	0.8745 lb/hr	0.0074 tpy	10.77 lb/MMscf	2.6234 lb/hr	0.0013 tpy
HAP (Total)	3.44 lb/MMscf	0.8375 lb/hr	0.0071 tpy	10.31 lb/MMscf	2.5125 lb/hr	0.0013 tpy
Acetaldehyde	1.34E-01 lb/MMscf	0.0326 lb/hr	0.0003 tpy	4.01E-01 lb/MMscf	0.0978 lb/hr	0.0000 tpy
Acrolein	2.14E-02 lb/MMscf	0.0052 lb/hr	0.0000 tpy	6.42E-02 lb/MMscf	0.0157 lb/hr	0.0000 tpy
Benzene	4.01E-02 lb/MMscf	0.0098 lb/hr	0.0001 tpy	1.20E-01 lb/MMscf	0.0293 lb/hr	0.0000 tpy
Biphenyl						
Butadiene (1,3-)	1.44E-03 lb/MMscf	0.0004 lb/hr	0.0000 tpy	4.32E-03 lb/MMscf	0.0011 lb/hr	0.0000 tpy
Carbon Tetrachloride						
Chlorobenzene						
Chloroform						
Dichloropropene (1,3-)						
Ethylbenzene	1.07E-01 lb/MMscf	0.0261 lb/hr	0.0002 tpy	3.21E-01 lb/MMscf	0.0783 lb/hr	0.0000 tpy
Ethylene Dibromide						
Formaldehyde	2.38E+00 lb/MMscf	0.5788 lb/hr	0.0049 tpy	7.13E+00 lb/MMscf	1.7364 lb/hr	0.0009 tpy
Hexane (n-)						
Methanol						
Methylene Chloride						
Methylnaphthalene (2-)						
Naphthalene	4.35E-03 lb/MMscf	0.0011 lb/hr	0.0000 tpy	1.30E-02 lb/MMscf	0.0032 lb/hr	0.0000 tpy
PAH	7.36E-03 lb/MMscf	0.0018 lb/hr	0.0000 tpy	2.21E-02 lb/MMscf	0.0054 lb/hr	0.0000 tpy
Phenol						
Propylene Oxide	9.70E-02 lb/MMscf	0.0236 lb/hr	0.0002 tpy	2.91E-01 lb/MMscf	0.0709 lb/hr	0.0000 tpy
Styrene						
Tetrachloroethane (1,1,2,2-)						
Toluene	4.35E-01 lb/MMscf	0.1060 lb/hr	0.0009 tpy	1.30E+00 lb/MMscf	0.3179 lb/hr	0.0002 tpy
Trichloroethane (1,1,2-)						
Trimethylpentane (2,2,4-)						
Vinyl Chloride						
Xylenes	2.14E-01 lb/MMscf	0.0522 lb/hr	0.0004 tpy	6.42E-01 lb/MMscf	0.1565 lb/hr	0.0001 tpy

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Operating hours for low ambient temperatures best on best fit of available data (see TABLE B-1Aa).
3. Manufacturer provided data on: power output, heat rate, along with NOx, CO, and UHC (or TOC) emissions.
4. Footnotes 4 thru 8 of TABLE B-1Ac.

TABLE B-1Ai
Gas-Fired Turbines
Maximum Emission Estimates
Normal Operations, Startup, Shutdown, and Low Temperature Operations
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar																	
Model	250-30002S4																	
Normal Operating Load	100%																	
Operations	Normal			Startup			Shutdown			Startup/Shutdown w/ Normal			Low Temperatures			Combined Operations		
Maximum Annual Combined Event Frequency	8,760 hrs/yr			39 hrs/yr			37 hrs/yr			8,760 hrs/yr			18 hrs/yr			8,760 hrs/yr		
	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum	Hourly			Hourly		Maximum	Hourly		Maximum
Pollutant	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Maximum Annual	Average	Maximum	Annual	Average	Maximum	Annual
NO_X	7.0025 lb/hr	7.7768 lb/hr	30.6710 tpy	5.0496 lb/hr	5.3044 lb/hr	0.3282 tpy	5.3853 lb/hr	5.6911 lb/hr	0.3500 tpy	7.0967 lb/hr	14.2358 lb/hr	31.0838 tpy	13.6245 lb/hr	107.7979 lb/hr	0.1226 tpy	7.1104 lb/hr	107.7979 lb/hr	31.1434 tpy
CO	11.8416 lb/hr	13.1510 lb/hr	51.8664 tpy	77.2812 lb/hr	80.8909 lb/hr	5.0233 tpy	66.4213 lb/hr	70.1940 lb/hr	4.3174 tpy	13.8717 lb/hr	156.5645 lb/hr	60.7581 tpy	17.4697 lb/hr	82.0316 lb/hr	0.1572 tpy	13.8833 lb/hr	156.5645 lb/hr	60.8087 tpy
SO_2	0.7352 lb/hr	0.8140 lb/hr	3.2202 tpy	0.0935 lb/hr	0.0980 lb/hr	0.0061 tpy	0.0998 lb/hr	0.1050 lb/hr	0.0065 tpy	0.7352 lb/hr	0.8140 lb/hr	3.2202 tpy	0.8450 lb/hr	0.8450 lb/hr	0.0076 tpy	0.7354 lb/hr	0.8450 lb/hr	3.2212 tpy
$PM_{10/2.5}$	1.4272 lb/hr	1.5802 lb/hr	6.2510 tpy	0.1815 lb/hr	0.1901 lb/hr	0.0118 tpy	0.1938 lb/hr	0.2038 lb/hr	0.0126 tpy	1.4272 lb/hr	1.5802 lb/hr	6.2510 tpy	1.6403 lb/hr	1.6403 lb/hr	0.0148 tpy	1.4276 lb/hr	1.6403 lb/hr	6.2529 tpy
CO_{2-e}	25,609 lb/hr	28,356 lb/hr	112,169 tpy	3,343 lb/hr	3,501 lb/hr	217 tpy	3,550 lb/hr	3,733 lb/hr	231 tpy	25,609 lb/hr	28,356 lb/hr	112,169 tpy	29,454 lb/hr	29,785 lb/hr	265 tpy	25,617 lb/hr	29,785 lb/hr	112,204 tpy
CO_2	25,443 lb/hr	28,171 lb/hr	111,442 tpy	3,237 lb/hr	3,390 lb/hr	210 tpy	3,455 lb/hr	3,633 lb/hr	225 tpy	25,443 lb/hr	28,171 lb/hr	111,442 tpy	29,243 lb/hr	29,243 lb/hr	263 tpy	25,451 lb/hr	29,243 lb/hr	111,476 tpy
N_2O	0.0480 lb/hr	0.0531 lb/hr	0.2100 tpy	0.0061 lb/hr	0.0064 lb/hr	0.0004 tpy	0.0065 lb/hr	0.0068 lb/hr	0.0004 tpy	0.0480 lb/hr	0.0531 lb/hr	0.2100 tpy	0.0551 lb/hr	0.0551 lb/hr	0.0005 tpy	0.0480 lb/hr	0.0551 lb/hr	0.2101 tpy
TOC (Total)	7.7669 lb/hr	8.6257 lb/hr	34.0192 tpy	5.3330 lb/hr	5.5848 lb/hr	0.3466 tpy	4.7307 lb/hr	4.9994 lb/hr	0.3075 tpy	7.8491 lb/hr	14.1782 lb/hr	34.3789 tpy	9.9638 lb/hr	26.9023 lb/hr	0.0897 tpy	7.8536 lb/hr	26.9023 lb/hr	34.3986 tpy
Methane	6.0723 lb/hr	6.7438 lb/hr	26.5968 tpy	4.1694 lb/hr	4.3663 lb/hr	0.2710 tpy	3.6986 lb/hr	3.9087 lb/hr	0.2404 tpy	6.1365 lb/hr	11.0848 lb/hr	26.8780 tpy	7.7899 lb/hr	21.0327 lb/hr	0.0701 tpy	6.1401 lb/hr	21.0327 lb/hr	26.8935 tpy
Ethane	0.2118 lb/hr	0.2352 lb/hr	0.9278 tpy	0.1454 lb/hr	0.1523 lb/hr	0.0095 tpy	0.1290 lb/hr	0.1363 lb/hr	0.0084 tpy	0.2141 lb/hr	0.3867 lb/hr	0.9376 tpy	0.2717 lb/hr	0.7337 lb/hr	0.0024 tpy	0.2142 lb/hr	0.7337 lb/hr	0.9381 tpy
VOC (Total)	1.4828 lb/hr	1.6467 lb/hr	6.4946 tpy	1.0181 lb/hr	1.0662 lb/hr	0.0662 tpy	0.9031 lb/hr	0.9544 lb/hr	0.0587 tpy	1.4985 lb/hr	2.7068 lb/hr	6.5632 tpy	1.9022 lb/hr	5.1359 lb/hr	0.0171 tpy	1.4993 lb/hr	5.1359 lb/hr	6.5670 tpy
VOC (non-HAP)	0.7574 lb/hr	0.8411 lb/hr	3.3174 tpy	0.5200 lb/hr	0.5446 lb/hr	0.0338 tpy	0.4613 lb/hr	0.4875 lb/hr	0.0300 tpy	0.7654 lb/hr	1.3826 lb/hr	3.3525 tpy	0.9716 lb/hr	2.6234 lb/hr	0.0087 tpy	0.7658 lb/hr	2.6234 lb/hr	3.3544 tpy
HAP (Total)	0.7254 lb/hr	0.8056 lb/hr	3.1772 tpy	0.4981 lb/hr	0.5216 lb/hr	0.0324 tpy	0.4418 lb/hr	0.4669 lb/hr	0.0287 tpy	0.7331 lb/hr	1.3242 lb/hr	3.2108 tpy	0.9306 lb/hr	2.5125 lb/hr	0.0084 tpy	0.7335 lb/hr	2.5125 lb/hr	3.2126 tpy
Acetaldehyde	2.82E-02 lb/hr	3.14E-02 lb/hr	1.24E-01 tpy	1.94E-02 lb/hr	2.03E-02 lb/hr	1.26E-03 tpy	1.72E-02 lb/hr	1.82E-02 lb/hr	1.12E-03 tpy	2.85E-02 lb/hr	5.16E-02 lb/hr	1.25E-01 tpy	3.62E-02 lb/hr	9.78E-02 lb/hr	3.26E-04 tpy	2.86E-02 lb/hr	9.78E-02 lb/hr	1.25E-01 tpy
Acrolein	4.52E-03 lb/hr	5.02E-03 lb/hr	1.98E-02 tpy	3.10E-03 lb/hr	3.25E-03 lb/hr	2.02E-04 tpy	2.75E-03 lb/hr	2.91E-03 lb/hr	1.79E-04 tpy	4.57E-03 lb/hr	8.25E-03 lb/hr	2.00E-02 tpy	5.80E-03 lb/hr	1.57E-02 lb/hr	5.22E-05 tpy	4.57E-03 lb/hr	1.57E-02 lb/hr	2.00E-02 tpy
Benzene	8.47E-03 lb/hr	9.41E-03 lb/hr	3.71E-02 tpy	5.82E-03 lb/hr	6.09E-03 lb/hr	3.78E-04 tpy	5.16E-03 lb/hr	5.45E-03 lb/hr	3.35E-04 tpy	8.56E-03 lb/hr	1.55E-02 lb/hr	3.75E-02 tpy	1.09E-02 lb/hr	2.93E-02 lb/hr	9.78E-05 tpy	8.57E-03 lb/hr	2.93E-02 lb/hr	3.75E-02 tpy
Biphenyl																		
Butadiene (1,3-)	3.04E-04 lb/hr	3.37E-04 lb/hr	1.33E-03 tpy	2.08E-04 lb/hr	2.18E-04 lb/hr	1.36E-05 tpy	1.85E-04 lb/hr	1.95E-04 lb/hr	1.20E-05 tpy	3.07E-04 lb/hr	5.54E-04 lb/hr	1.34E-03 tpy	3.89E-04 lb/hr	1.05E-03 lb/hr	3.51E-06 tpy	3.07E-04 lb/hr	1.05E-03 lb/hr	1.34E-03 tpy
Carbon Tetrachloride																		
Chlorobenzene																		
Chloroform																		
Dichloropropene (1,3-)																		
Ethylbenzene	2.26E-02 lb/hr	2.51E-02 lb/hr	9.90E-02 tpy	1.55E-02 lb/hr	1.62E-02 lb/hr	1.01E-03 tpy	1.38E-02 lb/hr	1.45E-02 lb/hr	8.95E-04 tpy	2.28E-02 lb/hr	4.12E-02 lb/hr	1.00E-01 tpy	2.90E-02 lb/hr	7.83E-02 lb/hr	2.61E-04 tpy	2.28E-02 lb/hr	7.83E-02 lb/hr	1.00E-01 tpy
Ethylene Dibromide																		
Formaldehyde	5.01E-01 lb/hr	5.57E-01 lb/hr	2.20E+00 tpy	3.44E-01 lb/hr	3.60E-01 lb/hr	2.24E-02 tpy	3.05E-01 lb/hr	3.23E-01 lb/hr	1.98E-02 tpy	5.07E-01 lb/hr	9.15E-01 lb/hr	2.22E+00 tpy	6.43E-01 lb/hr	1.74E+00 lb/hr	5.79E-03 tpy	5.07E-01 lb/hr	1.74E+00 lb/hr	2.22E+00 tpy
Hexane (n-)																		
Methanol																		
Methylene Chloride																		
Methylnaphthalene (2-)																		
Naphthalene	9.18E-04 lb/hr	1.02E-03 lb/hr	4.02E-03 tpy	6.30E-04 lb/hr	6.60E-04 lb/hr	4.10E-05 tpy	5.59E-04 lb/hr	5.91E-04 lb/hr	3.63E-05 tpy	9.28E-04 lb/hr	1.68E-03 lb/hr	4.06E-03 tpy	1.18E-03 lb/hr	3.18E-03 lb/hr	1.06E-05 tpy	9.28E-04 lb/hr	3.18E-03 lb/hr	4.07E-03 tpy
PAH	1.55E-03 lb/hr	1.73E-03 lb/hr	6.80E-03 tpy	1.07E-03 lb/hr	1.12E-03 lb/hr	6.93E-05 tpy	9.46E-04 lb/hr	1.00E-03 lb/hr	6.15E-05 tpy	1.57E-03 lb/hr	2.84E-03 lb/hr	6.88E-03 tpy	1.99E-03 lb/hr	5.38E-03 lb/hr	1.79E-05 tpy	1.57E-03 lb/hr	5.38E-03 lb/hr	6.88E-03 tpy
Phenol																		
Propylene Oxide	2.05E-02 lb/hr	2.27E-02 lb/hr	8.97E-02 tpy	1.41E-02 lb/hr	1.47E-02 lb/hr	9.14E-04 tpy	1.25E-02 lb/hr	1.32E-02 lb/hr	8.11E-04 tpy	2.07E-02 lb/hr	3.74E-02 lb/hr	9.06E-02 tpy	2.63E-02 lb/hr	7.09E-02 lb/hr	2.36E-04 tpy	2.07E-02 lb/hr	7.09E-02 lb/hr	9.07E-02 tpy
Styrene																		
Tetrachloroethane (1,1,2,2-)																		
Toluene	9.18E-02 lb/hr	1.02E-01 lb/hr	4.02E-01 tpy	6.30E-02 lb/hr	6.60E-02 lb/hr	4.10E-03 tpy	5.59E-02 lb/hr	5.91E-02 lb/hr	3.63E-03 tpy	9.28E-02 lb/hr	1.68E-01 lb/hr	4.06E-01 tpy	1.18E-01 lb/hr	3.18E-01 lb/hr	1.06E-03 tpy	9.28E-02 lb/hr	3.18E-01 lb/hr	4.07E-01 tpy
Trichloroethane (1,1,2-)																		
Trimethylpentane (2,2,4-)																		
Vinyl Chloride																		
Xylenes	4.52E-02 lb/hr	5.02E-02 lb/hr	1.98E-01 tpy	3.10E-02 lb/hr	3.25E-02 lb/hr	2.02E-03 tpy	2.75E-02 lb/hr	2.91E-02 lb/hr	1.79E-03 tpy	4.57E-02 lb/hr	8.25E-02 lb/hr	2.00E-01 tpy	5.80E-02 lb/hr	1.57E-01 lb/hr	5.22E-04 tpy	4.57E-02 lb/hr	1.57E-01 lb/hr	2.00E-01 tpy

NOTES

1. See TABLE B-1Ac, TABLE B-1Af, TABLE B-1Ag, and TABLE B-1Ah.
2. If $E(t)_{normal} > E(t)_{transient}$, then $E(8{,}760\ hrs/yr)_{all} = E(8{,}760\ hrs/yr)_{normal}$
   Otherwise, $E(8{,}760\ hrs/yr)_{all} = E(8{,}760\ hrs/yr)_{normal} - E(t)_{normal} + E(t)_{transient}$.
   where t = the duration of transient operation.

TABLE B-1Aj
Gas-Fired Turbines
Maximum Emission Estimates
Normal Operations, Startup, Shutdown, and Low Temperature Operations
PTE - 100% Fuel Utilization at 100% Power Output

Make		Solar																		
Model		250-30002S4																		
Normal Operating Load		100%																		
Operations		Normal			Startup			Shutdown			Startup/Shutdown w/ Normal			Low Temperatures			Combined Operations		
Maximum Annual Combined Event Frequency		8,760 hrs/yr			39 hrs/yr			37 hrs/yr			8,760 hrs/yr			18 hrs/yr			8,760 hrs/yr		
Pollutant	Control Efficiency	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum
		Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual
NO_X		7.0025 lb/hr	7.7768 lb/hr	30.6710 tpy	5.0496 lb/hr	5.3044 lb/hr	0.3282 tpy	5.3853 lb/hr	5.6911 lb/hr	0.3500 tpy	7.0967 lb/hr	14.2358 lb/hr	31.0838 tpy	13.6245 lb/hr	107.7979 lb/hr	0.1226 tpy	7.1104 lb/hr	107.7979 lb/hr	31.1434 tpy
CO	95.00% by weight	0.5921 lb/hr	0.6575 lb/hr	2.5933 tpy	77.2812 lb/hr	80.8909 lb/hr	5.0233 tpy	3.3211 lb/hr	3.5097 lb/hr	0.2159 tpy	1.7831 lb/hr	84.6746 lb/hr	7.8100 tpy	0.8735 lb/hr	4.1016 lb/hr	0.0079 tpy	1.7837 lb/hr	84.6746 lb/hr	7.8125 tpy
SO_2		0.7352 lb/hr	0.8140 lb/hr	3.2202 tpy	0.0935 lb/hr	0.0980 lb/hr	0.0061 tpy	0.0998 lb/hr	0.1050 lb/hr	0.0065 tpy	0.7352 lb/hr	0.8140 lb/hr	3.2202 tpy	0.8450 lb/hr	0.8450 lb/hr	0.0076 tpy	0.7354 lb/hr	0.8450 lb/hr	3.2212 tpy
$PM_{10/2.5}$		1.4272 lb/hr	1.5802 lb/hr	6.2510 tpy	0.1815 lb/hr	0.1901 lb/hr	0.0118 tpy	0.1938 lb/hr	0.2038 lb/hr	0.0126 tpy	1.4272 lb/hr	1.5802 lb/hr	6.2510 tpy	1.6403 lb/hr	1.6403 lb/hr	0.0148 tpy	1.4276 lb/hr	1.6403 lb/hr	6.2529 tpy
CO_{2-e}		25,627 lb/hr	28,375 lb/hr	112,247 tpy	3,343 lb/hr	3,501 lb/hr	217 tpy	3,649 lb/hr	3,838 lb/hr	237 tpy	25,627 lb/hr	28,375 lb/hr	112,247 tpy	29,480 lb/hr	29,908 lb/hr	265 tpy	25,635 lb/hr	29,908 lb/hr	112,281 tpy
CO_2		25,461 lb/hr	28,191 lb/hr	111,519 tpy	3,237 lb/hr	3,390 lb/hr	210 tpy	3,555 lb/hr	3,738 lb/hr	231 tpy	25,461 lb/hr	28,191 lb/hr	111,519 tpy	29,269 lb/hr	29,366 lb/hr	263 tpy	25,469 lb/hr	29,366 lb/hr	111,553 tpy
N_2O		0.0480 lb/hr	0.0531 lb/hr	0.2100 tpy	0.0061 lb/hr	0.0064 lb/hr	0.0004 tpy	0.0065 lb/hr	0.0068 lb/hr	0.0004 tpy	0.0480 lb/hr	0.0531 lb/hr	0.2100 tpy	0.0551 lb/hr	0.0551 lb/hr	0.0005 tpy	0.0480 lb/hr	0.0551 lb/hr	0.2101 tpy
TOC (Total)	10.91% by weight	6.9196 lb/hr	7.6847 lb/hr	30.3080 tpy	5.3330 lb/hr	5.5848 lb/hr	0.3466 tpy	4.2147 lb/hr	4.4540 lb/hr	0.2740 tpy	7.0014 lb/hr	13.2408 lb/hr	30.6663 tpy	8.8768 lb/hr	23.9675 lb/hr	0.0799 tpy	7.0055 lb/hr	23.9675 lb/hr	30.6839 tpy
Methane	0.00% by weight	6.0723 lb/hr	6.7438 lb/hr	26.5968 tpy	4.1694 lb/hr	4.3663 lb/hr	0.2710 tpy	3.6986 lb/hr	3.9087 lb/hr	0.2404 tpy	6.1365 lb/hr	11.0848 lb/hr	26.8780 tpy	7.7899 lb/hr	21.0327 lb/hr	0.0701 tpy	6.1401 lb/hr	21.0327 lb/hr	26.8935 tpy
Ethane	50.00% by weight	0.1059 lb/hr	0.1176 lb/hr	0.4639 tpy	0.1454 lb/hr	0.1523 lb/hr	0.0095 tpy	0.0645 lb/hr	0.0682 lb/hr	0.0042 tpy	0.1081 lb/hr	0.2695 lb/hr	0.4735 tpy	0.1359 lb/hr	0.3668 lb/hr	0.0012 tpy	0.1082 lb/hr	0.3668 lb/hr	0.4738 tpy
VOC (Total)	50.00% by weight	0.7414 lb/hr	0.8234 lb/hr	3.2473 tpy	1.0181 lb/hr	1.0662 lb/hr	0.0662 tpy	0.4516 lb/hr	0.4772 lb/hr	0.0294 tpy	0.7568 lb/hr	1.8865 lb/hr	3.3147 tpy	0.9511 lb/hr	2.5679 lb/hr	0.0086 tpy	0.7572 lb/hr	2.5679 lb/hr	3.3166 tpy
VOC (non-HAP)	19.10% by weight	0.6128 lb/hr	0.6805 lb/hr	2.6839 tpy	0.5200 lb/hr	0.5446 lb/hr	0.0338 tpy	0.3732 lb/hr	0.3944 lb/hr	0.0243 tpy	0.6207 lb/hr	1.2226 lb/hr	2.7187 tpy	0.7861 lb/hr	2.1224 lb/hr	0.0071 tpy	0.6211 lb/hr	2.1224 lb/hr	2.7203 tpy
HAP (Total)	8.23E-01 by weight	0.1286 lb/hr	0.1428 lb/hr	0.5634 tpy	0.4981 lb/hr	0.5216 lb/hr	0.0324 tpy	0.0783 lb/hr	0.0828 lb/hr	0.0051 tpy	0.1361 lb/hr	0.6639 lb/hr	0.5960 tpy	0.1650 lb/hr	0.4455 lb/hr	0.0015 tpy	0.1361 lb/hr	0.6639 lb/hr	0.5963 tpy
Acetaldehyde	80.00% by weight	5.65E-03 lb/hr	6.27E-03 lb/hr	2.47E-02 tpy	1.94E-02 lb/hr	2.03E-02 lb/hr	1.26E-03 tpy	3.44E-03 lb/hr	3.64E-03 lb/hr	2.24E-04 tpy	5.94E-03 lb/hr	2.66E-02 lb/hr	2.60E-02 tpy	7.25E-03 lb/hr	1.96E-02 lb/hr	6.52E-05 tpy	5.94E-03 lb/hr	2.66E-02 lb/hr	2.60E-02 tpy
Acrolein	50.00% by weight	2.26E-03 lb/hr	2.51E-03 lb/hr	9.90E-03 tpy	3.10E-03 lb/hr	3.25E-03 lb/hr	2.02E-04 tpy	1.38E-03 lb/hr	1.45E-03 lb/hr	8.95E-05 tpy	2.31E-03 lb/hr	5.75E-03 lb/hr	1.01E-02 tpy	2.90E-03 lb/hr	7.83E-03 lb/hr	2.61E-05 tpy	2.31E-03 lb/hr	7.83E-03 lb/hr	1.01E-02 tpy
Benzene	50.00% by weight	4.24E-03 lb/hr	4.70E-03 lb/hr	1.86E-02 tpy	5.82E-03 lb/hr	6.09E-03 lb/hr	3.78E-04 tpy	2.58E-03 lb/hr	2.73E-03 lb/hr	1.68E-04 tpy	4.32E-03 lb/hr	1.08E-02 lb/hr	1.89E-02 tpy	5.43E-03 lb/hr	1.47E-02 lb/hr	4.89E-05 tpy	4.33E-03 lb/hr	1.47E-02 lb/hr	1.90E-02 tpy
Biphenyl	0.00% by weight																		
Butadiene (1,3-)	50.00% by weight	1.52E-04 lb/hr	1.69E-04 lb/hr	6.65E-04 tpy	2.08E-04 lb/hr	2.18E-04 lb/hr	1.36E-05 tpy	9.25E-05 lb/hr	9.77E-05 lb/hr	6.01E-06 tpy	1.55E-04 lb/hr	3.86E-04 lb/hr	6.79E-04 tpy	1.95E-04 lb/hr	5.26E-04 lb/hr	1.75E-06 tpy	1.55E-04 lb/hr	5.26E-04 lb/hr	6.79E-04 tpy
Carbon Tetrachloride	50.00% by weight																		
Chlorobenzene	50.00% by weight																		
Chloroform	50.00% by weight																		
Dichloropropene (1,3-)	50.00% by weight																		
Ethylbenzene	50.00% by weight	1.13E-02 lb/hr	1.25E-02 lb/hr	4.95E-02 tpy	1.55E-02 lb/hr	1.62E-02 lb/hr	1.01E-03 tpy	6.88E-03 lb/hr	7.27E-03 lb/hr	4.47E-04 tpy	1.15E-02 lb/hr	2.87E-02 lb/hr	5.05E-02 tpy	1.45E-02 lb/hr	3.91E-02 lb/hr	1.30E-04 tpy	1.15E-02 lb/hr	3.91E-02 lb/hr	5.05E-02 tpy
Ethylene Dibromide	50.00% by weight																		
Formaldehyde	95.00% by weight	2.51E-02 lb/hr	2.78E-02 lb/hr	1.10E-01 tpy	3.44E-01 lb/hr	3.60E-01 lb/hr	2.24E-02 tpy	1.53E-02 lb/hr	1.61E-02 lb/hr	9.92E-04 tpy	3.02E-02 lb/hr	3.88E-01 lb/hr	1.32E-01 tpy	3.22E-02 lb/hr	8.68E-02 lb/hr	2.89E-04 tpy	3.02E-02 lb/hr	3.88E-01 lb/hr	1.32E-01 tpy
Hexane (n-)	50.00% by weight																		
Methanol	95.00% by weight																		
Methylene Chloride	50.00% by weight																		
Methylnaphthalene (2-)	50.00% by weight																		
Naphthalene	50.00% by weight	4.59E-04 lb/hr	5.10E-04 lb/hr	2.01E-03 tpy	6.30E-04 lb/hr	6.60E-04 lb/hr	4.10E-05 tpy	2.80E-04 lb/hr	2.95E-04 lb/hr	1.82E-05 tpy	4.68E-04 lb/hr	1.17E-03 lb/hr	2.05E-03 tpy	5.89E-04 lb/hr	1.59E-03 lb/hr	5.30E-06 tpy	4.69E-04 lb/hr	1.59E-03 lb/hr	2.05E-03 tpy
PAH	50.00% by weight	7.77E-04 lb/hr	8.63E-04 lb/hr	3.40E-03 tpy	1.07E-03 lb/hr	1.12E-03 lb/hr	6.93E-05 tpy	4.73E-04 lb/hr	5.00E-04 lb/hr	3.07E-05 tpy	7.93E-04 lb/hr	1.98E-03 lb/hr	3.47E-03 tpy	9.96E-04 lb/hr	2.69E-03 lb/hr	8.97E-06 tpy	7.93E-04 lb/hr	2.69E-03 lb/hr	3.47E-03 tpy
Phenol	50.00% by weight																		
Propylene Oxide	50.00% by weight	1.02E-02 lb/hr	1.14E-02 lb/hr	4.48E-02 tpy	1.41E-02 lb/hr	1.47E-02 lb/hr	9.14E-04 tpy	6.24E-03 lb/hr	6.59E-03 lb/hr	4.05E-04 tpy	1.05E-02 lb/hr	2.61E-02 lb/hr	4.58E-02 tpy	1.31E-02 lb/hr	3.55E-02 lb/hr	1.18E-04 tpy	1.05E-02 lb/hr	3.55E-02 lb/hr	4.58E-02 tpy
Styrene	0.00% by weight																		
Tetrachloroethane (1,1,2,2-)	50.00% by weight																		
Toluene	50.00% by weight	4.59E-02 lb/hr	5.10E-02 lb/hr	2.01E-01 tpy	6.30E-02 lb/hr	6.60E-02 lb/hr	4.10E-03 tpy	2.80E-02 lb/hr	2.95E-02 lb/hr	1.82E-03 tpy	4.68E-02 lb/hr	1.17E-01 lb/hr	2.05E-01 tpy	5.89E-02 lb/hr	1.59E-01 lb/hr	5.30E-04 tpy	4.69E-02 lb/hr	1.59E-01 lb/hr	2.05E-01 tpy
Trichloroethane (1,1,2-)	50.00% by weight																		
Trimethylpentane (2,2,4-)	50.00% by weight																		
Vinyl Chloride	0.00% by weight																		
Xylenes	50.00% by weight	2.26E-02 lb/hr	2.51E-02 lb/hr	9.90E-02 tpy	3.10E-02 lb/hr	3.25E-02 lb/hr	2.02E-03 tpy	1.38E-02 lb/hr	1.45E-02 lb/hr	8.95E-04 tpy	2.31E-02 lb/hr	5.75E-02 lb/hr	1.01E-01 tpy	2.90E-02 lb/hr	7.83E-02 lb/hr	2.61E-04 tpy	2.31E-02 lb/hr	7.83E-02 lb/hr	1.01E-01 tpy

NOTES

1. See TABLE B-1Ai.
2. It's assumed that oxidation catalyst will be ineffective during startup events.
3. $CO2 = CO2_{uncontrolled} + CE_{CO\text{-}control\ efficiency} * CO_{uncontrolled} * (MW_{CO2}/MW_{CO}) = CO2_{uncontrolled} + CE_{CO\text{-}control\ efficiency} * CO_{uncontrolled} * (44.0095/28.0101)$.

TABLE C-1A
4-Stroke Lean-Burn Reciprocating Engines
Hourly and Annual Emission Estimates
Uncontrolled

Type		4slb				
Service		Emergency				
JJJJ Relevant Date		Manufactured: On or After 01/01/2009				
ZZZZ Status		New RICE at Area HAP Source				
Make		Waukesha				
Model		VGF48GL				
Fuel		Natural Gas				
Fuel Higher Heating Value (HHV)		1,020 BTU/scf			1,020 BTU/scf	
Ambient Temperature		80 °F			80 °F	
Power Output		1,175 bhp (mech.)			1,175 bhp (mech.)	
		825 kW (elec.)			825 kW (elec.)	
Heat Rate at HHV		7,879 BTU/hp-hr			7,879 BTU/hp-hr	
Operating Hours		500 hrs/yr				
Fuel Consumption		9,076 scfh			9,076 scfh	
		4.538 MMscf/yr				
Heat Input at HHV		9.26 MMBTU/hr			9.26 MMBTU/hr	
		4,629 MMBTU/yr	Uncontrolled			Uncontrolled
Pollutant	Control Efficiency	Uncontrolled	Average Hourly	Maximum Annual	Uncontrolled	Maximum Hourly
NO_X		570.81 lb/MMscf	5.1808 lb/hr	1.2952 tpy	570.81 lb/MMscf	5.1808 lb/hr
CO		1,141.62 lb/MMscf	10.3616 lb/hr	2.5904 tpy	1,141.62 lb/MMscf	10.3616 lb/hr
SO_2		0.60 lb/MMscf	0.0054 lb/hr	0.0014 tpy	0.60 lb/MMscf	0.0054 lb/hr
$PM_{10/2.5}$		10.19 lb/MMscf	0.0925 lb/hr	0.0231 tpy	10.19 lb/MMscf	0.0925 lb/hr
CO_{2-e}		253,998 lb/MMscf	2,305 lb/hr	576 tpy	253,998 lb/MMscf	2,305 lb/hr
CO_2		120,017 lb/MMscf	1,089 lb/hr	272 tpy	120,017 lb/MMscf	1,089 lb/hr
N_2O		0.23 lb/MMscf	0.0021 lb/hr	0.0005 tpy	0.23 lb/MMscf	0.0021 lb/hr
TOC (Total)		6,299.27 lb/MMscf	57.1732 lb/hr	14.2933 tpy	6,299.27 lb/MMscf	57.1732 lb/hr
Methane		5,356.52 lb/MMscf	48.6167 lb/hr	12.1542 tpy	5,356.52 lb/MMscf	48.6167 lb/hr
Ethane		431.08 lb/MMscf	3.9126 lb/hr	0.9781 tpy	431.08 lb/MMscf	3.9126 lb/hr
VOC (Total)		511.66 lb/MMscf	4.6440 lb/hr	1.1610 tpy	511.66 lb/MMscf	4.6440 lb/hr
VOC (non-HAP)		202.29 lb/MMscf	1.8360 lb/hr	0.4590 tpy	202.29 lb/MMscf	1.8360 lb/hr
HAP (Total)		309.37 lb/MMscf	2.8079 lb/hr	0.7020 tpy	309.37 lb/MMscf	2.8079 lb/hr
Acetaldehyde		3.58E+01 lb/MMscf	3.25E-01 lb/hr	8.13E-02 tpy	3.58E+01 lb/MMscf	3.25E-01 lb/hr
Acrolein		2.20E+01 lb/MMscf	2.00E-01 lb/hr	5.00E-02 tpy	2.20E+01 lb/MMscf	2.00E-01 lb/hr
Benzene		1.89E+00 lb/MMscf	1.71E-02 lb/hr	4.28E-03 tpy	1.89E+00 lb/MMscf	1.71E-02 lb/hr
Biphenyl		9.08E-01 lb/MMscf	8.25E-03 lb/hr	2.06E-03 tpy	9.08E-01 lb/MMscf	8.25E-03 lb/hr
Butadiene (1,3-)		1.14E+00 lb/MMscf	1.04E-02 lb/hr	2.60E-03 tpy	1.14E+00 lb/MMscf	1.04E-02 lb/hr
Carbon Tetrachloride		1.57E-01 lb/MMscf	1.43E-03 lb/hr	3.57E-04 tpy	1.57E-01 lb/MMscf	1.43E-03 lb/hr
Chlorobenzene		1.30E-01 lb/MMscf	1.18E-03 lb/hr	2.96E-04 tpy	1.30E-01 lb/MMscf	1.18E-03 lb/hr
Chloroform		1.22E-01 lb/MMscf	1.11E-03 lb/hr	2.77E-04 tpy	1.22E-01 lb/MMscf	1.11E-03 lb/hr
Dichloropropene (1,3-)		1.13E-01 lb/MMscf	1.03E-03 lb/hr	2.57E-04 tpy	1.13E-01 lb/MMscf	1.03E-03 lb/hr
Ethylbenzene		1.70E-01 lb/MMscf	1.54E-03 lb/hr	3.86E-04 tpy	1.70E-01 lb/MMscf	1.54E-03 lb/hr
Ethylene Dibromide		1.90E-01 lb/MMscf	1.72E-03 lb/hr	4.31E-04 tpy	1.90E-01 lb/MMscf	1.72E-03 lb/hr
Formaldehyde		2.26E+02 lb/MMscf	2.05E+00 lb/hr	5.13E-01 tpy	2.26E+02 lb/MMscf	2.05E+00 lb/hr
Hexane (n-)		4.76E+00 lb/MMscf	4.32E-02 lb/hr	1.08E-02 tpy	4.76E+00 lb/MMscf	4.32E-02 lb/hr
Methanol		1.07E+01 lb/MMscf	9.72E-02 lb/hr	2.43E-02 tpy	1.07E+01 lb/MMscf	9.72E-02 lb/hr
Methylene Chloride		8.57E-02 lb/MMscf	7.78E-04 lb/hr	1.94E-04 tpy	8.57E-02 lb/MMscf	7.78E-04 lb/hr
Methylnaphthalene (2-)		1.42E-01 lb/MMscf	1.29E-03 lb/hr	3.23E-04 tpy	1.42E-01 lb/MMscf	1.29E-03 lb/hr
Naphthalene		3.19E-01 lb/MMscf	2.89E-03 lb/hr	7.23E-04 tpy	3.19E-01 lb/MMscf	2.89E-03 lb/hr
PAH		1.15E-01 lb/MMscf	1.05E-03 lb/hr	2.62E-04 tpy	1.15E-01 lb/MMscf	1.05E-03 lb/hr
Phenol		1.03E-01 lb/MMscf	9.33E-04 lb/hr	2.33E-04 tpy	1.03E-01 lb/MMscf	9.33E-04 lb/hr
Propylene Oxide						
Styrene		1.01E-01 lb/MMscf	9.18E-04 lb/hr	2.29E-04 tpy	1.01E-01 lb/MMscf	9.18E-04 lb/hr
Tetrachloroethane (1,1,2,2-)		1.82E-01 lb/MMscf	1.65E-03 lb/hr	4.13E-04 tpy	1.82E-01 lb/MMscf	1.65E-03 lb/hr
Toluene		1.75E+00 lb/MMscf	1.59E-02 lb/hr	3.97E-03 tpy	1.75E+00 lb/MMscf	1.59E-02 lb/hr
Trichloroethane (1,1,2-)		1.36E-01 lb/MMscf	1.24E-03 lb/hr	3.09E-04 tpy	1.36E-01 lb/MMscf	1.24E-03 lb/hr
Trimethylpentane (2,2,4-)		1.07E+00 lb/MMscf	9.72E-03 lb/hr	2.43E-03 tpy	1.07E+00 lb/MMscf	9.72E-03 lb/hr
Vinyl Chloride		6.38E-02 lb/MMscf	5.80E-04 lb/hr	1.45E-04 tpy	6.38E-02 lb/MMscf	5.80E-04 lb/hr
Xylenes		7.88E-01 lb/MMscf	7.16E-03 lb/hr	1.79E-03 tpy	7.88E-01 lb/MMscf	7.16E-03 lb/hr

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Maximum hourly emissions based on 100% of rated capacity.
3. Vendor provided data on power output and heat rate.
4. SO2 and PM10/2.5 emission factors based on AP-42, Section 3.2 (Revised 7/00), Table 3.2-2.
5. CO2 and N2O emission factors based on 40 CFR 98, Subpart C, Table C-1 and 40 CFR 98, Subpart C, Table C-2, respectively.
6. NOX and CO emission factors based on 40 CFR 60, Subpart JJJJ.
7. TOC (Total) and TOC specie emissions are estimated based on scaling of AP-42 using 40 CFR 60, Subpart JJJJ (VOC - Formaldehyde) data.
   Emission factors based on: $EF_i = [EF_{(VOC - Formaldehyde)}]/[(EF_{VOC-AP42} - EF_{Formaldehyde-AP42})] (EF_{i-AP42})$

TABLE D-1A
Natural Gas Combustion
Hourly and Annual Emission Estimates
Uncontrolled

Application		Process Heater				
Combustion Process		Conventional				
Add-on Controls		None				
Package (Make: Model)		Engineering Technology, Inc.: N/A				
Burner (Make: Model)		Unknown: Unknown				
Fuel		Natural Gas				
Fuel Higher Heating Value (HHV)		1,020 BTU/scf			1,020 BTU/scf	
Heat Output at HHV		0.750 MMBTU/hr			0.788 MMBTU/hr	
Thermal Efficiency		70%			70%	
Operating Hours		8,760 hrs/yr				
Fuel Consumption		1,050 scfh			1,103 scfh	
		9.202 MMscf/yr				
Heat Input at HHV		1.071 MMBTU/hr			1.125 MMBTU/hr	
		9,386 MMBTU/yr	Uncontrolled			Uncontrolled
Pollutant	Control Efficiency	Uncontrolled	Average Hourly	Maximum Annual	Uncontrolled	Maximum Hourly
NO_X		153.80 lb/MMscf	0.1616 lb/hr	0.7076 tpy	153.80 lb/MMscf	0.1696 lb/hr
CO		93.75 lb/MMscf	0.0985 lb/hr	0.4313 tpy	93.75 lb/MMscf	0.1034 lb/hr
SO_2		0.60 lb/MMscf	0.0006 lb/hr	0.0028 tpy	0.60 lb/MMscf	0.0007 lb/hr
$PM_{10/2.5}$		7.60 lb/MMscf	0.0080 lb/hr	0.0350 tpy	7.60 lb/MMscf	0.0084 lb/hr
CO_{2-e}		120,338.86 lb/MMscf	126.4064 lb/hr	553.6599 tpy	120,338.86 lb/MMscf	132.7267 lb/hr
CO_2		120,017.45 lb/MMscf	126.0688 lb/hr	552.1811 tpy	120,017.45 lb/MMscf	132.3722 lb/hr
N_2O		0.23 lb/MMscf	0.0002 lb/hr	0.0010 tpy	0.23 lb/MMscf	0.0002 lb/hr
TOC (Total)		60.00 lb/MMscf	0.0630 lb/hr	0.2761 tpy	60.00 lb/MMscf	0.0662 lb/hr
Methane		10.16 lb/MMscf	0.0107 lb/hr	0.0467 tpy	10.16 lb/MMscf	0.0112 lb/hr
Ethane		13.69 lb/MMscf	0.0144 lb/hr	0.0630 tpy	13.69 lb/MMscf	0.0151 lb/hr
VOC (Total)		36.15 lb/MMscf	0.0380 lb/hr	0.1663 tpy	36.15 lb/MMscf	0.0399 lb/hr
VOC (non-HAP)		27.83 lb/MMscf	0.0292 lb/hr	0.1280 tpy	27.83 lb/MMscf	0.0307 lb/hr
HAP (Total)		8.32 lb/MMscf	0.0087 lb/hr	0.0383 tpy	8.32 lb/MMscf	0.0092 lb/hr
Acetaldehyde						
Acrolein						
Benzene		9.28E-03 lb/MMscf	9.74E-06 lb/hr	4.27E-05 tpy	9.28E-03 lb/MMscf	1.02E-05 lb/hr
Biphenyl						
Butadiene (1,3-)						
Carbon Tetrachloride						
Chlorobenzene						
Chloroform						
Dichloropropene (1,3-)						
Ethylbenzene						
Ethylene Dibromide						
Formaldehyde		3.31E-01 lb/MMscf	3.48E-04 lb/hr	1.52E-03 tpy	3.31E-01 lb/MMscf	3.65E-04 lb/hr
Hexane (n-)		7.95E+00 lb/MMscf	8.35E-03 lb/hr	3.66E-02 tpy	7.95E+00 lb/MMscf	8.77E-03 lb/hr
Methanol						
Methylene Chloride						
Methylnaphthalene (2-)		1.06E-04 lb/MMscf	1.11E-07 lb/hr	4.88E-07 tpy	1.06E-04 lb/MMscf	1.17E-07 lb/hr
Naphthalene		2.69E-03 lb/MMscf	2.83E-06 lb/hr	1.24E-05 tpy	2.69E-03 lb/MMscf	2.97E-06 lb/hr
PAH						
Phenol						
Propylene Oxide						
Styrene						
Tetrachloroethane (1,1,2,2-)						
Toluene		1.50E-02 lb/MMscf	1.58E-05 lb/hr	6.91E-05 tpy	1.50E-02 lb/MMscf	1.66E-05 lb/hr
Trichloroethane (1,1,2-)						
Trimethylpentane (2,2,4-)						
Vinyl Chloride						
Xylenes						

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Maximum hourly emissions based on 105% of rated capacity.
3. Vendor provided data on: heat output and heat input.
4. CO2 and N2O emission factors based on 40 CFR 98, Subpart C, Table C-1 and 40 CFR 98, Subpart C, Table C-2, respectively.
5. NOX, CO and TOC (Total) emission factors based on vendor data.
6. SO2 and PM10/2.5 emission factors based on AP-42, Section 1.4 (Revised 3/98), Table 1.4-2.
7. Remaining TOC specie emission factors based on scaling of AP-42, Section 1.4 (Revised 3/98), Table 1.4-3 using vendor HC data.
   $EF_i = (EF_{HC}/EF_{TOC\text{-}AP42})\ (EF_{i\text{-}AP42})$

TABLE E-1
Flash Analysis
Summary of Laboratory Analysis

	FEED Pressurized Liquid	VAPOR Flash Gas	LIQUID Residual Liquid
Pressure	575.000 psig	0.034 psig	0.034 psig
	589.696 psia	14.730 psia	14.730 psia
Temperature	72 °F	60 °F	60 °F
API Gravity at 60°F	73.960 n.d.	788.526 n.d.	61.227 n.d.
Specific Gravity at 60°F	0.6887 n.d. (water)	0.1538 n.d. (water)	0.7342 n.d. (water)
	3.3880 n.d. (air)	0.9301 n.d. (air)	4.4320 n.d. (air)
Molecular Weight	98.125 lb/lb-mol	26.938 lb/lb-mol	128.362 lb/lb-mol
Density at 60°F and 14.730 psia	5.747 lb/gal	1.283 lb/gal	6.126 lb/gal
	0.2593 lb/ft^3	0.0712 lb/ft^3	0.3392 lb/ft^3
	22.1622 ft^3/gal	18.0282 ft^3/gal	18.0610 ft^3/gal
	930.8120 ft^3/bbl	757.1853 ft^3/bbl	758.5600 ft^3/bbl
	378.4123 $ft^3/lb\text{-}mol$	378.4123 $ft^3/lb\text{-}mol$	378.4123 $ft^3/lb\text{-}mol$
	17.0747 gal/lb-mol	20.9900 gal/lb-mol	20.9520 gal/lb-mol
	2.4598 lb-mol/bbl	2.0010 lb-mol/bbl	2.0046 lb-mol/bbl
Density at 68°F and 14.696 psia	947.3299 scf/bbl	770.6220 scf/bbl	772.0211 scf/bbl
	385.1275 scf/lb-mol	385.1275 scf/lb-mol	385.1275 scf/lb-mol
	2.4598 lb-mol/bbl	2.0010 lb-mol/bbl	2.0046 lb-mol/bbl
Vapor to Liquid Mole Ratio (V/L)	0.4249 n.d. ($lb\text{-}mol_{VAPOR}/lb\text{-}mol_{LIQUID}$)		
Mole Balance	1.0000 bbl	0.3666 bbl	0.8612 bbl
	2.4598 lb-mol	0.7335 lb-mol	1.7263 lb-mol
	947.3299 scf	282.4903 scf	664.8396 scf
Flash Factor (FF)	328.0318 scf_{VAPOR}/bbl_{LIQUID}		

NOTES

1. Sample Data:
   - Location: Atlanta, TX
   - Date: 04/15/09
   - Time: Not Recorded
2. Reference Conditions:

	SPL	Standard
T =	60 °F	68 °F
P =	14.730 psia	14.696 psia
Water	8.344 lb/gal	8.338 lb/gal
Air	0.0765 lb/ft^3	0.0752 lb/ft^3

3. V + L = F => F = (1 + V/L)L {Overall Mole Balance}.

TABLE E-2
Flash Analysis
Extrapolation of Specie Mole Percentages

Component						Liquid Dump Flash Data				
						Input			Output	
						Liquid	Scaled	*Calculated*	Vapor	Liquid
Name (i)	GC Postition	SPL Class	Formula	Type	HAP	z_i ($mol_{i\text{-}F}/mol_F$)		z_i ($mol_{i\text{-}F}/mol_F$)	y_i ($mol_{i\text{-}V}/mol_V$)	x_i ($mol_{i\text{-}L}/mol_L$)
Nitrogen	1		N2			0.034%	0.034%	0.030%	0.101%	0.000%
Carbon Dioxide	3		CO2	GHG		0.968%	0.968%	0.970%	3.163%	0.038%
Methane	2		C01H04	GHG		20.922%	20.922%	20.921%	69.445%	0.303%
Ethane	4		C02H06			3.391%	3.391%	3.390%	10.467%	0.383%
Propane	5		C03H08	VOC		2.183%	2.183%	2.180%	5.339%	0.838%
Butane (i-)	6		C04H10	VOC		1.232%	1.232%	1.230%	2.126%	0.849%
Butane (n-)	7		C04H10	VOC		1.721%	1.721%	1.720%	2.495%	1.391%
Pentane (i-)	8		C05H12	VOC		2.354%	2.354%	2.350%	1.895%	2.543%
Pentane (n-)	9		C05H12	VOC		1.622%	1.622%	1.620%	1.056%	1.859%
Dimethylbutane (2,2-)	10	Hexanes	C06H14	VOC		0.174%	0.174%	0.174%	0.050%	0.227%
Dimethylbutane (2,3-)	11	Hexanes	C06H14	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Cyclopentane	12	Hexanes	C05H10	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylpentane (2-)	13	Hexanes	C06H14	VOC		1.218%	1.218%	1.218%	0.352%	1.586%
Methylpentane (3-)	14	Hexanes	C06H14	VOC		0.912%	0.912%	0.912%	0.264%	1.187%
Hexane (n-)	15	Hexanes	C06H14	VOC	X	1.937%	1.937%	1.937%	0.561%	2.522%
Dimethylpentane (2,2-)	16	Heptanes	C07H16	VOC		0.311%	0.311%	0.311%	0.032%	0.430%
Methylcyclopentane	17	Heptanes	C06H12	VOC		1.134%	1.134%	1.134%	0.116%	1.566%
Dimethylpentane (2,4-)	18	Heptanes	C07H16	VOC		0.128%	0.128%	0.128%	0.013%	0.177%
Trimethylbutane (2,2,3-)	19	Heptanes	C07H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Benzene	20	Heptanes	C06H06	VOC	X	1.713%	1.713%	1.713%	0.175%	2.366%
Dimethylpentane (3,3-)	21	Heptanes	C07H16	VOC		0.221%	0.221%	0.221%	0.023%	0.305%
Cyclohexane	22	Heptanes	C06H12	VOC		1.106%	1.106%	1.106%	0.113%	1.528%
Methylhexane (2-)	23	Heptanes	C07H16	VOC		2.292%	2.292%	2.292%	0.235%	3.166%
Dimethylpentane (2,3-)	24	Heptanes	C07H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclopentane (1,1-)	25	Heptanes	C07H14	VOC		0.603%	0.603%	0.603%	0.062%	0.833%
Methylhexane (3-)	26	Heptanes	C07H16	VOC		2.379%	2.379%	2.379%	0.244%	3.286%
Dimethylcyclopentane (1,t-3-)	27	Heptanes	C07H14	VOC		0.163%	0.163%	0.163%	0.017%	0.225%
Dimethylcyclopentane (1,c-3-)	28	Heptanes	C07H14	VOC		0.266%	0.266%	0.266%	0.027%	0.367%
Ethylpentane (3-)	29	Heptanes	C07H16	VOC		0.029%	0.029%	0.029%	0.003%	0.040%
Dimethylcyclopentane (1,t-2-)	30	Heptanes	C07H14	VOC		0.222%	0.222%	0.222%	0.023%	0.307%
Trimethylpentane (2,2,4-)	31	Heptanes	C08H18	VOC	X	0.021%	0.021%	0.021%	0.002%	0.029%
Heptane (n-)	32	Heptanes	C07H16	VOC		3.742%	3.742%	3.742%	0.383%	5.169%
Methylcyclohexane	33	Octanes	C07H14	VOC		3.301%	3.301%	3.301%	0.136%	4.646%
Trimethylcyclopentane (1,1,3-)	34	Octanes	C08H16	VOC		0.225%	0.225%	0.225%	0.009%	0.317%
Dimethylhexane (2,2-)	35	Octanes	C08H18	VOC		0.095%	0.095%	0.095%	0.004%	0.134%
Dimethylcyclopentane (1,c-2-)	36	Octanes	C07H14	VOC		0.848%	0.848%	0.848%	0.035%	1.193%
Dimethylhexane (2,5-)	37	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,4-)	38	Octanes	C08H18	VOC		0.143%	0.143%	0.143%	0.006%	0.201%
Ethylcyclopentane	39	Octanes	C07H14	VOC		0.464%	0.464%	0.464%	0.019%	0.653%
Trimethylpentane (2,2,3-)	40	Octanes	C08H18	VOC		0.028%	0.028%	0.028%	0.001%	0.039%
Trimethylcyclopentane (1,t-2,c-4-)	41	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (3,3-)	42	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	43	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylpentane (2,3,4-)	44	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,3-)	45	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Toluene	46	Octanes	C07H08	VOC	X	4.444%	4.444%	4.444%	0.183%	6.255%
Trimethylcyclopentane (1,1,2-)	47	Octanes	C08H16	VOC		0.371%	0.371%	0.371%	0.015%	0.522%
Dimethylhexane (3,4-)	48	Octanes	C08H18	VOC		3.505%	3.505%	3.505%	0.144%	4.933%
Methylheptane (2-)	49	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylheptane (4-)	50	Octanes	C08H18	VOC		2.896%	2.896%	2.896%	0.119%	4.076%
Dimethylhexane (3,4-)	51	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylheptane (3-)	52	Octanes	C08H18	VOC		0.416%	0.416%	0.416%	0.017%	0.585%
Ethylhexane (3-)	53	Octanes	C08H18	VOC		0.111%	0.111%	0.111%	0.005%	0.156%
Trimethylcyclopentane (1,c-2,t-4-)	54	Octanes	C08H16	VOC		0.028%	0.028%	0.028%	0.001%	0.039%
Dimethylcyclohexane (1,c-3-)	55	Octanes	C08H16	VOC		0.170%	0.170%	0.170%	0.007%	0.239%
Trimethylcyclopentane (1,c-2,t-3-)	56	Octanes	C08H16	VOC		0.170%	0.170%	0.170%	0.007%	0.239%
Dimethylcyclohexane (1,t-4-)	57	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,5-)	58	Octanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,1-)	59	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	60	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	61	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	62	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,4-)	63	Octanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	64	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Cycloheptane	65	Octanes	C07H14	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Octane (n-)	66	Octanes	C08H18	VOC		4.372%	4.372%	4.372%	0.180%	6.153%
Trimethylhexane (2,4,4-)	67	Nonanes	C09H20	VOC		0.190%	0.190%	0.190%	0.003%	0.269%
Tetramethylpentane (2,2,4,4-)	68	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	69	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Dimethylcyclohexane (1,c-4-)	70	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Trimethylcyclopentane (1,c-2,c-3-)	71	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Propylcyclopentane (i-)	72	Nonanes	C08H16	VOC		0.348%	0.348%	0.348%	0.006%	0.493%
Trimethylhexane (2,3,5-)	73	Nonanes	C09H20	VOC		0.006%	0.006%	0.006%	0.000%	0.009%
Dimethylheptane (2,2-)	74	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,4-)	75	Nonanes	C09H20	VOC		0.158%	0.158%	0.158%	0.003%	0.224%
Methylcyclopentane (1-ethyl-c-2-)	76	Nonanes	C08H16	VOC		0.181%	0.181%	0.181%	0.003%	0.257%
Trimethylhexane (2,2,3-)	77	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%

TABLE E-2
Flash Analysis
Extrapolation of Specie Mole Percentages

Component						Liquid Dump Flash Data				
						Input			Output	
						Liquid	Scaled	*Calculated*	Vapor	Liquid
Name (i)	GC Postition	SPL Class	Formula	Type	HAP	z_i ($mol_{i\text{-}F}/mol_F$)		z_i ($mol_{i\text{-}F}/mol_F$)	y_i ($mol_{i\text{-}V}/mol_V$)	x_i ($mol_{i\text{-}L}/mol_L$)
Dimethylcyclohexane (1,c-2-)	78	Nonanes	C08H16	VOC		0.510%	0.510%	0.510%	0.009%	0.723%
Dimethylheptane (2,6-)	79	Nonanes	C09H20	VOC		0.112%	0.112%	0.112%	0.002%	0.159%
Propylcyclopentane (n-)	80	Nonanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	81	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclohexane	82	Nonanes	C08H16	VOC		1.365%	1.365%	1.365%	0.023%	1.935%
Dimethylheptane (2,5-)	83	Nonanes	C09H20	VOC		0.067%	0.067%	0.067%	0.001%	0.095%
Dimethylheptane (3,5-)	84	Nonanes	C09H20	VOC		0.067%	0.067%	0.067%	0.001%	0.095%
Trimethylcyclohexane (1,1,3-)	85	Nonanes	C09H18	VOC		0.077%	0.077%	0.077%	0.001%	0.109%
Trimethylhexane (2,3,3-)	86	Nonanes	C09H20	VOC		0.038%	0.038%	0.038%	0.001%	0.054%
Dimethylheptane (3,3-)	87	Nonanes	C09H20	VOC		0.038%	0.038%	0.038%	0.001%	0.054%
Trimethylcyclohexane (1,1,4-)	88	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Tetramethylpentane (2,2,3,3-)	89	Nonanes	C09H20	VOC		0.261%	0.261%	0.261%	0.004%	0.370%
Ethylbenzene	90	Nonanes	C08H10	VOC	X	0.406%	0.406%	0.406%	0.007%	0.576%
Trimethylhexane (2,3,4-)	91	Nonanes	C09H20	VOC		0.007%	0.007%	0.007%	0.000%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	92	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,3-)	93	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	94	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Xylene (m-)	95	Nonanes	C08H10	VOC	X	2.462%	2.462%	2.462%	0.042%	3.490%
Xylene (p-)	96	Nonanes	C08H10	VOC	X	2.462%	2.462%	2.462%	0.042%	3.490%
Dimethylheptane (3,4-)	97	Nonanes	C09H20	VOC		0.092%	0.092%	0.092%	0.002%	0.130%
Methyloctane (2-)	98	Nonanes	C09H20	VOC		0.782%	0.782%	0.782%	0.013%	1.109%
Methyloctane (4-)	99	Nonanes	C09H20	VOC		0.782%	0.782%	0.782%	0.013%	1.109%
Dimethylheptane (3,4-)	100	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methyloctane (3-)	101	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Butylcyclopentane (i-)	102	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	103	Nonanes	C09H18	VOC		0.231%	0.231%	0.231%	0.004%	0.327%
Trimethylcyclohexane (1,t-2,c-4-)	104	Nonanes	C09H18	VOC		0.231%	0.231%	0.231%	0.004%	0.327%
Xylene (o-)	105	Nonanes	C08H10	VOC	X	0.547%	0.547%	0.547%	0.009%	0.775%
Trimethylcyclohexane (1,1,2-)	106	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	107	Nonanes	C09H18	VOC		0.200%	0.200%	0.200%	0.003%	0.284%
Trimethylcyclohexane (1,c-2,c-4-)	108	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Nonane (n-)	109	Nonanes	C09H20	VOC		2.884%	2.884%	2.884%	0.050%	4.088%
Unknowns	110	Decanes+	C10+	VOC		10.753%	10.753%	10.753%	0.079%	15.288%
TOTAL						100.001%	100.000%	99.984%	100.001%	99.976%
TOC (Total)						98.999%	98.998%	98.984%	96.737%	99.938%
VOC (Total)						74.686%	74.685%	74.673%	16.825%	99.252%
Hexanes						4.241%	4.240%	4.241%	1.227%	5.521%
Heptanes						14.330%	14.310%	14.330%	1.468%	19.795%
Octanes						21.587%	21.610%	21.587%	0.888%	30.382%
Nonanes						14.663%	14.660%	14.663%	0.252%	20.786%
Decanes+						10.753%	10.770%	10.753%	0.079%	15.288%
HAP (Total)						13.992%	13.992%	13.992%	1.022%	19.503%
Xylenes						1.209%	1.209%	1.209%	0.021%	1.714%

NOTES

1. Sample Data: Location: Atlanta, TX
   Date: 04/15/09
   Dimethyloctane (2,3-) Time: Not Recorded
2. $v_i + l_i = f_i$; $y_i = v_i/V$; $x_i = l_i/L$; $z_i = f_i/F \Rightarrow y_iV + x_iL = z_iF \Rightarrow y_i(V/L)L + x_iL = z_i(1 + V/L)L \Rightarrow z_i = [y_i(V/L) + x_i]/[1 + (V/L)]$ {Mole Balance}.
3. $V/L =$ 0.4249 $1 + V/L =$ 1.4249
4. z_i is refined to the same number if significant digits as y_i and x_i using the component mole balance and laboratory results for V/L.
5. z_i is scale using the hydrocarbon (e.g., hexanes+) z_i percentage in the flash analysis results, with the exception of HAP species.
6. $[y_i ; x_i]$ mole percent for species of hydrocarbons is estimated using scaled lab mole percent results for z_i and $[y ; x]_{HC}$ for the hydrocarbon.

(assumes v_i/l_i is same for all hydrocarbon species)

$(v/l)_{hexanes} =$ 0.2219
$y_{hexanes} =$ 1.227% $x_{hexanes} =$ 5.520% $z_{hexanes} =$ 4.240%
$y_i = z_i(y/z)_{hexanes} =$ 0.2894 z_i
$x_i = z_i(x/z)_{hexanes} =$ 1.3019 z_i

$(v/l)_{heptanes} =$ 0.0740
$y_{heptanes} =$ 1.466% $x_{heptanes} =$ 19.767% $z_{heptanes} =$ 14.310%
$y_i = z_i(y/z)_{heptanes} =$ 0.1024 z_i
$x_i = z_i(x/z)_{heptanes} =$ 1.3814 z_i

$(v/l)_{octanes} =$ 0.0292
$y_{octanes} =$ 0.889% $x_{octanes} =$ 30.414% $z_{octanes} =$ 21.610%
$y_i = z_i(y/z)_{octanes} =$ 0.0411 z_i
$x_i = z_i(x/z)_{octanes} =$ 1.4074 z_i

$(v/l)_{nonanes} =$ 0.0121
$y_{nonanes} =$ 0.252% $x_{nonanes} =$ 20.782% $z_{nonanes} =$ 14.660%
$y_i = z_i(y/z)_{nonanes} =$ 0.0172 z_i
$x_i = z_i(x/z)_{nonanes} =$ 1.4176 z_i

$(v/l)_{decanes+} =$ 0.0051
$y_{decanes+} =$ 0.079% $x_{decanes+} =$ 15.313% $z_{decanes+} =$ 10.770%
$y_i = z_i(y/z)_{decanes+} =$ 0.0073 z_i
$x_i = z_i(x/z)_{decanes+} =$ 1.4218 z_i

TABLE E-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Nitrogen			28.013	0.0727	0.030%	0.009%
Carbon Dioxide	GHG		44.010	0.1143	0.970%	0.435%
Methane	GHG		16.042	0.0417	20.924%	3.421%
Ethane			30.069	0.0781	3.391%	1.039%
Propane	VOC		44.096	0.1145	2.181%	0.980%
Butane (i-)	VOC		58.122	0.1509	1.230%	0.729%
Butane (n-)	VOC		58.122	0.1509	1.720%	1.019%
Pentane (i-)	VOC		72.149	0.1873	2.350%	1.728%
Pentane (n-)	VOC		72.149	0.1873	1.620%	1.191%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.174%	0.153%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	1.218%	1.070%
Methylpentane (3-)	VOC		86.175	0.2238	0.912%	0.801%
Hexane (n-)	VOC	X	86.175	0.2238	1.937%	1.701%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.311%	0.318%
Methylcyclopentane	VOC		84.159	0.2185	1.134%	0.973%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.128%	0.131%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	1.713%	1.364%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.221%	0.226%
Cyclohexane	VOC		84.159	0.2185	1.106%	0.949%
Methylhexane (2-)	VOC		100.202	0.2602	2.292%	2.341%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.603%	0.603%
Methylhexane (3-)	VOC		100.202	0.2602	2.379%	2.430%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.163%	0.163%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.266%	0.266%
Ethylpentane (3-)	VOC		100.202	0.2602	0.029%	0.030%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.222%	0.222%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.021%	0.024%
Heptane (n-)	VOC		100.202	0.2602	3.743%	3.822%
Methylcyclohexane	VOC		98.186	0.2549	3.302%	3.304%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.225%	0.257%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.095%	0.111%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	0.848%	0.849%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.143%	0.166%
Ethylcyclopentane	VOC		98.186	0.2549	0.464%	0.464%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.028%	0.033%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE E-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	4.445%	4.174%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.371%	0.424%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	3.506%	4.081%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	2.896%	3.372%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.416%	0.484%
Ethylhexane (3-)	VOC		114.229	0.2966	0.111%	0.129%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.028%	0.032%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.170%	0.194%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.170%	0.194%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	4.373%	5.090%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.190%	0.248%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.053%	0.061%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.053%	0.061%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.053%	0.061%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.348%	0.398%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.006%	0.008%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.158%	0.207%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.181%	0.207%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.510%	0.583%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.112%	0.146%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	1.365%	1.561%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.067%	0.088%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.067%	0.088%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.077%	0.099%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.038%	0.050%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.038%	0.050%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE E-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.261%	0.341%
Ethylbenzene	VOC	X	106.165	0.2757	0.406%	0.439%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.007%	0.009%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	2.462%	2.664%
Xylene (p-)	VOC	X	106.165	0.2757	2.462%	2.664%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.092%	0.120%
Methyloctane (2-)	VOC		128.255	0.3330	0.782%	1.022%
Methyloctane (4-)	VOC		128.255	0.3330	0.782%	1.022%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.231%	0.297%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.231%	0.297%
Xylene (o-)	VOC	X	106.165	0.2757	0.547%	0.592%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.200%	0.257%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	2.884%	3.770%
Unknowns	VOC		**283.704**	0.7366	10.755%	31.094%
Pressurized Liquid			98.125	0.2548	100.000%	100.000%
TOC (Total)			98.677	0.2562	99.000%	99.556%
VOC (Total)			124.943	0.3244	74.685%	95.096%
HAP (Total)			92.449	0.2400	7.356%	6.931%
Xylenes			106.165	0.2757	5.472%	5.920%

NOTES

1. Normalized mole percentages from TABLE E-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE E-1.

MW = 98.125 lb/lb-mol

TABLE E-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Nitrogen			28.013	0.0727	0.101%	0.105%
Carbon Dioxide	GHG		44.010	0.1143	3.163%	5.167%
Methane	GHG		16.042	0.0417	69.444%	41.356%
Ethane			30.069	0.0781	10.467%	11.683%
Propane	VOC		44.096	0.1145	5.339%	8.739%
Butane (i-)	VOC		58.122	0.1509	2.126%	4.587%
Butane (n-)	VOC		58.122	0.1509	2.495%	5.383%
Pentane (i-)	VOC		72.149	0.1873	1.895%	5.075%
Pentane (n-)	VOC		72.149	0.1873	1.056%	2.828%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.050%	0.161%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	0.352%	1.128%
Methylpentane (3-)	VOC		86.175	0.2238	0.264%	0.844%
Hexane (n-)	VOC	X	86.175	0.2238	0.561%	1.793%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.032%	0.119%
Methylcyclopentane	VOC		84.159	0.2185	0.116%	0.363%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.013%	0.049%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	0.175%	0.509%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.023%	0.084%
Cyclohexane	VOC		84.159	0.2185	0.113%	0.354%
Methylhexane (2-)	VOC		100.202	0.2602	0.235%	0.873%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.062%	0.225%
Methylhexane (3-)	VOC		100.202	0.2602	0.244%	0.907%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.017%	0.061%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.027%	0.099%
Ethylpentane (3-)	VOC		100.202	0.2602	0.003%	0.011%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.023%	0.083%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.002%	0.009%
Heptane (n-)	VOC		100.202	0.2602	0.383%	1.426%
Methylcyclohexane	VOC		98.186	0.2549	0.136%	0.495%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.009%	0.039%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.004%	0.017%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	0.035%	0.127%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.006%	0.025%
Ethylcyclopentane	VOC		98.186	0.2549	0.019%	0.070%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.001%	0.005%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE E-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	0.183%	0.625%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.015%	0.064%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.144%	0.611%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	0.119%	0.505%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.017%	0.073%
Ethylhexane (3-)	VOC		114.229	0.2966	0.005%	0.019%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.001%	0.005%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.007%	0.029%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.007%	0.029%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	0.180%	0.763%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.003%	0.016%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.001%	0.004%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.001%	0.004%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.001%	0.004%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.006%	0.025%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.003%	0.013%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.003%	0.013%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.009%	0.037%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.002%	0.009%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	0.023%	0.098%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.001%	0.005%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.001%	0.005%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.001%	0.006%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.001%	0.003%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.001%	0.003%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE E-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.004%	0.021%
Ethylbenzene	VOC	X	106.165	0.2757	0.007%	0.028%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.000%	0.001%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	0.042%	0.167%
Xylene (p-)	VOC	X	106.165	0.2757	0.042%	0.167%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.002%	0.008%
Methyloctane (2-)	VOC		128.255	0.3330	0.013%	0.064%
Methyloctane (4-)	VOC		128.255	0.3330	0.013%	0.064%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.004%	0.019%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.004%	0.019%
Xylene (o-)	VOC	X	106.165	0.2757	0.009%	0.037%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.003%	0.016%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	0.050%	0.236%
Unknowns	VOC		**473.700**	1.2300	0.079%	1.387%
Flash Gas			26.938	0.0699	100.000%	100.000%
TOC (Total)			26.379	0.0685	96.736%	94.728%
VOC (Total)			66.745	0.1733	16.825%	41.688%
HAP (Total)			88.115	0.2288	0.762%	2.492%
Xylenes			106.165	0.2757	0.094%	0.371%

NOTES

1. Normalized mole percentages from TABLE E-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE E-1, unless value negative.

MW = 26.938 lb/lb-mol

TABLE E-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Nitrogen			28.013	0.0727	0.000%	0.000%
Carbon Dioxide	GHG		44.010	0.1143	0.038%	0.013%
Methane	GHG		16.042	0.0417	0.303%	0.038%
Ethane			30.069	0.0781	0.383%	0.090%
Propane	VOC		44.096	0.1145	0.838%	0.288%
Butane (i-)	VOC		58.122	0.1509	0.849%	0.385%
Butane (n-)	VOC		58.122	0.1509	1.391%	0.630%
Pentane (i-)	VOC		72.149	0.1873	2.544%	1.430%
Pentane (n-)	VOC		72.149	0.1873	1.859%	1.045%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.227%	0.152%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	1.586%	1.065%
Methylpentane (3-)	VOC		86.175	0.2238	1.188%	0.797%
Hexane (n-)	VOC	X	86.175	0.2238	2.522%	1.693%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.430%	0.335%
Methylcyclopentane	VOC		84.159	0.2185	1.567%	1.027%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.177%	0.138%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	2.367%	1.440%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.305%	0.238%
Cyclohexane	VOC		84.159	0.2185	1.528%	1.002%
Methylhexane (2-)	VOC		100.202	0.2602	3.167%	2.472%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.833%	0.637%
Methylhexane (3-)	VOC		100.202	0.2602	3.287%	2.566%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.225%	0.172%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.368%	0.281%
Ethylpentane (3-)	VOC		100.202	0.2602	0.040%	0.031%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.307%	0.235%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.029%	0.026%
Heptane (n-)	VOC		100.202	0.2602	5.170%	4.036%
Methylcyclohexane	VOC		98.186	0.2549	4.647%	3.555%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.317%	0.277%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.134%	0.119%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	1.194%	0.913%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.201%	0.179%
Ethylcyclopentane	VOC		98.186	0.2549	0.653%	0.500%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.039%	0.035%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE E-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	6.256%	4.491%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.522%	0.457%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	4.934%	4.391%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	4.077%	3.628%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.586%	0.521%
Ethylhexane (3-)	VOC		114.229	0.2966	0.156%	0.139%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.039%	0.034%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.239%	0.209%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.239%	0.209%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	6.155%	5.477%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.269%	0.269%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.075%	0.066%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.075%	0.066%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.075%	0.066%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.493%	0.431%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.009%	0.009%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.224%	0.224%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.257%	0.224%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.723%	0.632%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.159%	0.159%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	1.935%	1.692%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.095%	0.095%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.095%	0.095%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.109%	0.107%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.054%	0.054%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.054%	0.054%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE E-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.370%	0.370%
Ethylbenzene	VOC	X	106.165	0.2757	0.576%	0.476%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.010%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	3.491%	2.887%
Xylene (p-)	VOC	X	106.165	0.2757	3.491%	2.887%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.130%	0.130%
Methyloctane (2-)	VOC		128.255	0.3330	1.109%	1.108%
Methyloctane (4-)	VOC		128.255	0.3330	1.109%	1.108%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.328%	0.322%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.328%	0.322%
Xylene (o-)	VOC	X	106.165	0.2757	0.776%	0.641%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.284%	0.279%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	4.089%	4.086%
Unknowns	VOC		**283.170**	0.7353	15.292%	33.734%
Residual Liquid			128.362	0.3333	100.000%	100.000%
TOC (Total)			128.394	0.3334	99.962%	99.987%
VOC (Total)			129.116	0.3353	99.276%	99.859%
HAP (Total)			92.587	0.2404	10.159%	7.327%
Xylenes			106.165	0.2757	7.757%	6.416%

NOTES

1. Normalized mole percentages from TABLE E-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE E-1.

MW = 128.362 lb/lb-mol

TABLE E-4a
Flash Analysis
Maximum Hourly and Annual Emission Estimates

Station ID	HANO-SV-V2				
Service	Pipeline Liquids				
Liquids Holding Capacity	317 gal			317 gal	
Liquids Input Rate	4,000 gal/yr			317 gal/hr	
Flash Gas Density	0.0769 lb/scf			0.0769 lb/scf	
Flash Factor	328.03 scf/bbl			328.03 scf/bbl	
Flash Gas Rate	31,241 scf/yr			2,473 scfh	
Flash Losses	2,404 lb/yr	Average	Maximum	190 lb/hr	Maximum
Flash Gas	100.00% by weight	0.2744 lb/hr	1.2018 tpy	100.00% by weight	190.2917 lb/hr
CO_{2-e}	1039.07% by weight	2.8511 lb/hr	12.4880 tpy	1039.07% by weight	1,977 lb/hr
CO_2	5.17% by weight	0.0142 lb/hr	0.0621 tpy	5.17% by weight	9.8332 lb/hr
TOC (Total)	94.73% by weight	0.2599 lb/hr	1.1385 tpy	94.73% by weight	180.2587 lb/hr
Methane	41.36% by weight	0.1135 lb/hr	0.4970 tpy	41.36% by weight	78.6974 lb/hr
Ethane	11.68% by weight	0.0321 lb/hr	0.1404 tpy	11.68% by weight	22.2326 lb/hr
VOC (Total)	41.69% by weight	0.1144 lb/hr	0.5010 tpy	41.69% by weight	79.3286 lb/hr
HAP (Total)	2.49% by weight	0.0068 lb/hr	0.0300 tpy	2.49% by weight	4.7425 lb/hr
Benzene	0.5089% by weight	0.0014 lb/hr	0.0061 tpy	0.5089% by weight	0.9683 lb/hr
Ethylbenzene	0.0275% by weight	0.0001 lb/hr	0.0003 tpy	0.0275% by weight	0.0523 lb/hr
Hexane (n-)	1.7932% by weight	0.0049 lb/hr	0.0216 tpy	1.7932% by weight	3.4123 lb/hr
Methanol					
Naphthalene					
Toluene	0.6253% by weight	0.0017 lb/hr	0.0075 tpy	0.6253% by weight	1.1899 lb/hr
Trimethylpentane (2,2,4-)	0.0091% by weight	0.0000 lb/hr	0.0001 tpy	0.0091% by weight	0.0174 lb/hr
Xylenes	0.3706% by weight	0.0010 lb/hr	0.0045 tpy	0.3706% by weight	0.7053 lb/hr

NOTES

1. Separator Characteristics: Flash is represented for separators that receive majority of liquids, but flash may be emitted from other separators.
   - Orientation: Vertical Fixed Roof Tank
   - Height/Length: 10.00 ft
   - Diameter: 4.00 ft
   - Capacity (physical): 940 gal
   - Capacity (liquid): 317 gal — 34% of physical capacity
2. Liquid input rates:
   - a. maximum hourly based on operator experience; 317 gal
   - b. maximum annual based on operating experience and safety factor; and 4,000 gal
   - c. average hourly is just the maximum annual divided by 8,760 hrs/yr.
3. Flash gas density is 110% of the value extracted from TABLE E-3b.
   Density (TABLE E-3b): 0.0699 lb/scf Safety Factor: 110%
4. Flash factor extracted from TABLE E-1.
5. Speciated emissions vapor weight percentages extracted from TABLE E-3b.

TABLE F-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum			mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ M_i	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	T (°F)	P_i (psia)		(mol_i/mol_L) f_{v-i}	(lb_i/lb_L) f_{m-i}	(mol_i/mol_V)	(lb_i/lb_V)
Nitrogen			28.013	3.7362	2.6465E+02	-6.7880E+00	0.0000E+00	0.0000E+00	-345.75	-232.60	68.00			0.000%	0.000%	0.000%	0.000%
Carbon Dioxide	GHG		44.010	35.0169	-1.5119E+03	-1.1334E+01	9.3368E-03	1.7136E-09	-68.80	87.80	68.00	833.1743		0.038%	0.013%	1.087%	2.183%
Methane	GHG		16.042	14.6667	-5.7097E+02	-3.3373E+00	-2.1999E-09	1.3096E-05	-295.60	-115.60	68.00	7,889.8148		0.303%	0.038%	82.053%	60.088%
Ethane			30.069	20.6973	-1.1341E+03	-5.2514E+00	-9.8774E-11	6.7329E-06	-297.40	89.60	68.00	546.5426		0.383%	0.090%	7.185%	9.862%
Propane	VOC		44.096	21.4469	-1.4627E+03	-5.2610E+00	3.2820E-11	3.7349E-06	-306.40	206.60	68.00	121.5870		0.838%	0.288%	3.497%	7.039%
Butane (i-)	VOC		58.122	31.2541	-1.9532E+03	-8.8060E+00	8.9246E-11	5.7501E-06	-254.20	275.00	68.00	44.2751		0.849%	0.385%	1.290%	3.423%
Butane (n-)	VOC		58.122	27.0441	-1.9049E+03	-7.1805E+00	-6.6845E-11	4.2190E-06	-216.40	305.60	68.00	30.1688		1.391%	0.630%	1.440%	3.821%
Pentane (i-)	VOC		72.149	29.2963	-2.1762E+03	-7.8830E+00	-4.6512E-11	3.8997E-06	-256.00	368.60	68.00	11.1082		2.544%	1.430%	0.970%	3.193%
Pentane (n-)	VOC		72.149	33.3239	-2.4227E+03	-9.2354E+00	9.0199E-11	4.1050E-06	-202.00	386.60	68.00	8.1938		1.859%	1.045%	0.523%	1.722%
Dimethylbutane (2,2-)	VOC		86.175	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.227%	0.152%	0.039%	0.155%
Dimethylbutane (2,3-)	VOC		86.175	33.6319	-2.5524E+03	-9.3142E+00	1.4759E-10	3.9140E-06	-223.60	500.00	68.00	3.6998		0.000%	0.000%	0.000%	0.000%
Cyclopentane	VOC		70.133	29.1547	-2.3512E+03	-7.6965E+00	-1.6212E-10	3.1250E-06	-137.20	462.20	68.00	5.0181		0.000%	0.000%	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	30.7477	-2.4888E+03	-8.2295E+00	-2.3723E-11	3.2402E-06	-243.40	437.00	68.00	3.3041		1.586%	1.065%	0.180%	0.707%
Methylpentane (3-)	VOC		86.175	35.2848	-2.6773E+03	-9.8546E+00	2.2352E-11	4.0277E-06	-261.40	447.80	68.00	2.9617		1.188%	0.797%	0.121%	0.475%
Hexane (n-)	VOC	X	86.175	69.7378	-3.6278E+03	-2.3927E+01	1.2810E-02	-1.6844E-16	-139.00	453.20	68.00	2.3626		2.522%	1.693%	0.204%	0.804%
Dimethylpentane (2,2-)	VOC		100.202	6.2875	-2.1682E+03	2.6936E+00	-1.5525E-02	1.0917E-05	-191.20	478.40	68.00	1.6191		0.430%	0.335%	0.024%	0.109%
Methylcyclopentane	VOC		84.159	32.4766	-2.6434E+03	-8.7933E+00	2.0749E-11	3.2158E-06	-223.60	500.00	68.00	2.1257		1.567%	1.027%	0.114%	0.439%
Dimethylpentane (2,4-)	VOC		100.202	35.9436	-2.8460E+03	-9.9938E+00	8.0693E-11	3.6419E-06	-182.20	476.60	68.00	1.5074		0.177%	0.138%	0.009%	0.042%
Trimethylbutane (2,2,3-)	VOC		100.202	32.3633	-2.6614E+03	-8.7743E+00	-7.6870E-10	3.2006E-06	-11.20	496.40	68.00	1.5789		0.000%	0.000%	0.000%	0.000%
Benzene	VOC	X	78.112	31.7718	-2.7254E+03	-8.4443E+00	-5.3534E-09	2.7187E-06	42.80	552.20	68.00	1.4495		2.367%	1.440%	0.118%	0.420%
Dimethylpentane (3,3-)	VOC		100.202	30.2570	-2.6313E+03	-7.9839E+00	4.6848E-13	2.7170E-06	-209.20	505.40	68.00	1.2681		0.305%	0.238%	0.013%	0.061%
Cyclohexane	VOC		84.159	48.5529	-3.0874E+03	-1.5521E+01	7.3830E-03	6.3563E-12	44.60	537.80	68.00	1.5112		1.528%	1.002%	0.079%	0.304%
Methylhexane (2-)	VOC		100.202	54.1075	-3.3785E+03	-1.7547E+01	8.2594E-03	-3.4967E-14	-180.40	494.60	68.00	0.9987		3.167%	2.472%	0.109%	0.496%
Dimethylpentane (2,3-)	VOC		100.202	39.7737	-2.9050E+03	-1.2012E+01	5.1334E-03	-2.3807E-14	-171.40	507.20	68.00	1.0467		0.000%	0.000%	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	58.1943	-3.4151E+03	-1.9294E+01	9.6704E-03	-2.4361E-15	-94.00	525.20	68.00	1.1616		0.833%	0.637%	0.033%	0.149%
Methylhexane (3-)	VOC		100.202	35.2535	-2.9310E+03	-9.6667E+00	-5.2026E-11	3.2107E-06	-182.20	503.60	68.00	0.9291		3.287%	2.566%	0.105%	0.479%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	53.1912	-3.3121E+03	-1.7277E+01	8.3107E-03	5.0896E-14	-209.20	536.00	68.00	0.9791		0.225%	0.172%	0.008%	0.034%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	35.4255	-2.7286E+03	-1.0444E+01	4.6608E-03	1.7565E-14	-209.20	532.40	68.00	1.0075		0.368%	0.281%	0.013%	0.057%
Ethylpentane (3-)	VOC		100.202	8.5463	-2.2979E+03	1.5503E+00	-1.2233E-02	8.2670E-06	-180.40	514.40	68.00	0.8755		0.040%	0.031%	0.001%	0.006%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	36.8109	-2.9536E+03	-1.0275E+01	-4.6212E-12	3.6730E-06	-178.60	536.00	68.00	0.9713		0.307%	0.235%	0.010%	0.046%
Trimethylpentane (2,2,4-)	VOC	X	114.229	50.3422	-3.2789E+03	-1.6111E+01	7.4260E-03	-9.1804E-14	-160.60	519.80	68.00	0.7453		0.029%	0.026%	0.001%	0.004%
Heptane (n-)	VOC		100.202	65.0257	-3.8188E+03	-2.1684E+01	1.0387E-02	1.0206E-14	-130.00	512.60	68.00	0.6808		5.170%	4.036%	0.121%	0.552%
Methylcyclohexane	VOC		98.186	38.0955	-3.0738E+03	-1.0684E+01	-5.1766E-11	3.5282E-06	-194.80	570.20	68.00	0.6925		4.647%	3.555%	0.110%	0.495%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.317%	0.277%	0.000%	0.001%
Dimethylhexane (2,2-)	VOC		114.229	38.7670	-3.1841E+03	-1.0857E+01	1.9275E-12	3.4797E-06	-185.80	530.60	68.00	0.5066		0.134%	0.119%	0.002%	0.012%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	36.3623	-3.0025E+03	-1.0070E+01	-1.0435E-09	3.3726E-06	-65.20	557.60	68.00	0.7110		1.194%	0.913%	0.029%	0.131%
Dimethylhexane (2,5-)	VOC		114.229	40.0260	-3.2647E+03	-1.1282E+01	-6.5408E-10	3.6200E-06	-131.80	530.60	68.00	0.4490		0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	56.2877	-3.6225E+03	-1.8225E+01	8.1864E-03	8.7232E-12	30.20	537.80	68.00	0.4499		0.201%	0.179%	0.003%	0.016%
Ethylcyclopentane	VOC		98.186	36.3631	-3.0448E+03	-1.0038E+01	3.5007E-11	3.2347E-06	-216.40	566.60	68.00	0.5963		0.653%	0.500%	0.013%	0.060%
Trimethylpentane (2,2,3-)	VOC		114.229	35.9540	-3.0569E+03	-9.8896E+00	-7.2916E-11	3.1060E-06	-169.60	555.80	68.00	0.4788		0.039%	0.035%	0.001%	0.003%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	38.0712	-3.1736E+03	-1.0617E+01	6.3090E-11	3.3817E-06	-194.80	552.20	68.00	0.4250		0.000%	0.000%	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%

TABLE F-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum		mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ M_i	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	T (°F)	P_i (psia)	(mol_i/mol_L) f_{v-i}	(lb_i/lb_L) f_{m-i}	(mol_i/mol_V)	(lb_i/lb_V)
Trimethylpentane (2,3,4-)	VOC		114.229	34.1565	-3.0232E+03	-9.2267E+00	2.7691E-11	2.7828E-06	-164.20	559.40	68.00	0.4029	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,3-)	VOC		114.229	57.3778	-3.7143E+03	-1.8599E+01	8.2907E-03	-2.8441E-12	30.20	554.00	68.00	0.3451	0.000%	0.000%	0.000%	0.000%
Toluene	VOC	X	92.138	34.0775	-3.0379E+03	-9.1635E+00	1.0289E-11	2.7035E-06	-139.00	606.20	68.00	0.4219	6.256%	4.491%	0.091%	0.381%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.522%	0.457%	0.000%	0.001%
Dimethylhexane (3,4-)	VOC		114.229	38.6119	-3.2685E+03	-1.0752E+01	3.6386E-09	3.2771E-06	30.20	564.80	68.00	0.3186	4.934%	4.391%	0.054%	0.281%
Methylheptane (2-)	VOC		114.229	37.6930	-3.2611E+03	-1.0391E+01	-1.0524E-12	3.0560E-06	-164.20	548.60	68.00	0.3028	0.000%	0.000%	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	40.2080	-3.3661E+03	-1.1279E+01	-8.7855E-11	3.4055E-06	-185.80	552.20	68.00	0.3001	4.077%	3.628%	0.042%	0.219%
Dimethylhexane (3,4-)	VOC		114.229	38.6119	-3.2685E+03	-1.0752E+01	3.6386E-09	3.2771E-06	30.20	564.80	68.00	0.3186	0.000%	0.000%	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	52.8828	-3.6231E+03	-1.6804E+01	7.1828E-03	7.4077E-14	-184.00	555.80	68.00	0.2869	0.586%	0.521%	0.006%	0.030%
Ethylhexane (3-)	VOC		114.229	40.2079	-3.3651E+03	-1.1285E+01	-5.4180E-09	3.4199E-06	30.20	557.60	68.00	0.2931	0.156%	0.139%	0.002%	0.008%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.039%	0.034%	0.000%	0.000%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	32.4775	-3.0067E+03	-8.5896E+00	7.0258E-11	2.1739E-06	-103.00	604.40	68.00	0.3176	0.239%	0.209%	0.003%	0.013%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.239%	0.209%	0.000%	0.001%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	32.5731	-2.9872E+03	-8.6494E+00	-2.1355E-09	2.2946E-06	-34.60	602.60	68.00	0.3364	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	7.8816	-2.6422E+03	2.3902E+00	-1.5376E-02	9.7931E-06	-158.80	563.00	68.00	0.2426	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	33.1329	-3.0084E+03	-8.8498E+00	-4.3621E-10	2.3704E-06	-27.40	604.40	68.00	0.3361	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Cycloheptane	VOC		98.186	54.0858	-3.6109E+03	-1.7331E+01	7.5272E-03	1.7553E-12	17.60	627.80	68.00	0.3185	0.000%	0.000%	0.000%	0.000%
Octane (n-)	VOC		114.229	29.0948	-3.0114E+03	-7.2653E+00	-2.2696E-11	1.4680E-06	-70.60	564.80	68.00	0.2040	6.155%	5.477%	0.043%	0.225%
Trimethylhexane (2,4,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.269%	0.269%	0.047%	0.275%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	-3.8184	-2.2442E+03	7.0671E+00	-1.9644E-02	1.1435E-05	-86.80	568.40	68.00	0.2957	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	32.4384	-3.0550E+03	-8.5372E+00	2.2892E-10	2.0099E-06	-130.00	617.00	68.00	0.2590	0.075%	0.066%	0.001%	0.003%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	31.9151	-3.0253E+03	-8.3613E+00	5.7055E-12	1.9673E-06	-124.60	617.00	68.00	0.2640	0.075%	0.066%	0.001%	0.003%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.075%	0.066%	0.000%	0.000%
Propylcyclopentane (i-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.493%	0.431%	0.000%	0.001%
Trimethylhexane (2,3,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.009%	0.009%	0.001%	0.009%
Dimethylheptane (2,2-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.224%	0.224%	0.039%	0.228%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.257%	0.224%	0.000%	0.001%
Trimethylhexane (2,2,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	32.1635	-3.0728E+03	-8.4344E+00	6.8943E-10	1.9558E-06	-58.00	631.40	68.00	0.2121	0.723%	0.632%	0.005%	0.027%
Dimethylheptane (2,6-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.159%	0.159%	0.028%	0.162%
Propylcyclopentane (n-)	VOC		112.213	33.9220	-3.2097E+03	-8.9914E+00	-3.2992E-11	2.0684E-06	-178.60	626.00	68.00	0.1793	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	32.7090	-3.1283E+03	-8.6023E+00	-3.9268E-11	1.9935E-06	-167.80	636.80	68.00	0.1870	1.935%	1.692%	0.012%	0.064%
Dimethylheptane (2,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.095%	0.095%	0.017%	0.097%
Dimethylheptane (3,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.095%	0.095%	0.017%	0.097%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.109%	0.107%	0.000%	0.000%
Trimethylhexane (2,3,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.054%	0.054%	0.009%	0.055%

TABLE F-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum		mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ $\mathbf{M_i}$	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	**T** (°F)	P_i (psia)	(mol_i/mol_L) $\mathbf{f_{v\text{-}i}}$	(lb_i/lb_L) $\mathbf{f_{m\text{-}i}}$	(mol_i/mol_V)	(lb_i/lb_V)
Dimethylheptane (3,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.054%	0.054%	0.009%	0.055%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Tetramethylpentane (2,2,3,3-)	VOC		128.255	35.4216	-3.2760E+03	-9.5678E+00	9.0298E-10	2.4355E-06	14.00	640.40	68.00	0.1369	0.370%	0.370%	0.002%	0.010%
Ethylbenzene	VOC	X	106.165	36.1998	-3.3402E+03	-9.7970E+00	-1.1467E-11	2.5758E-06	-139.00	651.20	68.00	0.1388	0.576%	0.476%	0.003%	0.013%
Trimethylhexane (2,3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.010%	0.010%	0.002%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	34.6803	-3.2981E+03	-9.2570E+00	-4.3563E-10	-2.4103E-06	-54.40	649.40	68.00	0.0468	3.491%	2.887%	0.006%	0.027%
Xylene (p-)	VOC	X	106.165	60.0531	-4.0159E+03	-1.9441E+01	8.2881E-03	-2.3647E-12	55.40	649.40	68.00	0.1277	3.491%	2.887%	0.015%	0.074%
Dimethylheptane (3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.130%	0.130%	0.023%	0.133%
Methyloctane (2-)	VOC		128.255	6.0191	-2.8579E+03	3.4068E+00	-1.6572E-02	9.8047E-06	-112.00	597.20	68.00	0.0881	1.109%	1.108%	0.003%	0.020%
Methyloctane (4-)	VOC		128.255	11.2012	-2.9467E+03	1.2133E+00	-1.4423E-02	9.1770E-06	-171.40	599.00	68.00	0.0974	1.109%	1.108%	0.004%	0.022%
Dimethylheptane (3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	9.8147	-2.9609E+03	1.9061E+00	-1.5675E-02	9.7961E-06	-160.60	602.60	68.00	0.0889	0.000%	0.000%	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.328%	0.322%	0.000%	0.001%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.328%	0.322%	0.000%	0.001%
Xylene (o-)	VOC	X	106.165	37.2413	-3.4573E+03	-1.0126E+01	9.0676E-11	2.6123E-06	-13.00	674.60	68.00	0.0946	0.776%	0.641%	0.003%	0.012%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.284%	0.279%	0.000%	0.001%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Nonane (n-)	VOC		128.255	8.8817	-2.8042E+03	1.5262E+00	-1.0464E-02	5.7972E-06	-63.40	613.40	68.00	0.0627	4.089%	4.086%	0.009%	0.051%
Unknowns	VOC		283.170	116.5157	-8.0140E+03	-3.8799E+01	1.3398E-02	-4.4444E-13	50.00	813.20	68.00	0.0000	15.292%	33.734%	0.000%	0.000%
Residual Liquid	Liquid	128.362 lb/lb-mol	Vapor	68.00 °F	29.1420 psia	21.907 lb/lb-mol							100.000%	100.000%	100.000%	100.000%
TOC (Total)		128.394 lb/lb-mol		68.00 °F	28.8362 psia	21.664 lb/lb-mol							99.962%	99.987%	98.913%	97.817%
VOC (Total)		129.116 lb/lb-mol		68.00 °F	2.8403 psia	63.095 lb/lb-mol							99.276%	99.859%	9.676%	27.868%
HAP (Total)		95.690 lb/lb-mol		68.00 °F	0.6569 psia	86.481 lb/lb-mol							19.507%	14.542%	0.440%	1.736%
Xylenes		106.165 lb/lb-mol		68.00 °F	0.0880 psia	106.165 lb/lb-mol							7.757%	6.416%	0.023%	0.114%

NOTES

1. Liquid composition of residual liquid based on SPL flash analysis (see TABLE E-3c).
2. Vapor pressure data for unknowns based on: Pentadecane (n-)

TABLE F-2
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		HANO-SV-V1S					
Service		Pipeline Liquids					
Capacity		530 gal			530 gal		
Temperature of Stored Liquid		56.18 °F			82.24 °F		
Vapor Pressure		4.8822 psia			7.8425 psia		
Pumping Rate		150 gal/min			150 gal/min		
Throughput		0.13 turnover/yr					
		71 gal/yr			530 gal/hr		
Standing Losses					**July**		
					744 hrs/month		
					40.5771 lbs/month		
		261.2652 lb/yr			0.0545 lb/hr		
Working Losses		**7.67E-03** lb/gal			**9.77E-03** lb/gal		
		0.5410 lb/yr	Average	Maximum	5.1784 lb/hr		Maximum
Residual Liquid	Stand	358.84% by weight	0.1070 lb/hr	0.4688 tpy	358.84% by weight		0.1957 lb/hr
	Work		0.0002 lb/hr	0.0010 tpy			18.5820 lb/hr
	Total		0.1072 lb/hr	0.4697 tpy			18.7777 lb/hr
CO_{2-e}		5398.27% by weight	1.6134 lb/hr	7.0665 tpy	5398.27% by weight		282 lb/hr
CO_2		7.83% by weight	0.0023 lb/hr	0.0103 tpy	7.83% by weight		0.4099 lb/hr
TOC (Total)		351.00% by weight	0.1049 lb/hr	0.4595 tpy	351.00% by weight		18.3678 lb/hr
Methane		215.62% by weight	0.0644 lb/hr	0.2822 tpy	215.62% by weight		11.2831 lb/hr
Ethane		35.39% by weight	0.0106 lb/hr	0.0463 tpy	35.39% by weight		1.8518 lb/hr
VOC (Total)		100.00% by weight	0.0299 lb/hr	0.1309 tpy	100.00% by weight		5.2329 lb/hr
HAP (Total)		6.23% by weight	0.0019 lb/hr	0.0082 tpy	6.23% by weight		0.3259 lb/hr
Benzene		1.5063% by weight	4.50E-04 lb/hr	1.97E-03 tpy	1.5063% by weight		7.88E-02 lb/hr
Ethylbenzene		0.0477% by weight	1.42E-05 lb/hr	6.24E-05 tpy	0.0477% by weight		2.49E-03 lb/hr
Hexane (n-)		2.8866% by weight	8.63E-04 lb/hr	3.78E-03 tpy	2.8866% by weight		1.51E-01 lb/hr
Methanol							
Naphthalene							
Toluene		1.3668% by weight	4.08E-04 lb/hr	1.79E-03 tpy	1.3668% by weight		7.15E-02 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	4.15E-06 lb/hr	1.82E-05 tpy	0.0139% by weight		7.27E-04 lb/hr
Xylenes		0.4073% by weight	1.22E-04 lb/hr	5.33E-04 tpy	0.4073% by weight		2.13E-02 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes	
Height/Length	10.83 ft	10.83 ft	Shell/Roof Color	Gray/Medium	or less solar
Diameter	5.00 ft		Shell Condition	Good	absorptance
Capacity (estimated)	1,591 gal		Vacuum Setting	-0.03 psig	
Capacity (nominal)	1,590 gal		Pressure Setting	0.03 psig	

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Youngstown, Ohio
Material	Gasoline (RVP 10)	Selection based on VOC vapor pressure (see TABLE F-1).	
Liquid Molecular Weight	92.00 lb/lb-mol	Vapor Molecular Weight	66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.6026	3.9945	41.87	46.88	7.8028	9.0013	1,590
February	28	3.7784	4.3077	44.17	50.61	9.6633	9.4405	1,590
March	31	4.2880	5.0487	50.38	58.62	15.9860	10.7139	1,590
April	30	4.9007	5.9913	57.10	67.55	23.2320	12.2448	1,590
May	31	5.5068	6.9067	63.12	75.21	32.4547	13.7592	1,590
June	30	6.0309	7.6494	67.90	80.85	38.2434	15.0687	1,590
July	31	6.2176	7.8425	69.53	82.24	40.5771	15.5351	1,590
August	31	5.9901	7.4005	67.54	79.01	34.5646	14.9666	1,590
September	30	5.4809	6.5905	62.87	72.66	25.1334	13.6944	1,590
October	31	4.8025	5.5795	56.07	63.80	17.1542	11.9995	1,590
November	30	4.2265	4.6893	49.66	54.86	9.4162	10.5602	1,590
December	31	3.7618	4.1116	43.96	48.30	7.0376	9.3992	1,590
ALL	365	4.8822	7.8425	56.18	82.24	261.2652	146.3836	19,080

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01

4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-3
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		HANO-SV-V1D				
Service		Pipeline Liquids				
Capacity		530 gal			530 gal	
Temperature of Stored Liquid		56.18 °F			82.24 °F	
Vapor Pressure		4.8822 psia			7.8425 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		0.13 turnover/yr				
		71 gal/yr			530 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					40.5771 lbs/month	
		261.2652 lb/yr			0.0545 lb/hr	
Working Losses		**7.67E-03** lb/gal			**9.77E-03** lb/gal	
		0.5410 lb/yr	Average	Maximum	5.1784 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.1070 lb/hr	0.4688 tpy	358.84% by weight	0.1957 lb/hr
	Work		0.0002 lb/hr	0.0010 tpy		18.5820 lb/hr
	Total		0.1072 lb/hr	0.4697 tpy		18.7777 lb/hr
CO_{2-e}		5398.27% by weight	1.6134 lb/hr	7.0665 tpy	5398.27% by weight	282 lb/hr
CO_2		7.83% by weight	0.0023 lb/hr	0.0103 tpy	7.83% by weight	0.4099 lb/hr
TOC (Total)		351.00% by weight	0.1049 lb/hr	0.4595 tpy	351.00% by weight	18.3678 lb/hr
Methane		215.62% by weight	0.0644 lb/hr	0.2822 tpy	215.62% by weight	11.2831 lb/hr
Ethane		35.39% by weight	0.0106 lb/hr	0.0463 tpy	35.39% by weight	1.8518 lb/hr
VOC (Total)		100.00% by weight	0.0299 lb/hr	0.1309 tpy	100.00% by weight	5.2329 lb/hr
HAP (Total)		6.23% by weight	0.0019 lb/hr	0.0082 tpy	6.23% by weight	0.3259 lb/hr
Benzene		1.5063% by weight	4.50E-04 lb/hr	1.97E-03 tpy	1.5063% by weight	7.88E-02 lb/hr
Ethylbenzene		0.0477% by weight	1.42E-05 lb/hr	6.24E-05 tpy	0.0477% by weight	2.49E-03 lb/hr
Hexane (n-)		2.8866% by weight	8.63E-04 lb/hr	3.78E-03 tpy	2.8866% by weight	1.51E-01 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	4.08E-04 lb/hr	1.79E-03 tpy	1.3668% by weight	7.15E-02 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	4.15E-06 lb/hr	1.82E-05 tpy	0.0139% by weight	7.27E-04 lb/hr
Xylenes		0.4073% by weight	1.22E-04 lb/hr	5.33E-04 tpy	0.4073% by weight	2.13E-02 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank		Above Ground?	Yes	
Height/Length	10.83 ft	10.83 ft	Shell/Roof Color	Gray/Medium	or less solar
Diameter	5.00 ft		Shell Condition	Good	absorptance
Capacity (estimated)	1,591 gal		Vacuum Setting	-0.03 psig	
Capacity (nominal)	1,590 gal		Pressure Setting	0.03 psig	

2. Stored Liquid Characteristics:

Basis: USEPA TANKS 4.09d — MET Station: Youngstown, Ohio
Material: Gasoline (RVP 10) — Selection based on VOC vapor pressure (see TABLE F-1).
Liquid Molecular Weight: 92.00 lb/lb-mol — Vapor Molecular Weight: 66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.6026	3.9945	41.87	46.88	7.8028	9.0013	1,590
February	28	3.7784	4.3077	44.17	50.61	9.6633	9.4405	1,590
March	31	4.2880	5.0487	50.38	58.62	15.9860	10.7139	1,590
April	30	4.9007	5.9913	57.10	67.55	23.2320	12.2448	1,590
May	31	5.5068	6.9067	63.12	75.21	32.4547	13.7592	1,590
June	30	6.0309	7.6494	67.90	80.85	38.2434	15.0687	1,590
July	31	6.2176	7.8425	69.53	82.24	40.5771	15.5351	1,590
August	31	5.9901	7.4005	67.54	79.01	34.5646	14.9666	1,590
September	30	5.4809	6.5905	62.87	72.66	25.1334	13.6944	1,590
October	31	4.8025	5.5795	56.07	63.80	17.1542	11.9995	1,590
November	30	4.2265	4.6893	49.66	54.86	9.4162	10.5602	1,590
December	31	3.7618	4.1116	43.96	48.30	7.0376	9.3992	1,590
ALL	365	4.8822	7.8425	56.18	82.24	261.2652	146.3836	19,080

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-4
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		HANO-SV-V1C12				
Service		Pipeline Liquids				
Capacity		400 gal			400 gal	
Temperature of Stored Liquid		56.18 °F			82.24 °F	
Vapor Pressure		4.8822 psia			7.8425 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		0.13 turnover/yr				
		53 gal/yr			400 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					31.9251 lbs/month	
		204.9195 lb/yr			0.0429 lb/hr	
Working Losses		**7.67E-03** lb/gal			**9.77E-03** lb/gal	
		0.4083 lb/yr	Average	Maximum	3.9082 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.0839 lb/hr	0.3677 tpy	358.84% by weight	0.1540 lb/hr
	Work		0.0002 lb/hr	0.0007 tpy		14.0242 lb/hr
	Total		0.0841 lb/hr	0.3684 tpy		14.1781 lb/hr
CO_{2-e}		5398.27% by weight	1.2653 lb/hr	5.5421 tpy	5398.27% by weight	213 lb/hr
CO_2		7.83% by weight	0.0018 lb/hr	0.0080 tpy	7.83% by weight	0.3095 lb/hr
TOC (Total)		351.00% by weight	0.0823 lb/hr	0.3604 tpy	351.00% by weight	13.8686 lb/hr
Methane		215.62% by weight	0.0505 lb/hr	0.2214 tpy	215.62% by weight	8.5193 lb/hr
Ethane		35.39% by weight	0.0083 lb/hr	0.0363 tpy	35.39% by weight	1.3982 lb/hr
VOC (Total)		100.00% by weight	0.0234 lb/hr	0.1027 tpy	100.00% by weight	3.9511 lb/hr
HAP (Total)		6.23% by weight	0.0015 lb/hr	0.0064 tpy	6.23% by weight	0.2461 lb/hr
Benzene		1.5063% by weight	3.53E-04 lb/hr	1.55E-03 tpy	1.5063% by weight	5.95E-02 lb/hr
Ethylbenzene		0.0477% by weight	1.12E-05 lb/hr	4.89E-05 tpy	0.0477% by weight	1.88E-03 lb/hr
Hexane (n-)		2.8866% by weight	6.77E-04 lb/hr	2.96E-03 tpy	2.8866% by weight	1.14E-01 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	3.20E-04 lb/hr	1.40E-03 tpy	1.3668% by weight	5.40E-02 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	3.25E-06 lb/hr	1.43E-05 tpy	0.0139% by weight	5.49E-04 lb/hr
Xylenes		0.4073% by weight	9.55E-05 lb/hr	4.18E-04 tpy	0.4073% by weight	1.61E-02 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	10.00 ft	Shell/Roof Color	Gray/Medium
Diameter	4.50 ft	Shell Condition	Good
Capacity (estimated)	1,190 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	1,200 gal	Pressure Setting	0.03 psig

or less solar absorptance

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Youngstown, Ohio
Material	Gasoline (RVP 10)	Selection based on VOC vapor pressure (see TABLE F-1).	
Liquid Molecular Weight	92.00 lb/lb-mol	Vapor Molecular Weight	66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.6026	3.9945	41.87	46.88	6.0729	6.7934	1,200
February	28	3.7784	4.3077	44.17	50.61	7.5282	7.1249	1,200
March	31	4.2880	5.0487	50.38	58.62	12.4860	8.0860	1,200
April	30	4.9007	5.9913	57.10	67.55	18.1943	9.2414	1,200
May	31	5.5068	6.9067	63.12	75.21	25.4754	10.3843	1,200
June	30	6.0309	7.6494	67.90	80.85	30.0717	11.3726	1,200
July	31	6.2176	7.8425	69.53	82.24	31.9251	11.7246	1,200
August	31	5.9901	7.4005	67.54	79.01	27.1755	11.2956	1,200
September	30	5.4809	6.5905	62.87	72.66	19.7268	10.3354	1,200
October	31	4.8025	5.5795	56.07	63.80	13.4291	9.0562	1,200
November	30	4.2265	4.6893	49.66	54.86	7.3525	7.9699	1,200
December	31	3.7618	4.1116	43.96	48.30	5.4821	7.0938	1,200
ALL	365	4.8822	7.8425	56.18	82.24	204.9195	110.4782	14,400

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01

4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-5
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		HANO-SV-V2				
Service		Pipeline Liquids				
Capacity		317 gal			317 gal	
Temperature of Stored Liquid		56.18 °F			82.24 °F	
Vapor Pressure		4.8822 psia			7.8425 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		12.63 turnover/yr				
		4,000 gal/yr			317 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					25.1652 lbs/month	
		161.4897 lb/yr			0.0338 lb/hr	
Working Losses		**7.67E-03** lb/gal			**9.77E-03** lb/gal	
		30.6884 lb/yr	Average	Maximum	3.0940 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.0662 lb/hr	0.2897 tpy	358.84% by weight	0.1214 lb/hr
	Work		0.0126 lb/hr	0.0551 tpy		11.1025 lb/hr
	Total		0.0787 lb/hr	0.3448 tpy		11.2238 lb/hr
CO_{2-e}		5398.27% by weight	1.1843 lb/hr	5.1871 tpy	5398.27% by weight	169 lb/hr
CO_2		7.83% by weight	0.0017 lb/hr	0.0075 tpy	7.83% by weight	0.2450 lb/hr
TOC (Total)		351.00% by weight	0.0770 lb/hr	0.3373 tpy	351.00% by weight	10.9788 lb/hr
Methane		215.62% by weight	0.0473 lb/hr	0.2072 tpy	215.62% by weight	6.7441 lb/hr
Ethane		35.39% by weight	0.0078 lb/hr	0.0340 tpy	35.39% by weight	1.1068 lb/hr
VOC (Total)		100.00% by weight	0.0219 lb/hr	0.0961 tpy	100.00% by weight	3.1278 lb/hr
HAP (Total)		6.23% by weight	0.0014 lb/hr	0.0060 tpy	6.23% by weight	0.1948 lb/hr
Benzene		1.5063% by weight	3.30E-04 lb/hr	1.45E-03 tpy	1.5063% by weight	4.71E-02 lb/hr
Ethylbenzene		0.0477% by weight	1.05E-05 lb/hr	4.58E-05 tpy	0.0477% by weight	1.49E-03 lb/hr
Hexane (n-)		2.8866% by weight	6.33E-04 lb/hr	2.77E-03 tpy	2.8866% by weight	9.03E-02 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	3.00E-04 lb/hr	1.31E-03 tpy	1.3668% by weight	4.28E-02 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	3.05E-06 lb/hr	1.33E-05 tpy	0.0139% by weight	4.34E-04 lb/hr
Xylenes		0.4073% by weight	8.94E-05 lb/hr	3.91E-04 tpy	0.4073% by weight	1.27E-02 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	10.00 ft	Shell/Roof Color	Gray/Medium (or less solar absorptance)
Diameter	4.00 ft	Shell Condition	Good
Capacity (estimated)	940 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	950 gal	Pressure Setting	0.03 psig

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Youngstown, Ohio
Material	Gasoline (RVP 10)	Selection based on VOC vapor pressure (see TABLE F-1).	
Liquid Molecular Weight	92.00 lb/lb-mol	Vapor Molecular Weight	66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.6026	3.9945	41.87	46.88	4.7829	5.3781	950
February	28	3.7784	4.3077	44.17	50.61	5.9295	5.6405	950
March	31	4.2880	5.0487	50.38	58.62	9.8365	6.4014	950
April	30	4.9007	5.9913	57.10	67.55	14.3365	7.3161	950
May	31	5.5068	6.9067	63.12	75.21	20.0775	8.2209	950
June	30	6.0309	7.6494	67.90	80.85	23.7032	9.0033	950
July	31	6.2176	7.8425	69.53	82.24	25.1652	9.2820	950
August	31	5.9901	7.4005	67.54	79.01	21.4201	8.9423	950
September	30	5.4809	6.5905	62.87	72.66	15.5468	8.1822	950
October	31	4.8025	5.5795	56.07	63.80	10.5814	7.1695	950
November	30	4.2265	4.6893	49.66	54.86	5.7922	6.3095	950
December	31	3.7618	4.1116	43.96	48.30	4.3179	5.6159	950
ALL	365	4.8822	7.8425	56.18	82.24	161.4897	87.4619	11,400

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01

4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-6
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		HANO-SV-V4SD				
Service		Pipeline Liquids				
Capacity		43 gal			43 gal	
Temperature of Stored Liquid		56.18 °F			82.24 °F	
Vapor Pressure		4.8822 psia			7.8425 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		0.13 turnover/yr				
		6 gal/yr			43 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					3.9769 lbs/month	
		25.2766 lb/yr			0.0053 lb/hr	
Working Losses		**7.67E-03** lb/gal			**9.77E-03** lb/gal	
		0.0442 lb/yr	Average	Maximum	0.4234 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.0104 lb/hr	0.0454 tpy	358.84% by weight	0.0192 lb/hr
	Work		0.0000 lb/hr	0.0001 tpy		1.5193 lb/hr
	Total		0.0104 lb/hr	0.0454 tpy		1.5385 lb/hr
CO_{2-e}		5398.27% by weight	0.1560 lb/hr	0.6834 tpy	5398.27% by weight	23 lb/hr
CO_2		7.83% by weight	0.0002 lb/hr	0.0010 tpy	7.83% by weight	0.0336 lb/hr
TOC (Total)		351.00% by weight	0.0101 lb/hr	0.0444 tpy	351.00% by weight	1.5049 lb/hr
Methane		215.62% by weight	0.0062 lb/hr	0.0273 tpy	215.62% by weight	0.9244 lb/hr
Ethane		35.39% by weight	0.0010 lb/hr	0.0045 tpy	35.39% by weight	0.1517 lb/hr
VOC (Total)		100.00% by weight	0.0029 lb/hr	0.0127 tpy	100.00% by weight	0.4287 lb/hr
HAP (Total)		6.23% by weight	0.0002 lb/hr	0.0008 tpy	6.23% by weight	0.0267 lb/hr
Benzene		1.5063% by weight	4.35E-05 lb/hr	1.91E-04 tpy	1.5063% by weight	6.46E-03 lb/hr
Ethylbenzene		0.0477% by weight	1.38E-06 lb/hr	6.04E-06 tpy	0.0477% by weight	2.04E-04 lb/hr
Hexane (n-)		2.8866% by weight	8.34E-05 lb/hr	3.65E-04 tpy	2.8866% by weight	1.24E-02 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	3.95E-05 lb/hr	1.73E-04 tpy	1.3668% by weight	5.86E-03 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	4.01E-07 lb/hr	1.76E-06 tpy	0.0139% by weight	5.95E-05 lb/hr
Xylenes		0.4073% by weight	1.18E-05 lb/hr	5.16E-05 tpy	0.4073% by weight	1.75E-03 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank		Above Ground?	Yes	
Height/Length	8.00 ft		Shell/Roof Color	Gray/Medium	or less solar
Diameter	1.67 ft	1.67 ft	Shell Condition	Good	absorptance
Capacity (estimated)	131 gal		Vacuum Setting	-0.03 psig	
Capacity (nominal)	130 gal		Pressure Setting	0.03 psig	

2. Stored Liquid Characteristics:

Basis: USEPA TANKS 4.09d — MET Station: Youngstown, Ohio
Material: Gasoline (RVP 10) — Selection based on VOC vapor pressure (see TABLE F-1).
Liquid Molecular Weight: 92.00 lb/lb-mol — Vapor Molecular Weight: 66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.6026	3.9945	41.87	46.88	0.7310	0.7360	130
February	28	3.7784	4.3077	44.17	50.61	0.9089	0.7719	130
March	31	4.2880	5.0487	50.38	58.62	1.5197	0.8760	130
April	30	4.9007	5.9913	57.10	67.55	2.2332	1.0011	130
May	31	5.5068	6.9067	63.12	75.21	3.1499	1.1250	130
June	30	6.0309	7.6494	67.90	80.85	3.7391	1.2320	130
July	31	6.2176	7.8425	69.53	82.24	3.9769	1.2702	130
August	31	5.9901	7.4005	67.54	79.01	3.3776	1.2237	130
September	30	5.4809	6.5905	62.87	72.66	2.4384	1.1197	130
October	31	4.8025	5.5795	56.07	63.80	1.6462	0.9811	130
November	30	4.2265	4.6893	49.66	54.86	0.8940	0.8634	130
December	31	3.7618	4.1116	43.96	48.30	0.6617	0.7685	130
ALL	365	4.8822	7.8425	56.18	82.24	25.2766	11.9685	1,560

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-7
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		HANO-TK-V5				
Service		Pipeline Liquids				
Capacity		2,000 gal			2,000 gal	
Temperature of Stored Liquid		56.18 °F			82.24 °F	
Vapor Pressure		4.8822 psia			7.8425 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		2.00 turnover/yr				
		4,000 gal/yr			2,000 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					79.4733 lbs/month	
		499.2658 lb/yr			0.1068 lb/hr	
Working Losses		**7.67E-03** lb/gal			**9.77E-03** lb/gal	
		30.6884 lb/yr	Average	Maximum	19.5411 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.2045 lb/hr	0.8958 tpy	358.84% by weight	0.3833 lb/hr
	Work		0.0126 lb/hr	0.0551 tpy		70.1208 lb/hr
	Total		0.2171 lb/hr	0.9508 tpy		70.5041 lb/hr
CO_{2-e}		5398.27% by weight	3.2658 lb/hr	14.3042 tpy	5398.27% by weight	1,061 lb/hr
CO_2		7.83% by weight	0.0047 lb/hr	0.0208 tpy	7.83% by weight	1.5392 lb/hr
TOC (Total)		351.00% by weight	0.2123 lb/hr	0.9301 tpy	351.00% by weight	68.9649 lb/hr
Methane		215.62% by weight	0.1304 lb/hr	0.5713 tpy	215.62% by weight	42.3642 lb/hr
Ethane		35.39% by weight	0.0214 lb/hr	0.0938 tpy	35.39% by weight	6.9528 lb/hr
VOC (Total)		100.00% by weight	0.0605 lb/hr	0.2650 tpy	100.00% by weight	19.6479 lb/hr
HAP (Total)		6.23% by weight	0.0038 lb/hr	0.0165 tpy	6.23% by weight	1.2238 lb/hr
Benzene		1.5063% by weight	9.11E-04 lb/hr	3.99E-03 tpy	1.5063% by weight	2.96E-01 lb/hr
Ethylbenzene		0.0477% by weight	2.88E-05 lb/hr	1.26E-04 tpy	0.0477% by weight	9.37E-03 lb/hr
Hexane (n-)		2.8866% by weight	1.75E-03 lb/hr	7.65E-03 tpy	2.8866% by weight	5.67E-01 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	8.27E-04 lb/hr	3.62E-03 tpy	1.3668% by weight	2.69E-01 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	8.40E-06 lb/hr	3.68E-05 tpy	0.0139% by weight	2.73E-03 lb/hr
Xylenes		0.4073% by weight	2.46E-04 lb/hr	1.08E-03 tpy	0.4073% by weight	8.00E-02 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	5.00 ft	Shell/Roof Color	Gray/Medium
Diameter	8.00 ft	Shell Condition	Good
Capacity (estimated)	1,880 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	2,000 gal	Pressure Setting	0.03 psig

or less solar absorptance

2. Stored Liquid Characteristics:

Basis: USEPA TANKS 4.09d MET Station: Youngstown, Ohio
Material: Gasoline (RVP 10) Selection based on VOC vapor pressure (see TABLE F-1).
Liquid Molecular Weight: 92.00 lb/lb-mol Vapor Molecular Weight: 66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.6026	3.9945	41.87	46.88	14.0291	11.3224	2,000
February	28	3.7784	4.3077	44.17	50.61	17.5039	11.8748	2,000
March	31	4.2880	5.0487	50.38	58.62	29.5389	13.4766	2,000
April	30	4.9007	5.9913	57.10	67.55	43.8423	15.4023	2,000
May	31	5.5068	6.9067	63.12	75.21	62.3786	17.3072	2,000
June	30	6.0309	7.6494	67.90	80.85	74.5511	18.9544	2,000
July	31	6.2176	7.8425	69.53	82.24	79.4733	19.5411	2,000
August	31	5.9901	7.4005	67.54	79.01	67.3090	18.8260	2,000
September	30	5.4809	6.5905	62.87	72.66	48.2714	17.2257	2,000
October	31	4.8025	5.5795	56.07	63.80	32.2696	15.0937	2,000
November	30	4.2265	4.6893	49.66	54.86	17.3596	13.2832	2,000
December	31	3.7618	4.1116	43.96	48.30	12.7390	11.8229	2,000
ALL	365	4.8822	7.8425	56.18	82.24	499.2658	184.1303	24,000

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-8
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		HANO-TK-OIL1				
Service		Oil				
Capacity		570 gal			570 gal	
Temperature of Stored Liquid		56.18 °F			82.24 °F	
Vapor Pressure		0.0060 psia			0.0129 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		365.00 turnover/yr				
		208,050 gal/yr			570 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					0.0239 lbs/month	
		0.1485 lb/yr			0.00003 lb/hr	
Working Losses		**1.85E-05** lb/gal			**2.75E-05** lb/gal	
		3.8426 lb/yr	Average	Maximum	0.0157 lb/hr	Maximum
Liquid	Stand	100.00% by weight	0.0000 lb/hr	0.0001 tpy	100.00% by weight	0.0000 lb/hr
	Work		0.0004 lb/hr	0.0019 tpy		0.0157 lb/hr
	Total		0.0005 lb/hr	0.0020 tpy		0.0157 lb/hr
TOC (Total)		100.00% by weight	0.0005 lb/hr	0.0020 tpy	100.00% by weight	0.0157 lb/hr
Methane						
Ethane						
VOC (Total)		100.00% by weight	0.0005 lb/hr	0.0020 tpy	100.00% by weight	0.0157 lb/hr
HAP (Total)						
Benzene						
Ethylbenzene						
Hexane (n-)						
Methanol						
Naphthalene						
Toluene						
Trimethylpentane (2,2,4-)						
Xylenes						

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	6.00 ft	Shell/Roof Color	Gray/Medium or less solar
Diameter	4.00 ft	Shell Condition	Good absorptance
Capacity (estimated)	564 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	570 gal	Pressure Setting	0.03 psig

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Youngstown, Ohio
Material	Distillate fuel oil no. 2	Selected purely for a worst-case scenario.	
Liquid Molecular Weight	188.00 lb/lb-mol	Vapor Molecular Weight	130.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	0.0034	0.0041	41.87	46.88	0.0037	0.0059	570
February	28	0.0037	0.0046	44.17	50.61	0.0048	0.0065	570
March	31	0.0046	0.0062	50.38	58.62	0.0084	0.0081	570
April	30	0.0059	0.0084	57.10	67.55	0.0132	0.0104	570
May	31	0.0073	0.0106	63.12	75.21	0.0191	0.0128	570
June	30	0.0085	0.0123	67.90	80.85	0.0226	0.0150	570
July	31	0.0089	0.0129	69.53	82.24	0.0239	0.0157	570
August	31	0.0084	0.0117	67.54	79.01	0.0204	0.0148	570
September	30	0.0072	0.0098	62.87	72.66	0.0147	0.0127	570
October	31	0.0057	0.0075	56.07	63.80	0.0096	0.0101	570
November	30	0.0045	0.0055	49.66	54.86	0.0048	0.0079	570
December	31	0.0037	0.0043	43.96	48.30	0.0034	0.0064	570
ALL	365	0.0060	0.0129	56.18	82.24	0.1485	0.1263	6,840

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. There is no basis for speciation of emissions.

TABLE F-9
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		HANO-TK-OIL2				
Service		Oil				
Capacity		570 gal			570 gal	
Temperature of Stored Liquid		56.18 °F			82.24 °F	
Vapor Pressure		0.0060 psia			0.0129 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		365.00 turnover/yr				
		208,050 gal/yr			570 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					0.0239 lbs/month	
		0.1485 lb/yr			0.00003 lb/hr	
Working Losses		**1.85E-05** lb/gal			**2.75E-05** lb/gal	
		3.8426 lb/yr	Average	Maximum	0.0157 lb/hr	Maximum
Liquid	Stand	100.00% by weight	0.0000 lb/hr	0.0001 tpy	100.00% by weight	0.0000 lb/hr
	Work		0.0004 lb/hr	0.0019 tpy		0.0157 lb/hr
	Total		0.0005 lb/hr	0.0020 tpy		0.0157 lb/hr
TOC (Total)		100.00% by weight	0.0005 lb/hr	0.0020 tpy	100.00% by weight	0.0157 lb/hr
Methane						
Ethane						
VOC (Total)		100.00% by weight	0.0005 lb/hr	0.0020 tpy	100.00% by weight	0.0157 lb/hr
HAP (Total)						
Benzene						
Ethylbenzene						
Hexane (n-)						
Methanol						
Naphthalene						
Toluene						
Trimethylpentane (2,2,4-)						
Xylenes						

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	6.00 ft	Shell/Roof Color	Gray/Medium
Diameter	4.00 ft	Shell Condition	Good
Capacity (estimated)	564 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	570 gal	Pressure Setting	0.03 psig

or less solar absorptance

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Youngstown, Ohio
Material	Distillate fuel oil no. 2	Selected purely for a worst-case scenario.	
Liquid Molecular Weight	188.00 lb/lb-mol	Vapor Molecular Weight	130.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	0.0034	0.0041	41.87	46.88	0.0037	0.0059	570
February	28	0.0037	0.0046	44.17	50.61	0.0048	0.0065	570
March	31	0.0046	0.0062	50.38	58.62	0.0084	0.0081	570
April	30	0.0059	0.0084	57.10	67.55	0.0132	0.0104	570
May	31	0.0073	0.0106	63.12	75.21	0.0191	0.0128	570
June	30	0.0085	0.0123	67.90	80.85	0.0226	0.0150	570
July	31	0.0089	0.0129	69.53	82.24	0.0239	0.0157	570
August	31	0.0084	0.0117	67.54	79.01	0.0204	0.0148	570
September	30	0.0072	0.0098	62.87	72.66	0.0147	0.0127	570
October	31	0.0057	0.0075	56.07	63.80	0.0096	0.0101	570
November	30	0.0045	0.0055	49.66	54.86	0.0048	0.0079	570
December	31	0.0037	0.0043	43.96	48.30	0.0034	0.0064	570
ALL	365	0.0060	0.0129	56.18	82.24	0.1485	0.1263	6,840

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01

4. There is no basis for speciation of emissions.

TABLE F-10
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		HANO-TK-OW1				
Service		Oily Water				
Capacity		3,000 gal			3,000 gal	
Temperature of Stored Liquid		56.18 °F			82.24 °F	
Vapor Pressure		0.0060 psia			0.0129 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		12.00 turnover/yr				
		36,000 gal/yr			3,000 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					0.1515 lbs/month	
		0.9408 lb/yr			0.00020 lb/hr	
Working Losses		**1.85E-05** lb/gal			**2.75E-05** lb/gal	
		0.6649 lb/yr	Average	Maximum	0.0825 lb/hr	Maximum
Liquid	Stand	100.00% by weight	0.0001 lb/hr	0.0005 tpy	100.00% by weight	0.0002 lb/hr
	Work		0.0001 lb/hr	0.0003 tpy		0.0825 lb/hr
	Total		0.0002 lb/hr	0.0008 tpy		0.0827 lb/hr
TOC (Total)		100.00% by weight	0.0002 lb/hr	0.0008 tpy	100.00% by weight	0.0827 lb/hr
Methane						
Ethane						
VOC (Total)		100.00% by weight	0.0002 lb/hr	0.0008 tpy	100.00% by weight	0.0827 lb/hr
HAP (Total)						
Benzene						
Ethylbenzene						
Hexane (n-)						
Methanol						
Naphthalene						
Toluene						
Trimethylpentane (2,2,4-)						
Xylenes						

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Horizontal Tank		Above Ground?	Yes	
Height/Length	18.00 ft		Shell/Roof Color	Gray/Medium	or less solar
Diameter	5.38 ft	5.38 ft	Shell Condition	Good	absorptance
Capacity (estimated)	3,055 gal		Vacuum Setting	-0.03 psig	
Capacity (nominal)	3,000 gal		Pressure Setting	0.03 psig	

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Youngstown, Ohio
Material	Distillate fuel oil no. 2	Selected purely for a worst-case scenario.	
Liquid Molecular Weight	188.00 lb/lb-mol	Vapor Molecular Weight	130.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	0.0034	0.0041	41.87	46.88	0.0235	0.0312	3,000
February	28	0.0037	0.0046	44.17	50.61	0.0303	0.0342	3,000
March	31	0.0046	0.0062	50.38	58.62	0.0532	0.0425	3,000
April	30	0.0059	0.0084	57.10	67.55	0.0834	0.0550	3,000
May	31	0.0073	0.0106	63.12	75.21	0.1208	0.0676	3,000
June	30	0.0085	0.0123	67.90	80.85	0.1434	0.0787	3,000
July	31	0.0089	0.0129	69.53	82.24	0.1515	0.0825	3,000
August	31	0.0084	0.0117	67.54	79.01	0.1293	0.0779	3,000
September	30	0.0072	0.0098	62.87	72.66	0.0928	0.0670	3,000
October	31	0.0057	0.0075	56.07	63.80	0.0606	0.0531	3,000
November	30	0.0045	0.0055	49.66	54.86	0.0304	0.0413	3,000
December	31	0.0037	0.0043	43.96	48.30	0.0215	0.0339	3,000
ALL	365	0.0060	0.0129	56.18	82.24	0.9408	0.6649	36,000

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. There is no basis for speciation of emissions.

TABLE F-11
Volatile Organic Liquids Loading (Tanker Trucks)
Hourly and Annual Emission Estimates

Source	HANO-TL-PL				
Supply Vessel	HANO-TK-V5				
	Pipeline Liquids				
	2,000 gal			2,000 gal	
Tanker Truck Service	Dedicated Normal			Dedicated Normal	
Loading Method	Submerged			Submerged	
Saturation Factor	0.60 n.d.			0.60 n.d.	
Vapor Molecular Weight	66.00 lb/lb-mol			66.00 lb/lb-mol	
Bulk Liquid Temperature	56.18 °F			82.24 °F	
	516.18 R			542.24 R	
Vapor Pressure	4.8822 psia			7.8425 psia	
Loading Loss Factor	4.6669 lb/kgal			7.1363 lb/kgal	
Pumping Rate				150 gpm	
Throughput	2.00 turnover/yr				
	4,000 gal/yr			2,000 gal/hr	
Loading Losses	18.6677 lb/yr	Average	Maximum	14.2726 lb/hr	Maximum
Residual Liquid	358.84% by weight	0.0076 lb/hr	0.0335 tpy	358.84% by weight	51.2156 lb/hr
CO_{2-e}	5398.27% by weight	0.1150 lb/hr	0.5039 tpy	5398.27% by weight	770.4737 lb/hr
CO_2	7.83% by weight	0.0002 lb/hr	0.0007 tpy	7.83% by weight	1.1181 lb/hr
TOC (Total)	351.00% by weight	0.0075 lb/hr	0.0328 tpy	351.00% by weight	50.0975 lb/hr
Methane	215.62% by weight	0.0046 lb/hr	0.0201 tpy	215.62% by weight	30.7742 lb/hr
Ethane	35.39% by weight	0.0008 lb/hr	0.0033 tpy	35.39% by weight	5.0507 lb/hr
VOC (Total)	100.00% by weight	0.0021 lb/hr	0.0093 tpy	100.00% by weight	14.2726 lb/hr
HAP (Total)	6.23% by weight	0.0001 lb/hr	0.0006 tpy	6.23% by weight	0.8890 lb/hr
Benzene	1.5063% by weight	3.21E-05 lb/hr	1.41E-04 tpy	1.5063% by weight	2.15E-01 lb/hr
Ethylbenzene	0.0477% by weight	1.02E-06 lb/hr	4.45E-06 tpy	0.0477% by weight	6.80E-03 lb/hr
Hexane (n-)	2.8866% by weight	6.15E-05 lb/hr	2.69E-04 tpy	2.8866% by weight	4.12E-01 lb/hr
Methanol					
Naphthalene					
Toluene	1.3668% by weight	2.91E-05 lb/hr	1.28E-04 tpy	1.3668% by weight	1.95E-01 lb/hr
Trimethylpentane (2,2,4-)	0.0139% by weight	2.96E-07 lb/hr	1.30E-06 tpy	0.0139% by weight	1.98E-03 lb/hr
Xylenes	0.4073% by weight	8.68E-06 lb/hr	3.80E-05 tpy	0.4073% by weight	5.81E-02 lb/hr

NOTES

1. Emissions calculated using methods provided in USEPA, AP-42 Section 5.2 dated 1/95. $L_L = 12.46[(S)M_VP/T]$
2. Physical property, throughput and speciation data based data from supply vessel emission calculation spreadsheet.

TABLE F-12
Volatile Organic Liquids Loading (Tanker Trucks)
Hourly and Annual Emission Estimates

Source	HANO-TL-OIL				
Supply Vessel	HANO-TK-OIL1 & HANO-TK-OIL2				
	Oil				
	1,140 gal			1,140 gal	
Tanker Truck Service	Dedicated Normal			Dedicated Normal	
Loading Method	Splash			Splash	
Saturation Factor	1.45 n.d.			1.45 n.d.	
Vapor Molecular Weight	130.00 lb/lb-mol			130.00 lb/lb-mol	
Bulk Liquid Temperature	56.18 °F			82.24 °F	
	516.18 R			542.24 R	
Vapor Pressure	0.0060 psia			0.0129 psia	
Loading Loss Factor	0.0272 lb/kgal			0.0559 lb/kgal	
Pumping Rate				150 gpm	
Throughput	12.00 turnover/yr				
	13,680 gal/yr			1,140 gal/hr	
Loading Losses	0.3714 lb/yr	Average	Maximum	0.0637 lb/hr	Maximum
Residual Liquid	100.00% by weight	0.00004 lb/hr	0.0002 tpy	100.00% by weight	0.0637 lb/hr
TOC (Total)	100.00% by weight	0.00004 lb/hr	0.0002 tpy	100.00% by weight	0.0637 lb/hr
Methane					
Ethane					
VOC (Total)	100.00% by weight	0.00004 lb/hr	0.0002 tpy	100.00% by weight	0.0637 lb/hr
HAP (Total)					
Benzene					
Ethylbenzene					
Hexane (n-)					
Methanol					
Naphthalene					
Toluene					
Trimethylpentane (2,2,4-)					
Xylenes					

NOTES

1. Emissions calculated using methods provided in USEPA, AP-42 Section 5.2 dated 1/95. $L_L = 12.46[(S)M_VP/T]$
2. Physical property, throughput and speciation data based data from supply vessel emission calculation spreadsheet.

TABLE F-13
Volatile Organic Liquids Loading (Tanker Trucks)
Hourly and Annual Emission Estimates

Source	HANO-TL-OW				
Supply Vessel	HANO-TK-OW1				
	Oily Water				
	3,000 gal			3,000 gal	
Tanker Truck Service	Dedicated Normal			Dedicated Normal	
Loading Method	Splash			Splash	
Saturation Factor	1.45 n.d.			1.45 n.d.	
Vapor Molecular Weight	130.00 lb/lb-mol			130.00 lb/lb-mol	
Bulk Liquid Temperature	56.18 °F			82.24 °F	
	516.18 R			542.24 R	
Vapor Pressure	0.0060 psia			0.0129 psia	
Loading Loss Factor	0.0272 lb/kgal			0.0559 lb/kgal	
Pumping Rate				150 gpm	
Throughput	12.00 turnover/yr				
	36,000 gal/yr			3,000 gal/hr	
Loading Losses	0.9774 lb/yr	Average	Maximum	0.1676 lb/hr	Maximum
Residual Liquid	100.00% by weight	0.00011 lb/hr	0.0005 tpy	100.00% by weight	0.1676 lb/hr
TOC (Total)	100.00% by weight	0.00011 lb/hr	0.0005 tpy	100.00% by weight	0.1676 lb/hr
Methane					
Ethane					
VOC (Total)	100.00% by weight	0.00011 lb/hr	0.0005 tpy	100.00% by weight	0.1676 lb/hr
HAP (Total)					
Benzene					
Ethylbenzene					
Hexane (n-)					
Methanol					
Naphthalene					
Toluene					
Trimethylpentane (2,2,4-)					
Xylenes					

NOTES

1. Emissions calculated using methods provided in USEPA, AP-42 Section 5.2 dated 1/95. $L_L = 12.46[(S)M_VP/T]$
2. Physical property, throughput and speciation data based data from supply vessel emission calculation spreadsheet.

TABLE G-1a
Gas Releases
Hourly and Annual Emission Estimates

Category	Station Operations					
Source	HANO-GR-ST			HANO-GR-PL		
	Avg. Hourly	Max. Annual	Max. Hourly	Avg. Hourly	Max. Annual	Max. Hourly
Gas Release	2,557 scfh	22,400,000 scf/yr	1,950,000 scfh	1,615 scfh	14,150,000 scf/yr	5,660,000 scfh
	119 lb/hr	1,038,349 lb/yr	92,739 lb/hr	75 lb/hr	655,922 lb/yr	269,181 lb/hr
NO_X						
CO						
SO_2						
$PM_{10/2.5}$						
CO_{2-e}	2,674 lb/hr	11,714 tpy	2,062,592 lb/hr	1,689 lb/hr	7,400 tpy	5,986,804 lb/hr
CO_2	1.5793 lb/hr	6.9173 tpy	1,235.6286 lb/hr	0.9976 lb/hr	4.3697 tpy	3,586.4912 lb/hr
N_2O						
TOC (Total)	116 lb/hr	507 tpy	90,535 lb/hr	73 lb/hr	320 tpy	262,784 lb/hr
Methane	107 lb/hr	468 tpy	82,454 lb/hr	68 lb/hr	296 tpy	239,329 lb/hr
Ethane	5 lb/hr	23 tpy	4,134 lb/hr	3 lb/hr	15 tpy	11,998 lb/hr
VOC (Total)	3.4418 lb/hr	15.0751 tpy	3,947.2009 lb/hr	2.1742 lb/hr	9.5229 tpy	11,457.0035 lb/hr
VOC (non-HAP)	3.1573 lb/hr	13.8290 tpy	3,620.9224 lb/hr	1.9945 lb/hr	8.7357 tpy	10,509.9594 lb/hr
HAP (Total)	0.2845 lb/hr	1.2461 tpy	326.2784 lb/hr	0.1797 lb/hr	0.7872 tpy	947.0441 lb/hr
Acetaldehyde						
Acrolein						
Benzene	0.1004 lb/hr	0.4397 tpy	115.1289 lb/hr	0.0634 lb/hr	0.2778 tpy	334.1689 lb/hr
Biphenyl						
Butadiene (1,3-)						
Carbon Tetrachloride						
Chlorobenzene						
Chloroform						
Dichloropropene (1,3-)						
Ethylbenzene	0.0025 lb/hr	0.0108 tpy	2.8296 lb/hr	0.0016 lb/hr	0.0068 tpy	8.2131 lb/hr
Ethylene Dibromide						
Formaldehyde						
Hexane (n-)	0.1001 lb/hr	0.4386 tpy	114.8406 lb/hr	0.0633 lb/hr	0.2771 tpy	333.3321 lb/hr
Methanol						
Methylene Chloride						
Methylnaphthalene (2-)						
Naphthalene						
PAH						
Phenol						
Propylene Oxide						
Styrene						
Tetrachloroethane (1,1,2,2-)						
Toluene	0.0642 lb/hr	0.2814 tpy	73.6723 lb/hr	0.0406 lb/hr	0.1777 tpy	213.8386 lb/hr
Trichloroethane (1,1,2-)						
Trimethylpentane (2,2,4-)						
Vinyl Chloride						
Xylenes	0.0173 lb/hr	0.0756 tpy	19.8071 lb/hr	0.0109 lb/hr	0.0478 tpy	57.4915 lb/hr

NOTES

1. Gas release estimates based on data for a similar compressor station.
2. Gas density is the value extracted from physical property estimation spreadsheets.

					Density:
Density (Lab):	0.0441 lb/scf				
Density (GC - Avg+):	0.0464 lb/scf	Safety Factor (GC):	103%	Average Plus:	0.0464 lb/scf
Density (GC - Max):	0.0476 lb/scf			Maximum:	0.0476 lb/scf

3. As it will be assumed that Gas Chromatograph (GC) is more representative, the following is used to scaled the extended analysis (Lab).

				Average Plus	Maximum	VOC Specie Scaling:	
VOC (Lab):	0.00128 lb/scf	VOC:	GC	0.00128 lb/scf	0.00188 lb/scf	Average Plus:	100%
	2.91% wt%		Use	2.90% wt%	4.26% wt%	Maximum:	146%
Methane (Lab):	90.19% wt%	Methane (Use):		90.20% wt%	88.91% wt%		
Ethane (Lab):	4.52% wt%	Ethane (Use):		4.52% wt%	4.46% wt%		

TABLE G-2
Natural Gas
Physical Property Estimations

Component				Molecular	Vapor	Stream		
Name (i)	Formula	Type	HAP	Weight M_i $(lb/lb\text{-}mol)_i$	Density ρ_i $(lb/scf)_i$	Mole Fraction $f_{n\text{-}i}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $f_{m\text{-}i}$ $(f_{n\text{-}i}M_i)/\Sigma(f_{n\text{-}i}M_i)$ (lb_i/lb_T)	Volume Fraction $f_{v\text{-}i}$ $f_{m\text{-}i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Nitrogen	N2			28.013	0.0727	0.632%	1.044%	0.633%
Carbon Dioxide	CO2	GHG		44.010	0.1143	0.514%	1.332%	0.514%
Methane	C01H04	GHG		16.042	0.0417	95.390%	90.193%	95.447%
Ethane	C02H06			30.069	0.0781	2.551%	4.522%	2.553%
Propane	C03H08	VOC		44.096	0.1145	0.449%	1.167%	0.449%
Butane (i-)	C04H10	VOC		58.122	0.1509	0.097%	0.333%	0.097%
Butane (n-)	C04H10	VOC		58.122	0.1509	0.114%	0.391%	0.114%
Cyclopentane	C05H10	VOC		70.133	0.1821	0.002%	0.007%	0.002%
Pentane (i-)	C05H12	VOC		72.149	0.1873			
Pentane (i-)	C05H12	VOC		72.149	0.1873			
Pentane (n-)	C05H12	VOC		72.149	0.1873	0.041%	0.176%	0.041%
Benzene	C06H06	VOC	X	78.112	0.2028	0.018%	0.085%	0.018%
Cyclohexane	C06H12	VOC		84.159	0.2185	0.007%	0.035%	0.007%
Methylcyclopentane	C06H12	VOC		84.159	0.2185	0.005%	0.026%	0.005%
Dimethylbutane (2,2-)	C06H14	VOC		86.175	0.2238	0.004%	0.019%	0.004%
Dimethylbutane (2,3-)	C06H14	VOC		86.175	0.2238	0.003%	0.014%	0.003%
Hexane (n-)	C06H14	VOC	X	86.175	0.2238	0.017%	0.085%	0.017%
Methylpentane (2-)	C06H14	VOC		86.175	0.2238	0.014%	0.073%	0.014%
Methylpentane (3-)	C06H14	VOC		86.175	0.2238	0.009%	0.044%	0.009%
Toluene	C07H08	VOC	X	92.138	0.2392	0.010%	0.054%	0.010%
Cycloheptane	C07H14	VOC		98.186	0.2549			
Dimethylcyclopentane (1,1-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Dimethylcyclopentane (1,c-2-)	C07H14	VOC		98.186	0.2549			
Dimethylcyclopentane (1,c-3-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Dimethylcyclopentane (1,t-2-)	C07H14	VOC		98.186	0.2549	0.001%	0.006%	0.001%
Dimethylcyclopentane (1,t-3-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Ethylcyclopentane	C07H14	VOC		98.186	0.2549	0.000%	0.002%	0.000%
Methylcyclohexane	C07H14	VOC		98.186	0.2549	0.007%	0.042%	0.007%
Dimethylpentane (2,2-)	C07H16	VOC		100.202	0.2602	0.001%	0.006%	0.001%
Dimethylpentane (2,3-)	C07H16	VOC		100.202	0.2602	0.002%	0.010%	0.002%
Dimethylpentane (2,4-)	C07H16	VOC		100.202	0.2602	0.001%	0.006%	0.001%
Dimethylpentane (3,3-)	C07H16	VOC		100.202	0.2602	0.001%	0.004%	0.001%
Ethylpentane (3-)	C07H16	VOC		100.202	0.2602	0.000%	0.002%	0.000%
Heptane (n-)	C07H16	VOC		100.202	0.2602	0.009%	0.055%	0.009%
Methylhexane (2-)	C07H16	VOC		100.202	0.2602	0.005%	0.031%	0.005%
Methylhexane (3-)	C07H16	VOC		100.202	0.2602	0.005%	0.030%	0.005%
Trimethylbutane (2,2,3-)	C07H16	VOC		100.202	0.2602	0.001%	0.004%	0.001%
Ethylbenzene	C08H10	VOC	X	106.165	0.2757	0.000%	0.002%	0.000%
Xylene (m-)	C08H10	VOC	X	106.165	0.2757	0.001%	0.006%	0.001%
Xylene (o-)	C08H10	VOC	X	106.165	0.2757	0.000%	0.002%	0.000%
Xylene (p-)	C08H10	VOC	X	106.165	0.2757	0.001%	0.006%	0.001%
Cyclooctane	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,1-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,c-2-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Dimethylcyclohexane (1,c-3-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Dimethylcyclohexane (1,c-4-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,t-2-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Dimethylcyclohexane (1,t-3-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,t-4-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Ethylcyclohexane	C08H16	VOC		112.213	0.2914			

TABLE G-2
Natural Gas
Physical Property Estimations

Component				Molecular	Vapor	Stream		
Name (i)	Formula	Type	HAP	Weight M_i $(lb/lb\text{-}mol)_i$	Density ρ_i $(lb/scf)_i$	Mole Fraction $f_{n\text{-}i}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $f_{m\text{-}i}$ $(f_{n\text{-}i}M_i)/\Sigma(f_{n\text{-}i}M_i)$ (lb_i/lb_T)	Volume Fraction $f_{v\text{-}i}$ $f_{m\text{-}i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Ethylcyclopentane (1-methyl-1-)	C08H16	VOC		112.213	0.2914			
Ethylcyclopentane (1-methyl-c-2-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	C08H16	VOC		112.213	0.2914			
Ethylcyclopentane (1-methyl-t-2-)	C08H16	VOC		112.213	0.2914			
Propylcyclopentane (i-)	C08H16	VOC		112.213	0.2914			
Propylcyclopentane (n-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,1,2-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,1,3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,c-3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,t-3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,t-4-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,t-2,c-3-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Trimethylcyclopentane (1,t-2,c-4-)	C08H16	VOC		112.213	0.2914			
Dimethylhexane (2,2-)	C08H18	VOC		114.229	0.2966			
Dimethylhexane (2,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (2,4-)	C08H18	VOC		114.229	0.2966			
Dimethylhexane (2,5-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (3,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (3,4-)	C08H18	VOC		114.229	0.2966	0.001%	0.004%	0.001%
Ethylhexane (3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Methylheptane (2-)	C08H18	VOC		114.229	0.2966	0.002%	0.013%	0.002%
Methylheptane (3-)	C08H18	VOC		114.229	0.2966	0.003%	0.018%	0.003%
Methylheptane (4-)	C08H18	VOC		114.229	0.2966			
Octane (n-)	C08H18	VOC		114.229	0.2966	0.005%	0.034%	0.005%
Trimethylpentane (1,1,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Trimethylpentane (2,2,3-)	C08H18	VOC		114.229	0.2966			
Trimethylpentane (2,2,4-)	C08H18	VOC	X	114.229	0.2966			
Trimethylpentane (2,3,4-)	C08H18	VOC		114.229	0.2966			
Ethyltoluene (m-)	C09H12	VOC		120.192	0.3121			
Ethyltoluene (o-)	C09H12	VOC		120.192	0.3121			
Ethyltoluene (p-)	C09H12	VOC		120.192	0.3121			
Propylbenzene (i-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Propylbenzene (n-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Trimethylbenzene (1,2,4-)	C09H12	VOC		120.192	0.3121			
Trimethylbenzene (1,3,5-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Butylcyclopentane (n-)	C09H18	VOC		126.239	0.3278			
Methylcyclooctane	C09H18	VOC		126.239	0.3278			
Propylcyclohexane (i-)	C09H18	VOC		126.239	0.3278			
Propylcyclohexane (n-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,2-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,c-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,c-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,t-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,c-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,c-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,t-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-3,c-5-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-3,t-5-)	C09H18	VOC		126.239	0.3278			

TABLE G-2
Natural Gas
Physical Property Estimations

Component				Molecular Weight	Vapor Density	Stream		
Name (i)	Formula	Type	HAP	M_i $(lb/lb\text{-}mol)_i$	ρ_i $(lb/scf)_i$	Mole Fraction $f_{n\text{-}i}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $f_{m\text{-}i}$ $(f_{n\text{-}i}M_i)/\Sigma(f_{n\text{-}i}M_i)$ (lb_i/lb_T)	Volume Fraction $f_{v\text{-}i}$ $f_{m\text{-}i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Dimethylheptane (2,2-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,3-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,5-)	C09H20	VOC		128.255	0.3330			
Dimethylheptane (2,6-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (3,3-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (3,4-)	C09H20	VOC		128.255	0.3330			
Dimethylheptane (3,5-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Methyloctane (2-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Methyloctane (3-)	C09H20	VOC		128.255	0.3330	0.001%	0.005%	0.001%
Methyloctane (4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Nonane (n-)	C09H20	VOC		128.255	0.3330	0.002%	0.018%	0.002%
Trimethylhexane (2,2,3-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,2,4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Trimethylhexane (2,2,5-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Trimethylhexane (2,3,3-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,3,4-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,3,5-)	C09H20	VOC		128.255	0.3330			
Butylbenzene (t-)	C10H14	VOC		134.218	0.3485			
Butylcyclohexane (i-)	C10H20	VOC		140.266	0.3642			
Butylcyclohexane (t-)	C10H20	VOC		140.266	0.3642			
Decane (n-)	C10H22	VOC		142.282	0.3694	0.001%	0.008%	0.001%
Dimethyloctane (2,2-)	C10H22	VOC		142.282	0.3694			
Dimethyloctane (2,3-)	C10H22	VOC		142.282	0.3694			
Dimethyloctane (3,3-)	C10H22	VOC		142.282	0.3694	0.000%	0.003%	0.000%
Ethyloctane (3-)	C10H22	VOC		142.282	0.3694			
Methylnonane (2-)	C10H22	VOC		142.282	0.3694	0.000%	0.003%	0.000%
Methylnonane (3-)	C10H22	VOC		142.282	0.3694			
Methylnonane (4-)	C10H22	VOC		142.282	0.3694			
Methylnonane (5-)	C10H22	VOC		142.282	0.3694			
Trimethylheptane (2,3,4-)	C10H22	VOC		142.282	0.3694			
Trimethylheptane (2,5,5-)	C10H22	VOC		142.282	0.3694			
Undecane (n-)	C11H24	VOC		156.308	0.4059	0.000%	0.003%	0.000%
Dodecane (n-)	C12H26	VOC		170.335	0.4423	0.000%	0.003%	0.000%
Tridecane (n-)	C13H28	VOC		184.361	0.4787			
Tetradecane (n-)	C14H30	VOC		198.388	0.5151			
Natural Gas				16.977	0.0441	99.940%	100.000%	100.000%
TOC (Total)				16.766	0.0435	98.794%	97.624%	98.853%
VOC (Total)				57.866	0.1503	0.853%	2.910%	0.854%
HAP (Total)				85.428	0.2218	0.048%	0.241%	0.048%
Xylenes				106.165	0.2757	0.002%	0.015%	0.002%

NOTES

1. Vapor density is estimated using the ideal gas law (PV = nRT = (m/M)RT OR ρ = RPT/M), where R = 10.73164 (psia ft^3)/(lb-mol °R).
2. Standard conditions 68 °F
   14.696 psia
3. Mole percentages from analysis on Various of sample collected at Meter Station Avg. Results (3 Most Representative Samples).
   The sample is assumed to be representative of the actual gas composition at Hanoverton Compressor Station.

TABLE H-1a
Piping Components
Hourly and Annual Emission Estimates

Source			HANO-PC-NG			
Service			Gas			
			Natural Gas			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	1,023 components			
		Emission Factor	4.50E-03 kg/hr/component			
	Connectors	Count	3,232 components			
		Emission Factor	2.00E-04 kg/hr/component			
	Flanges	Count	715 components			
		Emission Factor	3.90E-04 kg/hr/component			
	Open-Ended Lines	Count	18 components			
		Emission Factor	2.00E-03 kg/hr/component			
	Pump Seals	Count	0 components			
		Emission Factor	2.40E-03 kg/hr/component			
	Other	Count	108 components	**Emissions**		
		Emission Factor	8.80E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}		2256.29% by weight	324.0749 lb/hr	1,419.4481 tpy	388.8899 lb/hr
	CO_2		1.33% by weight	0.1914 lb/hr	0.8382 tpy	0.2296 lb/hr
	TOC (Total)		97.62% by weight	14.0219 lb/hr	61.4158 tpy	16.8263 lb/hr
	Methane		90.198% by weight	12.9553 lb/hr	56.7444 tpy	15.5464 lb/hr
	Ethane		4.522% by weight	0.6495 lb/hr	2.8447 tpy	0.7794 lb/hr
	VOC (Total)		2.904% by weight	0.4171 lb/hr	1.8267 tpy	0.5005 lb/hr
	HAP (Total)		0.240% by weight	0.0345 lb/hr	0.1510 tpy	0.0414 lb/hr
	Benzene		0.085% by weight	1.22E-02 lb/hr	5.33E-02 tpy	1.46E-02 lb/hr
	Ethylbenzene		0.002% by weight	2.99E-04 lb/hr	1.31E-03 tpy	3.59E-04 lb/hr
	Hexane (n-)		0.084% by weight	1.21E-02 lb/hr	5.31E-02 tpy	1.46E-02 lb/hr
	Methanol					
	Naphthalene					
	Toluene		0.054% by weight	7.78E-03 lb/hr	3.41E-02 tpy	9.34E-03 lb/hr
	Trimethylpentane (2,2,4-)					
	Xylenes		0.015% by weight	2.09E-03 lb/hr	9.17E-03 tpy	2.51E-03 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017).
The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings for a similar compressor station.
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on gas analysis used to estimate gas release annual emissions (TABLE G-1a).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.

TABLE H-2a
Piping Components
Hourly and Annual Emission Estimates

Source			HANO-PC-PL			
Service			Light Oil			
			Pipeline Liquids			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	165 components			
		Emission Factor	2.50E-03 kg/hr/component			
	Connectors	Count	1,048 components			
		Emission Factor	2.10E-04 kg/hr/component			
	Flanges	Count	245 components			
		Emission Factor	1.10E-04 kg/hr/component			
	Open-Ended Lines	Count	22 components			
		Emission Factor	1.40E-03 kg/hr/component			
	Pump Seals	Count	3 components			
		Emission Factor	1.30E-02 kg/hr/component			
	Other	Count	3 components	**Emissions**		
		Emission Factor	7.50E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}		0.96% by weight	0.0159 lb/hr	0.0697 tpy	0.0191 lb/hr
	CO_2		0.01% by weight	0.0002 lb/hr	0.0009 tpy	0.0003 lb/hr
	TOC (Total)		99.99% by weight	1.6573 lb/hr	7.2588 tpy	1.9887 lb/hr
	Methane		0.04% by weight	0.0006 lb/hr	0.0027 tpy	0.0008 lb/hr
	Ethane		0.09% by weight	0.0015 lb/hr	0.0065 tpy	0.0018 lb/hr
	VOC (Total)		99.86% by weight	1.6551 lb/hr	7.2495 tpy	1.9862 lb/hr
	HAP (Total)		14.54% by weight	0.2410 lb/hr	1.0557 tpy	0.2892 lb/hr
	Benzene		1.44% by weight	2.39E-02 lb/hr	1.05E-01 tpy	2.86E-02 lb/hr
	Ethylbenzene		0.48% by weight	7.89E-03 lb/hr	3.46E-02 tpy	9.47E-03 lb/hr
	Hexane (n-)		1.69% by weight	2.81E-02 lb/hr	1.23E-01 tpy	3.37E-02 lb/hr
	Methanol					
	Naphthalene					
	Toluene		4.49% by weight	7.44E-02 lb/hr	3.26E-01 tpy	8.93E-02 lb/hr
	Trimethylpentane (2,2,4-)		0.03% by weight	4.28E-04 lb/hr	1.87E-03 tpy	5.14E-04 lb/hr
	Xylenes		6.42% by weight	1.06E-01 lb/hr	4.66E-01 tpy	1.28E-01 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017).
The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings for a similar compressor station.
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on composition estimate (TABLE F-1).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.

TABLE H-3a
Piping Components
Hourly and Annual Emission Estimates

Source			HANO-PC-OIL			
Service			Heavy Oil			
			Oil			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	118 components			
		Emission Factor	8.40E-06 kg/hr/component			
	Connectors	Count	556 components			
		Emission Factor	7.50E-06 kg/hr/component			
	Flanges	Count	188 components			
		Emission Factor	3.90E-07 kg/hr/component			
	Open-Ended Lines	Count	0 components			
		Emission Factor	1.40E-04 kg/hr/component			
	Pump Seals	Count	12 components			
		Emission Factor	8.62E-03 kg/hr/component			
	Other	Count	4 components	**Emissions**		
		Emission Factor	3.20E-05 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}					
	CO_2					
	TOC (Total)		100.00% by weight	0.2398 lb/hr	1.0504 tpy	0.2878 lb/hr
	Methane					
	Ethane					
	VOC (Total)		100.00% by weight	0.2398 lb/hr	1.0504 tpy	0.2878 lb/hr
	HAP (Total)					
	Benzene					
	Ethylbenzene					
	Hexane (n-)					
	Methanol					
	Naphthalene					
	Toluene					
	Trimethylpentane (2,2,4-)					
	Xylenes					

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017). The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings for a similar compressor station.
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based listed on MSDS.
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.

TABLE I-1
Parts Washer
Hourly and Annual Emission Estimates

Solvent			Eversol 143			
Solvent Density			6.84 lb/gal			
Potential	Hourly	Maximum	0.3288 gal/hr			
Make-up Solvent		Average	0.0137 gal/hr	**Emissions**		
Requirement	Annual		120.00 gal/yr	**Avg. Hourly**	**Max. Hourly**	**Max. Annual**
Speciation	TOC (Total)		100.00% by weight	0.0937 lb/hr	2.2484 lb/hr	0.4103 tpy
	Methane					
	Ethane					
	VOC (Total)		100.00% by weight	0.0937 lb/hr	2.2484 lb/hr	0.4103 tpy
	VOC (non-HAP)		100.00% by weight	0.0937 lb/hr	2.2484 lb/hr	0.4103 tpy
	HAP (Total)					
	Benzene					
	Ethylbenzene					
	Hexane (n-)					
	Naphthalene					
	Toluene					
	Trimethylpentane (2,2,4-)					
	Xylenes					

NOTES

1. Although emissions are estimated based on the physical properties and chemical speciation of Eversol 143, other solvents may be used as long as the represented solvent density and chemical species weight percents are not exceeded. MSDS indicate that the vapor pressure at 100°F is less than 5 mmHg (0.097 psia).
2. Potential maximum annual solvent make-up is based on past experience and a safety factor.
3. Potential maximum hourly solvent make-up is the potential maximum annual solvent make-up divided by 365 day/yr.
4. Potential average hourly solvent make-up is the potential maximum annual solvent make-up divided by 8,760 hrs/yr.

APPENDIX C

Traditional BAT Request Letter

July 1, 2015

Mr. Kevin Fortune
Ohio EPA – Division of Air Pollution Control
Northeast District Office
2110 E Aurora Rd
Twinsburg, Ohio 44087

RE: NEXUS Gas Transmission – Hanoverton, OH
Request for Application of Historic BAT Format

Dear Mr. Fortune:

NEXUS Gas Transmission (NGT) plans to construct a natural gas compressor station near Hanoverton, in Columbiana County, Ohio (Hanoverton Compressor Station). As part of the Hanoverton Compressor Station, NGT plans to install two (2) new natural gas-fired Solar Titan 250 combustion turbines each sized to a nominal, NEMA-rated capacity of 26,000 horsepower (hp) and equipped with an oxidation catalyst.

Pursuant to the provisions added to Ohio Revised Code (ORC) 3704 as a result of Senate Bill 265, sources modified or constructed after August 3, 2009, are to have rule-based BAT limits established by Ohio EPA for specific source categories. However, Ohio EPA has yet to promulgate the rule based BAT limits. To address this regulatory gap, the Ohio EPA's Division of Air Pollution Control (DAPC) released a memo (February 2014 Memo) indicating that permits filed on or after August 3, 2009, must go through an interim case-by-case BAT procedure.[43]

As clarified in the February 2014 Memo,[44] Ohio EPA requires any entity establishing a synthetic minor restriction to do so in accordance with U.S. EPA's "Limiting Potential to Emit" guidance. The memo states Ohio EPA's belief that BAT established in the format of a source design/design efficiency can be used to limit potential to emit (PTE) for New Source Review (NSR) actions. The February 2014 Memo also asserts that PTE must still be calculated before controls for the purposes of assessing Title V applicability and establishes Ohio EPA's stance that limits established in accordance with the memo are legally and practically enforceable. U.S. EPA since sent a letter[45] to Ohio EPA stating concerns regarding the practical enforceability of the source design BAT format, noting that the format does not establish an expectation of ongoing compliance for the source.

[43] Ohio EPA Memo from Mike Hopkins, Assistant Chief, Permitting, DAPC, to Permit Writers and Reviewers "BAT Requirements for Permits Issued On or After February 7, 2014" dated February 7, 2014, which supersedes the BAT guidance issued on August 30, 2013. Ohio's BAT policy will be in place only until such time when the Ohio EPA develops and promulgates rules that define BAT in accordance with ORC 3704.03(T) requirements.

[44] Refer to Questions 26, 27, and 28 in the February 2014 Memo.

[45] Letter send from John Mooney (U.S. EPA, Region V, Air Programs Branch) to Mike Hopkins (Ohio EPA) on September 2, 2014.

Ohio EPA has recently issued guidance[46] clarifying that operators may request that BAT be administered in the traditional BAT format (i.e., the format in which BAT would have been administered prior to the implementation of Senate Bill 265). Specifically, the application of the traditional BAT format would result in a short-term (e.g., pound per hour [lb/hr]) limit, annual (e.g., ton per year [tpy]) limit, and associated parametric monitoring for the control device (as necessary). As U.S. EPA has historically approved such limits as an adequate means to limit PTE, no synthetic minor limit is required when BAT has been established in this format. NGT has proposed BAT for the combustion turbines in the application narrative in accordance with this request.

***

NGT respectfully requests that Ohio EPA establish BAT for the combustion turbines in accordance with this letter and the application narrative. Please contact Reagan Mayces at (713) 627-4790 with any questions regarding this request.

Sincerely,

NEXUS GAS TRANSMISSION

Thomas V. Wooden Jr.
Vice President – US Field Operations

[46] Per discussion between Amanda Adams (Trinity Consultants) and Mike Hopkins (Ohio EPA) on November 6, 2014.

APPENDIX D

PTIO APPLICATION FORMS

Application for Permit to Install (PTI) and Permit to Install/Operate (PTIO)

Ohio Environmental Protection Agency
Lazarus Government Center
50 West Town Street, Suite 700
P.O. Box 1049
Columbus, Ohio 43216-1049

For EPA Use Only

Application Number_____

Date Received _____

Facility Information

Note: Application is incomplete if all **bolded** questions throughout the application are not completed.

Legal Facility Name	Hanoverton Compressor Station			
Alternate Name (if any)				
Facility Physical Address	State Route 644			
City, ZIP code	Hanoverton			
County	Columbiana			
Facility ID				
Facility Description	Natural Gas Compressor Station			
NAICS Code	486210			
Facility Latitude	40	degrees 44	minutes 14.06	seconds
Facility Longitude	80	degrees 56	minutes 33.00	seconds
Core Place ID (if known)				
SCSC ID (if known)				

Portable? ☐ Yes ■ No

Portable Type ☐ Asphalt Plant ☐ Concrete Plant ☐ Generator ☐ Aggregate Processing ☐ Concrete Crusher ☐ Grinder ☐ Other

Initial Location County If "Other", describe:

Contact Information

☐ No change to information on file.

❶ ☑ Billing ☐ Owner ☑ Primary ☐ Operator ☐ On-Site ☐ Responsible Official					
First Name: Reagan	Last Name: Mayces	Phone: 713-627-4790	Fax:	E-mail: rmmayces@spectraenergy. com	
Address 1: P.O. Box 1642	Address 2:	City or Township: Houston	State: TX	Zip Code: 77251-1642	

❷ ☐ Billing ☐ Owner ☐ Primary ☐ Operator ☐ On-Site ☑ Responsible Official					
First Name: Thomas	Last Name: Wooden Jr.	Phone: 713-627-5400	Fax:	E-mail: tvwooden@spectraenergy.com	
Address 1: P.O. Box 1642	Address 2:	City or Township: Houston	State: TX	Zip Code: 77251-1642	

❸ ☐ Billing ☐ Owner ☐ Primary ☐ Operator ☐ On-Site ☐ Responsible Official					
First Name:	Last Name:	Phone:	Fax:	E-mail:	
Address 1:	Address 2:	City or Township:	State:	Zip Code:	

❹ ☐ Billing ☐ Owner ☐ Primary ☐ Operator ☐ On-Site ☐ Responsible Official					
First Name:	Last Name:	Phone:	Fax:	E-mail:	
Address 1:	Address 2:	City or Township:	State:	Zip Code:	

❺ ☐ Billing ☐ Owner ☐ Primary ☐ Operator ☐ On-Site ☐ Responsible Official					
First Name:	Last Name:	Phone:	Fax:	E-mail:	
Address 1:	Address 2:	City or Township:	State:	Zip Code:	

❻ ☐ Billing ☐ Owner ☐ Primary ☐ Operator ☐ On-Site ☐ Responsible Official					
First Name:	Last Name:	Phone:	Fax:	E-mail:	
Address 1:	Address 2:	City or Township:	State:	Zip Code:	

Division of Air Pollution Control
Application for Permit-to-Install or Permit-to-Install and Operate

Section I – General Application Information

This section should be filled out for each permit to install (PTI) or Permit to Install and Operate (PTIO) application. A PTI is required for all air contaminant sources (emissions units) installed or modified after January 1, 1974 that are subject to OAC Chapter 3745-77. A PTIO is required for all air contaminant sources (emissions units) that are not subject to OAC Chapter 3745-77 (Title V). See the application instructions for additional information.

For OEPA use only:	☐ Installation	☐ Request Federally enforceable restrictions
	☐ Modification	☐ General Permit
	☐ Renewal	☐ Other

1. Is the purpose of this application to transition from OAC Chapter 3745-77 (Title V) to OAC Chapter 3745-31 (PTIO)?

   ☐ yes ■ no

2. **Establish PER Due Date** - Select an annual Permit Evaluation Report (PER) due date for this facility (does not apply to facilities subject to Title V, OAC Chapter 3745-77). If the PER has previously been established and a change is now desired, a PER Change Request form must be filed instead of selecting a date here.

Due Date:	For Time Period:
■ February 15	January 1 through December 31
☐ May 15	April 1 through March 31
☐ August 15	July 1 through June 30
☐ November 15	October 1 through September 30

   ☐ PER not applicable (Title V) or due date already established
   ☐ PER Request Permit Change form attached

3. **Federal Rules Applicability** - Please check all of the appropriate boxes below.

New Source Performance Standards (NSPS)
New Source Performance Standards are listed under 40 CFR 60 - Standards of Performance for New Stationary Sources.
☐ not affected ■ subject to Subpart: JJJJ, KKKK
☐ unknown ☐ exempt - explain below

National Emission Standards for Hazardous Air Pollutants (NESHAP)
National Emissions Standards for Hazardous Air Pollutants are listed under 40 CFR 61. (These include asbestos, benzene, beryllium, mercury, and vinyl chloride).
■ not affected ☐ subject to Subpart: _____
☐ unknown ☐ subject, but exempt - explain below

Maximum Achievable Control Technology (MACT)
The Maximum Achievable Control Technology standards are listed under 40 CFR 63 and OAC rule 3745-31-28.
☐ not affected ■ subject to Subpart: ZZZZ
☐ unknown ☐ subject, but exempt - explain below

Prevention of Significant Deterioration (PSD)
These rules are found under OAC rule 3745-31-10 through OAC rule 3745-31-20.
■ not affected ☐ subject to regulation
☐ unknown

Non-Attainment New Source Review
These rules are found under OAC rule 3745-31-21 through OAC rule 3745-31-27.
■ not affected ☐ subject to regulation
☐ unknown

112 (r) - Risk Management Plan
These rules are found under 40 CFR 68.
■ not affected ☐ subject to regulation
☐ unknown

Title IV (Acid Rain Requirements)
These rules are found under 40 CFR 72 and 40 CFR 73.
■ not affected ☐ subject to regulation
☐ unknown

Please explain why you checked "exempt" in this question for one or more federal rules. Identify each exemption and whether the entire facility and/or the specific air contaminant sources included in this permit application is exempted. Attach an additional page if necessary.

_____

_____

4. Express PTI/PTIO - Do you qualify for express PTI or PTIO processing?

☐ yes ■ no

If yes, are you requesting express processing per OAC rule 3745-31-05?

☐ yes ☐ no

5. **Air Contaminant Sources in this Application** - Identify the air contaminant source(s) for which you are applying below. Attach additional pages if necessary. Section II of this application and an EAC form should be completed for each air contaminant source.

Emissions Unit ID*	**Company Equipment ID** (company's name for air contaminant source)	**Equipment Description** (List all equipment that are a part of this air contaminant source)
	See Attached	See Attached

* This ID would have been created when a previous air permit was issued. If no previous permits have been issued for this air contaminant source, leave this field blank. If this air contaminant source was previously identified in STARShip applications as a "Z" source (e.g., Z001), please provide that identification and a new ID will be assigned when the PTI/PTIO is issued.

6. Trade Secret Information - Is any information included in this application being claimed as a trade secret per Ohio Revised Code (ORC) 3704.08?

☐ yes (A "non-confidential" version must also be submitted in order for this application to be deemed complete.)
■ no

7. Permit Application Contact - Person to contact for questions about this application:

Reagan Mayces — EHS Manager, US Operations
Name — Title

P.O. Box 1642, Houston, TX, 77251-1642
Address (Street, City/Township, State and Zip Code)

713-627-4790 — rmmayces@spectraenergy.com
Phone — Fax — E-mail

8. **Authorized Signature** – OAC rule 3745-31-04 states that applications for permits to install or permits to install and operate shall be signed:
   (1) In the case of a corporation, by a principal executive officer of at least the level of vice president, or his duly authorized representative, if such representative is responsible for the overall operation of the facility.
   (2) In the case of a partnership by a general partner.
   (3) In the case of sole proprietorship, by the proprietor, and
   (4) In the case of a municipal, state, federal or other governmental facility, by the principal executive officer, the ranking elected official, or other duly authorized employee.

   Under OAC rule 3745-31-04, this signature shall constitute personal affirmation that all statements or assertions of fact made in the application are true and complete, comply fully with applicable state requirements, and shall subject the signatory to liability under applicable state laws forbidding false or misleading statements.

Authorized Signature (for facility)	Date
Thomas V. Wooden Jr.	Vice President - US Field Operations
Print Name	Title

5. **Air Contaminant Sources in this Application** - Identify the air contaminant source(s) for which you are applying below. Attach additional pages if necessary. Section II of this application and an EAC form should be completed for each air contaminant source.

Emissions Unit ID*	**Company Equipment ID** (company's name for air contaminant source)	**Equipment Description** (List all equipment that are a part of this air contaminant source)
	Combustion Turbine #1	New natural gas-fired combustion turbine sized 26,000 hp, equipped with an oxidation catalyst
	Combustion Turbine #2	New natural gas-fired combustion turbine sized 26,000 hp, equipped with an oxidation catalyst
	Gas Releases	Periodic Maintenance, routine operations, and pigging activities will occasionally necessitate the evacuation of equipment directly to atmosphere
	Equipment Leaks	Various equipment components will be located throughout the compressor station that may result in fugitive emissions due to equipment leaks
	Separator Vessel #1	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 530 gallons handling condensate liquids collected from the pipeline
	Separator Vessel #2	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 530 gallons handling condensate liquids collected from the pipeline
	Separator Vessel #3	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 400 gallons handling condensate liquids collected from the pipeline
	Separator Vessel #4	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 317 gallons handling condensate liquids collected from the pipeline
	Separator Vessel #5	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 43 gallons handling condensate liquids collected from the pipeline
	Loading Operation	NGT will periodically transfer the condensate liquids and the used lubricating oil collected on-site to tanker trucks for shipment off-site

* This ID would have been created when a previous air permit was issued. If no previous permits have been issued for this air contaminant source, leave this field blank. If this air contaminant source was previously identified in STARShip applications as a "Z" source (e.g., Z001), please provide that identification and a new ID will be assigned when the PTI/PTIO is issued.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: J001
Company Equipment ID: Loading Operation

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-001-50 _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					1.00E-02
Volatile organic compounds (VOC)					1.00E-02
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					6.00E-04
Highest single HAP: Hexane					2.69E-04
Toxic Air Contaminants (see instructions):					6.00E-04

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
N/A						
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
N/A						

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
J001	■ Area ☐ Volume	2,590 x 2,000	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Loading Operation			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude			Egress Point Longitude		
J001	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3107 - Loading Rack for Liquid Materials

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
LOADING RACK FOR LIQUID MATERIALS

This form is to be completed for each loading rack for liquid materials. State/Federal regulations which may apply to loading racks for liquid materials are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

   ☑ New Permit ☐ Renewal or Modification of Air Permit Number(s) (e.g. J001) J001 _____

2. Maximum Operating Schedule: 24 _____ hours per day; 365 _____ days per year

   If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. Complete the following table for each bay:

Bay Identification	Number of Loading Arms	Type of Vehicle Loaded (check one or more)	Loading Method (check one or more)
J001	N/A	☑ Tank Truck ❒ Barge ❒ RR Car ❒ Ship ❒ Other (describe):	❒ Top Load, Splash Fill ❒ Bottom Load ☑ Top Load, fully Submerged ❒ Top Load, Partial Submerged
		❒ Tank Truck ❒ Barge ❒ RR Car ❒ Ship ❒ Other (describe):	❒ Top Load, Splash Fill ❒ Bottom Load ❒ Top Load, fully Submerged ❒ Top Load, Partial Submerged
		❒ Tank Truck ❒ Barge ❒ RR Car ❒ Ship ❒ Other (describe):	❒ Top Load, Splash Fill ❒ Bottom Load ❒ Top Load, fully Submerged ❒ Top Load, Partial Submerged

4. Complete this section for each material loaded.

Liquid Material Loaded	Bay ID	Average Material Vapor Pressure at Loading Temperature (millimeters mercury)	Is liquid a photo-chemically reactive material?*	Maximum Daily Throughput (gallons)	Proposed Maximum Annual Throughput (gallons)
Pipeline Liquids	J001	252.48	❒Yes ☐ No	2,000	4,000
Lubricating Oil	J001	0.31	❒Yes ☐ No	1,140	13,680
Oily Water	J001	0.31	❒Yes ☐ No	3,000	36,000
			❒Yes ❒ No		

* Photochemically reactive material is defined in OAC rule 3745-21-01(C)(5).

5. Complete this section for each vapor control system.

Type of Vapor Control System (check one):	Minimum Control Efficiency (% by weight):	Maximum Controlled Mass Emissions Rate (pounds/1,000 gallons):	Basis for Mass Emissions Rate Data (check one):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ☑ None ❒ Other (describe):	N/A	N/A	❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ❒ None ❒ Other (describe):			❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ❒ None ❒ Other (describe):			❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ❒ None ❒ Other (describe):			❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P001
Company Equipment ID: Combustion Turbine #1

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P001
Company Equipment ID: Combustion Turbine #1

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

2-02-002-01 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)				1.58	6.25
PM • •10 microns in diameter (PE/PM_{10})				1.58	6.25
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)				1.58	6.25
Sulfur dioxide (SO_2)				0.81	3.22
Nitrogen oxides (NO_x)				7.78	31.14
Carbon monoxide (CO)				13.15	7.81
Organic compounds (OC)				1.65	3.32
Volatile organic compounds (VOC)				1.65	3.32
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					0.60
Highest single HAP: Toluene					0.21
Toxic Air Contaminants (see instructions):					0.60

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☒ Yes - fill out the applicable information below.
☐ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P001
Company Equipment ID: Combustion Turbine #1

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations
PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

■ Catalytic Converter
Manufacturer: Solar Year installed: Not Installed **Your ID for control equipment** P001
Describe this control equipment: Oxidation Catalyst
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ■ VOC ☐ SO_2 ☐ NO_x ■ CO ☐ Pb ■ Other HAPs
Estimated capture efficiency (%): _____ Basis for efficiency: Refer to Table B-1Aj for estimated efficiencies
Design control efficiency (%): _____ Basis for efficiency: Refer to Table B-1Aj for estimated efficiencies
Operating control efficiency (%): _____ Basis for efficiency: Refer to Table B-1Aj for estimated efficiencies
■ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: P001

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
P001	A	7.5 ft	50	897		
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
P001 Stack	Round	44.18	1,160	60	150	120

❷ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❷ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P001	40 deg 44 min 13.01 sec	80 deg 56 min 31.81 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3862 - Stationary Internal Combustion Engine

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STATIONARY INTERNAL COMBUSTION ENGINE

This form is to be completed for each stationary reciprocating or gas turbine engine. State/Federal regulations which may apply to stationary internal combustion engines are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

   ☑ New Permit ☐ Renewal or Modification of Air Permit Number (e.g. P001) P001 and P002

2. Maximum Operating Schedule: 24 hours per day; 365 days per year

   If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. Engine type: ☑ Gas turbine ☐ Reciprocating

4. Purpose of engine: ☑ Driving pump or compressor ☐ Driving electrical generator

5. Normal use of engine: ☐ Emergency only ☑ Non-emergency

6. Engine Manufacturer: Solar Model No: 250-30002S4

7. Engine exhaust configuration: (for turbines only)
   ☑ simple cycle *(no heat recovery)*
   ❒ regenerative cycle *(heat recovery to preheat combustion air)*
   ❒ cogeneration cycle *(heat recovered to produce steam)*
   ❒ combined cycle *(heat recovered to produce steam which drives generator)*

8. Input capacities (million BTU/hr): Rated: 196.51 Maximum: 196.51
   Normal: 196.51

   Supplemental burner (duct burner) input capacity, if equipped (million BTU/hr):

   Rated:_____ Maximum:_____ Normal:_____

9. Output capacities (Horsepower): Rated: 29,517 Maximum: 29,517 Normal: 29,517

   (Kilowatts): Rated:_____ Maximum:_____ Normal:_____

   (lbs steam/hr)*: Rated:_____ Maximum:_____ Normal:_____

   **required for cogeneration or combined cycle units only*

10. Type of ignition: ☐ non-spark (diesel) ☑ spark

11. Type of fuel fired (check all that apply):

☑ single fuel	❒ No. 2 oil, low-sulfur	☑ natural gas	❒ landfill gas
❒ dual fuel	❒ No. 2 oil, high-sulfur	❒ diesel	❒ digester gas
	❒ gasoline	❒ propane	
	❒ other, explain_____		

12. Complete the following table for all fuels identified in question 11 that are used for the engine and any supplemental (duct) burners, if equipped:

Fuel	HeatContent (BTU/unit)	wt.% Ash	wt.% Sulfur	Fuel Usage		
				Estimated Maximum Per Year	Normal Per Hour	Max. Per Hour
Nat. gas	939.2 BTU/cu ft		gr/scf	1,832,863,560 cu ft	209,231 cu ft	209,231 cu ft
No. 2 oil	BTU/gal			gal	gal	gal
Gasoline	BTU/gal			gal	gal	gal
Diesel	BTU/gal			gal	gal	gal
Landfill/digester gas	BTU/cu ft		ppm	cu ft	cu ft	cu ft
Other (show units)						
List supplemental (duct) burner fuel and information below (show units):						

13. Type of combustion cycle (check all that apply):

❒ 2-stroke	☐ 4-stroke
❒ rich-burn	☐ lean-burn
❒ carbureted	❒ fuel injected
❒ other, explain_____	

14. Emissions control techniques (check all that apply):

❒ prestratified charge	❒ nonselective catalytic reduction (NSCR)
☑ catalytic oxidation (CO)	❒ selective catalytic reduction (SCR)
❒ air/fuel ratio	❒ injection timing retard (ITR)
❒ 2-stage rich/lean combustion	❒ 2-stage lean/lean combustion
❒ water/steam injection	❒ preignition chamber combustion (PCC)
☐ other, explain_____	

For each emissions control technique checked above, explain what pollutants are controlled by each technique: CO, VOC, and HAPs

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P002
Company Equipment ID: Combustion Turbine #2

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P002
Company Equipment ID: Combustion Turbine #2

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

2-02-002-01 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)				1.58	6.25
PM • •10 microns in diameter (PE/PM_{10})				1.58	6.25
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)				1.58	6.25
Sulfur dioxide (SO_2)				0.81	3.22
Nitrogen oxides (NO_x)				7.78	31.14
Carbon monoxide (CO)				13.15	7.81
Organic compounds (OC)				1.65	3.32
Volatile organic compounds (VOC)				1.65	3.32
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					0.60
Highest single HAP: Toluene					0.21
Toxic Air Contaminants (see instructions):					0.60

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☒ Yes - fill out the applicable information below.
☐ No - proceed to Question 6.

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations
PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

■ Catalytic Converter
Manufacturer: Solar Year installed: Not Installed **Your ID for control equipment** P002
Describe this control equipment: Oxidation Catalyst
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ■ VOC ☐ SO_2 ☐ NO_x ■ CO ☐ Pb ☐ Other HAPs
Estimated capture efficiency (%): _____ Basis for efficiency: Refer to Table B-1Ai for estimated efficiencies
Design control efficiency (%): _____ Basis for efficiency: Refer to Table B-1Ai for estimated efficiencies
Operating control efficiency (%): _____ Basis for efficiency: Refer to Table B-1Aj for estimated efficiencies
■ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: P001

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
P002	A	7.5 ft	40	897		
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
P002 Stack	Round	44.18	1,158	60	150	120

❷ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❷ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P002	40 deg 44 min 13.76 sec	80 deg 56 min 30.83 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3862 - Stationary Internal Combustion Engine

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STATIONARY INTERNAL COMBUSTION ENGINE

This form is to be completed for each stationary reciprocating or gas turbine engine. State/Federal regulations which may apply to stationary internal combustion engines are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

   ☑ New Permit ☐ Renewal or Modification of Air Permit Number (e.g. P001) P001 and P002

2. Maximum Operating Schedule: 24 hours per day; 365 days per year

   If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. Engine type: ☑ Gas turbine ☐ Reciprocating

4. Purpose of engine: ☑ Driving pump or compressor ☐ Driving electrical generator

5. Normal use of engine: ☐ Emergency only ☑ Non-emergency

6. Engine Manufacturer: Solar Model No: 250-30002S4

7. Engine exhaust configuration: (for turbines only)
   ☑ simple cycle *(no heat recovery)*
   ❒ regenerative cycle *(heat recovery to preheat combustion air)*
   ❒ cogeneration cycle *(heat recovered to produce steam)*
   ❒ combined cycle *(heat recovered to produce steam which drives generator)*

8. Input capacities (million BTU/hr): Rated: 196.51 Maximum: 196.51
   Normal: 196.51

   Supplemental burner (duct burner) input capacity, if equipped (million BTU/hr):

   Rated:_____ Maximum:_____ Normal:_____

9. Output capacities (Horsepower): Rated: 29,517 Maximum: 29,517 Normal: 29,517

   (Kilowatts): Rated:_____ Maximum:_____ Normal:_____

   (lbs steam/hr)*: Rated:_____ Maximum:_____ Normal:_____

   **required for cogeneration or combined cycle units only*

10. Type of ignition: ☐ non-spark (diesel) ☑ spark

11. Type of fuel fired (check all that apply):

☑ single fuel	❒ No. 2 oil, low-sulfur	☑ natural gas	❒ landfill gas
❒ dual fuel	❒ No. 2 oil, high-sulfur	❒ diesel	❒ digester gas
	❒ gasoline	❒ propane	
	❒ other, explain_____		

12. Complete the following table for all fuels identified in question 11 that are used for the engine and any supplemental (duct) burners, if equipped:

Fuel	HeatContent (BTU/unit)	wt.% Ash	wt.% Sulfur	Fuel Usage		
				Estimated Maximum Per Year	Normal Per Hour	Max. Per Hour
Nat. gas	939.2 BTU/cu ft		gr/scf	1,832,863,560 cu ft	209,231 cu ft	209,231 cu ft
No. 2 oil	BTU/gal			gal	gal	gal
Gasoline	BTU/gal			gal	gal	gal
Diesel	BTU/gal			gal	gal	gal
Landfill/digester gas	BTU/cu ft		ppm	cu ft	cu ft	cu ft
Other (show units)						
List supplemental (duct) burner fuel and information below (show units):						

13. Type of combustion cycle (check all that apply):

❒ 2-stroke	☐ 4-stroke
❒ rich-burn	☐ lean-burn
❒ carbureted	❒ fuel injected
❒ other, explain_____	

14. Emissions control techniques (check all that apply):

❒ prestratified charge	❒ nonselective catalytic reduction (NSCR)
☑ catalytic oxidation (CO)	❒ selective catalytic reduction (SCR)
❒ air/fuel ratio	❒ injection timing retard (ITR)
❒ 2-stage rich/lean combustion	❒ 2-stage lean/lean combustion
❒ water/steam injection	❒ preignition chamber combustion (PCC)
☐ other, explain_____	

For each emissions control technique checked above, explain what pollutants are controlled by each technique: CO, VOC, and HAPs

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P004
Company Equipment ID: Gas Releases

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

3-06-004-02 _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					24.60
Volatile organic compounds (VOC)					24.60
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					2.03
Highest single HAP: Benzene					0.72
Toxic Air Contaminants (see instructions):					2.03

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P004
Company Equipment ID: Gas Releases

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
N/A						
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
N/A						

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P004	■ Area ☐ Volume	2,590 x 2,000	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Gas Releases			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P004	40 deg 44 min 14.06 sec	80 deg 56 min 33.00 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3100 - General Process Operation

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
GENERAL PROCESS OPERATION

This form is to be completed for each process operation when there is no specific emissions activity category (EAC) form applicable. If there is more than one end product for this process, copy and complete this form for each additional product (see instructions). Several State/Federal regulations which may apply to process operations are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. P001) P004

2. Maximum Operating Schedule: 24 hours per day; 365 days per year

If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. End product of this process: N/A - Natural Gas released during maintenance blowdown events

4. Hourly production rates (indicate appropriate units). Please see the instructions for clarification of "Maximum" and "Average" for new versus existing operations:

Hourly	Rate	Units (e.g., widgets)
Average production	N/A	N/A
Maximum production	N/A	N/A

5. Annual production rates (indicate appropriate units) Please see the instructions for clarification of "Maximum" and "Actual" for new versus existing operations:

Annual	Rate	Units (e.g., widgets)
Actual production	N/A	N/A
Maximum production	N/A	N/A

6. Type of operation (please check one):

☐ Continuous
❒ Batch (please complete items below)

Minimum cycle* time (minutes): _____
Minimum time between cycles (minutes): _____
Maximum number of cycles per daily 24 hour period: _____
(Note: include cycle time and set up/clean up time.)

*"Cycle" refers to the time the equipment is in operation.

7. Materials used in process at maximum hourly production rate (add rows/pages as needed):

Material	Physical State at Standard Conditions	Principle Use	Amount**
Pipeline Gas	Gas	Venting during planned gas release events	1,694,271 lb/yr

** Please indicate the amount **and** rate (e.g., lbs/hr, gallons/hr, lbs/cycle, etc.).

8. Please provide a narrative description of the process below (e.g., coating of metal parts using high VOC content coatings for the manufacture of widgets; emissions controlled by thermal oxidizer...):

Gas releases associated with routine operation and periodic pipeline maintenance activities.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P005
Company Equipment ID: Separator Vessel #1

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.13
Volatile organic compounds (VOC)					0.13
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					8.20E-03
Highest single HAP: Hexane					3.78E-03
Toxic Air Contaminants (see instructions):					8.20E-03

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
N/A						
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
N/A						

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P005-P009	■ Area ☐ Volume	2,590 x 2,000	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	40 deg 44 min 14.06 sec	80 deg 56 min 33.00 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P005-P006

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 1,590 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 530 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 10.83 ft.
Tank shell diameter or width: 5 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 56.18 °F and Maximum 82.24 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 4.8822 psia at average storage temperature
7.8425 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ °F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 530 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 71 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.67 ft

24. The average height of the liquid material stored within the tank during the year: 5.41 ft.

25. The maximum height of the liquid material stored within the tank during the year: 10.83 ft.

26. The average liquid surface temperature: 56.18 °F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area ❒ Gasketed ❒ Ungasketed ❒ Sock
_____ Adjustable, center area ❒ Gasketed ❒ Ungasketed ❒ Sock
_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)

_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)

_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)

_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)

_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)

_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P006
Company Equipment ID: Separator Vessel #2

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.13
Volatile organic compounds (VOC)					0.13
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					8.20E-03
Highest single HAP: Hexane					3.78E-03
Toxic Air Contaminants (see instructions):					8.20E-03

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P006
Company Equipment ID: Separator Vessel #2

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
N/A						
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
N/A						

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P005-P009	■ Area ☐ Volume	2,590 x 2,000	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	40 deg 44 min 14.06 sec	80 deg 56 min 33.00 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P005-P006

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 1,590 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 530 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 10.83 ft.
Tank shell diameter or width: 5 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 56.18 °F and Maximum 82.24 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 4.8822 psia at average storage temperature
7.8425 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ °F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 530 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 71 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.67 ft

24. The average height of the liquid material stored within the tank during the year: 5.41 ft.

25. The maximum height of the liquid material stored within the tank during the year: 10.83 ft.

26. The average liquid surface temperature: 56.18 °F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area ❒ Gasketed ❒ Ungasketed ❒ Sock
_____ Adjustable, center area ❒ Gasketed ❒ Ungasketed ❒ Sock
_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)

_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)

_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)

_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)

_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)

_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P007
Company Equipment ID: Separator Vessel #3

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.10
Volatile organic compounds (VOC)					0.10
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					6.40E-03
Highest single HAP: Hexane					2.96E-03
Toxic Air Contaminants (see instructions):					6.40E-03

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P005-P009	☒ Area ☐ Volume	2,590 x 2,000	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	40 deg 44 min 14.06 sec	80 deg 56 min 33.00 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P007

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 1,200 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 400 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 10 ft.
Tank shell diameter or width: 4.5 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 56.18 °F and Maximum 82.24 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 4.8822 psia at average storage temperature
7.8425 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ °F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 400 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 53 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.6 ft

24. The average height of the liquid material stored within the tank during the year: 5 ft.

25. The maximum height of the liquid material stored within the tank during the year: 10 ft.

26. The average liquid surface temperature: 56.18 °F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area ❒ Gasketed ❒ Ungasketed ❒ Sock
_____ Adjustable, center area ❒ Gasketed ❒ Ungasketed ❒ Sock
_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)

_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)

_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)

_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)

_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)

_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P008
Company Equipment ID: Separator Vessel #4

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.60
Volatile organic compounds (VOC)					0.60
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					0.04
Highest single HAP: Hexane					0.02
Toxic Air Contaminants (see instructions):					0.04

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
N/A						
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
N/A						

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P005-P009	■ Area ☐ Volume	2,590 x 2,000	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	40 deg 44 min 14.06 sec	80 deg 56 min 33.00 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P008

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 950 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 317 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 10 ft.
Tank shell diameter or width: 4 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 56.18 °F and Maximum 82.24 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 4.8822 psia at average storage temperature
7.8425 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ °F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 317 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 4,000 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.54 ft

24. The average height of the liquid material stored within the tank during the year: 5 ft.

25. The maximum height of the liquid material stored within the tank during the year: 10 ft.

26. The average liquid surface temperature: 56.18 °F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area ❒ Gasketed ❒ Ungasketed ❒ Sock
_____ Adjustable, center area ❒ Gasketed ❒ Ungasketed ❒ Sock
_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)

_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)

_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)

_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)

_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)

_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P009
Company Equipment ID: Separator Vessel #5

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					1.27E-02
Volatile organic compounds (VOC)					1.27E-02
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					8.00E-04
Highest single HAP: Hexane					3.65E-04
Toxic Air Contaminants (see instructions):					8.00E-04

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
N/A						
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
N/A						

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P005-P009	■ Area ☐ Volume	2,590 x 2,000	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	40 deg 44 min 14.06 sec	80 deg 56 min 33.00 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P009

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 130 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 43 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 8 ft.
Tank shell diameter or width: 1.67 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 56.18 °F and Maximum 82.24 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 4.8822 psia at average storage temperature
7.8425 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ °F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 43 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 6 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.22 ft

24. The average height of the liquid material stored within the tank during the year: 4 ft.

25. The maximum height of the liquid material stored within the tank during the year: 8 ft.

26. The average liquid surface temperature: 56.18 °F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area ❒ Gasketed ❒ Ungasketed ❒ Sock
_____ Adjustable, center area ❒ Gasketed ❒ Ungasketed ❒ Sock
_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)

_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)

_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)

_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)

_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)

_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P801
Company Equipment ID: Equipment Leaks

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

3-10-002-20 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					10.13
Volatile organic compounds (VOC)					10.13
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					1.21
Highest single HAP: Xylenes					0.48
Toxic Air Contaminants (see instructions):					1.21

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
N/A						
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
N/A						

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P801	■ Area ☐ Volume	2,590 x 2,000	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Equipment Leaks			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P801	40 deg 44 min 14.06 sec	80 deg 56 min 33.00 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3100 - General Process Operation

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
GENERAL PROCESS OPERATION

This form is to be completed for each process operation when there is no specific emissions activity category (EAC) form applicable. If there is more than one end product for this process, copy and complete this form for each additional product (see instructions). Several State/Federal regulations which may apply to process operations are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. P001) P801

2. Maximum Operating Schedule: 24 hours per day; 365 days per year

If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. End product of this process: N/A - Fugitive Emissions from Equipment Leaks

4. Hourly production rates (indicate appropriate units). Please see the instructions for clarification of "Maximum" and "Average" for new versus existing operations:

Hourly	Rate	Units (e.g., widgets)
Average production	N/A	N/A
Maximum production	N/A	N/A

5. Annual production rates (indicate appropriate units) Please see the instructions for clarification of "Maximum" and "Actual" for new versus existing operations:

Annual	Rate	Units (e.g., widgets)
Actual production	N/A	N/A
Maximum production	N/A	N/A

6. Type of operation (please check one):

☑ Continuous
❒ Batch (please complete items below)

Minimum cycle* time (minutes): _____
Minimum time between cycles (minutes): _____
Maximum number of cycles per daily 24 hour period: _____
(Note: include cycle time and set up/clean up time.)

*"Cycle" refers to the time the equipment is in operation.

7. Materials used in process at maximum hourly production rate (add rows/pages as needed):

Material	Physical State at Standard Conditions	Principle Use	Amount**
N/A			

** Please indicate the amount **and** rate (e.g., lbs/hr, gallons/hr, lbs/cycle, etc.).

8. Please provide a narrative description of the process below (e.g., coating of metal parts using high VOC content coatings for the manufacture of widgets; emissions controlled by thermal oxidizer...):

Fugitive emissions from various equipment components, including valves, connectors, pump seals, and flanges.

PERMIT TO INSTALL AND OPERATE APPLICATION

NEXUS Gas Transmission > Medina, OH

Wadsworth Compressor Station

Prepared By:

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July 2015

Project 143601.0141

Trinity Consultants

Environmental solutions delivered uncommonly well

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APPENDIX A – PROCESS FLOW DIAGRAM

APPENDIX B – EMISSION CALCULATIONS DOCUMENTATION

APPENDIX C – TRADITIONAL BAT REQUEST LETTER

APPENDIX D – PTIO APPLICATION FORMS

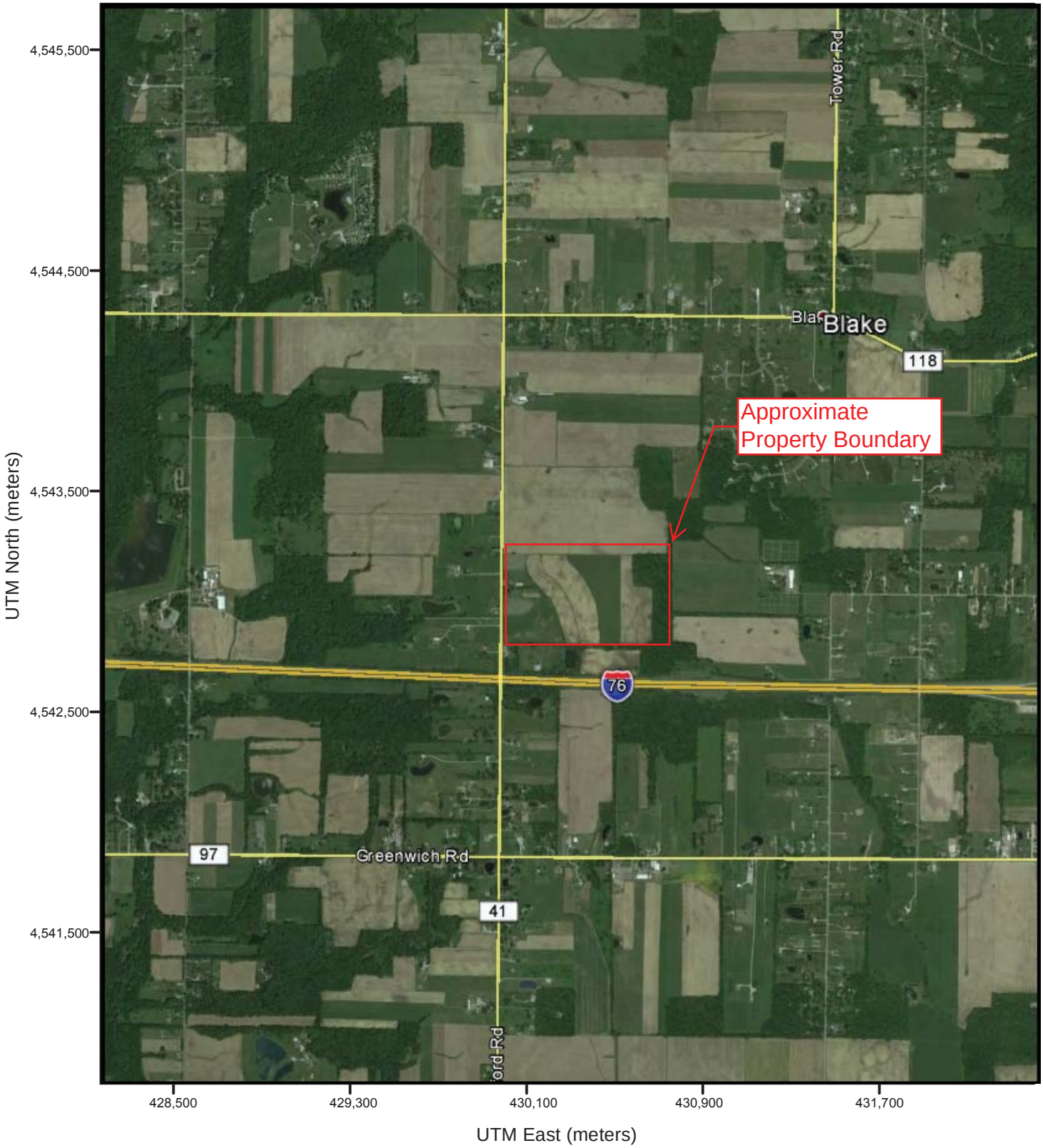
NEXUS Gas Transmission (NGT) plans to construct a new natural gas pipeline to facilitate the delivery of natural gas from Appalachian supplies to supply markets in Ohio, Michigan, Chicago, and Ontario. NGT proposes to construct and operate a natural gas compressor station (Wadsworth Compressor Station) in Medina County, Ohio to support the transmission of gas through the new pipeline. The purpose of the compressor station is to maintain line pressure and ensure natural gas continues to move at sufficient volumes for reliable service at delivery points. With this Permit to Install and Operate (PTIO) application, NGT is requesting approval for the construction and operation of this natural gas compressor station.

The primary Standard Industrial Classification (SIC) code of the proposed Wadsworth Compressor Station is 4922 (Natural Gas Transmission).

1.1. FACILITY LOCATION

The Wadsworth Compressor Station will be located in Medina County near Wadsworth, Ohio. Figure 1-1 is an area map that shows the site location relative to predominant geographical features such as highways and railroads.

Fig. 1-1. NEXUS Gas Transmission
Wadsworth Compressor Station
Area Map



Coordinate System: NAD83 UTM Zone 17N

Scale

0 1,000 2,000 3,000 4,000

Feet

0 500 1,000 1,500

Meters

Trinity Consultants

1.2. PROJECT DESCRIPTION

The Wadsworth Compressor Station will facilitate the delivery of natural gas along the NEXUS Gas Transmission (NGT) pipeline. NGT plans to install the following emission units during the construction of the Wadsworth Compressor Station. Each of the following emission units is listed with the proposed Ohio Environmental Protection Agency (Ohio EPA) Emission Unit Identification Number (EUID). Refer to Figure 1-2 for a process flow diagram describing the organization of these emission units.

- Combustion Turbine (P001) – One (1) new natural gas-fired Solar Titan 250 combustion turbine sized to a nominal, NEMA-rated capacity of 26,000 horsepower (hp) and equipped with an oxidation catalyst.
- Emergency Generator (P002) – One (1) new natural gas-fired internal combustion engine rated at a maximum capacity of 880 hp intended to drive a generator to supply power to the facility during emergency situations. Because this engine qualifies for coverage under a Permit by Rule (PBR) in accordance with Ohio Administrative Code (OAC) 3745-31-03(A)(4)(b), the application described herein will not contain any application forms for this unit; rather, NGT will submit under separate cover a notification of intent to operate a new emergency engine under Ohio EPA's PBR program.
- Gas Releases (P003) – Periodic maintenance, routine operations, and pigging activities will occasionally necessitate the evacuation of equipment (e.g., turbine, piping components) directly to atmosphere.
- Equipment Leaks (P801) – Various equipment components, including valves, flanges, and connectors will be located throughout the compressor station that may result in fugitive emissions due to equipment leaks.
- Separator Vessel #1 (P004) – One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 530 gallons handling condensate liquids collected from the pipeline.
- Separator Vessel #2 (P005) - One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 530 gallons handling condensate liquids collected from the pipeline.
- Separator Vessel #3 (P006) - One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 400 gallons handling condensate liquids collected from the pipeline.
- Separator Vessel #4 (P007) - One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 317 gallons handling condensate liquids collected from the pipeline.
- Separator Vessel #5 (P008) - One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 43 gallons handling condensate liquids collected from the pipeline.
- Loading Operation (J001) – NGT will periodically transfer the condensate liquids collected in T001, the used lubricating oil collected in T002, and the oily water collected in T003 to tanker trucks for shipment off-site.

The Wadsworth Compression Station will also include the following additional *de minimis* sources under Ohio Administrative Code (OAC) 3745-15-05.

- Process Heater (B001) – One (1) new natural gas-fired catalytic heater rated at a heat input capacity of 1.125 MMBtu/hr intended to provide heat to various streams at the facility.
- Parts Washer (L001) – One parts washer expected to require 120 gallons of makeup organic solvent per year.

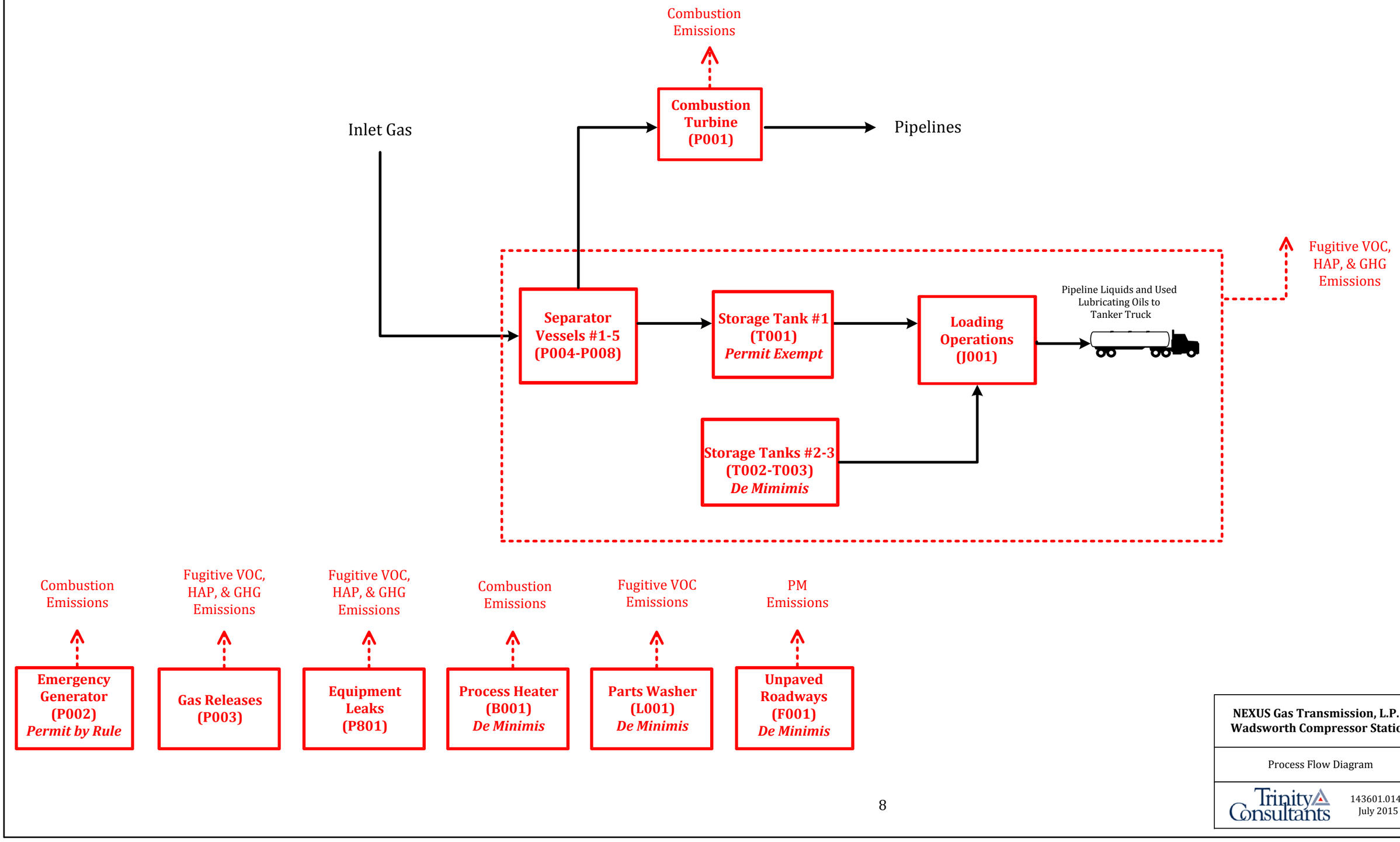
- Storage Tank #2 (T002) – One vertical fixed roof tank sized to a capacity of 570 gallons used to store lubricating oils for the turbine.
- Storage Tank #3 (T003) – One vertical fixed roof tank sized to a capacity of 3,000 gallons used to store oily water.
- Roadways (F001) – Vehicle traffic on facility roadways will result in fugitive emissions of particulate matter.

Additionally, the Wadsworth Compressor Station will include the following emissions sources considered exempt from permitting under OAC 3745-31-03(A)(1).

- Storage Tank #1 (T001) – One vertical fixed roof tank sized to a capacity of 2,000 gallons used to store condensate liquids collected from the pipeline and from station equipment. T001 will be equipped with submerged filling mechanisms and will be eligible for the permanent permitting exemption provided in OAC 3745-31-03(A)(1)(l)(iv).

NGT requests that the PTIO be issued for all non-exempt, non-*de minimis* emission units to be installed at the Wadsworth Compressor Station.

FIGURE 1-2. PROCESS FLOW DIAGRAM FOR THE WADSWORTH COMPRESSOR STATION



NEXUS Gas Transmission, L.P. – Wadsworth Compressor Station
Process Flow Diagram
Trinity Consultants 143601.0141 July 2015

1.3. PROJECT EMISSIONS

This section provides a summary of the calculation methodology used to estimate potential emissions for the turbine, emergency generator, heater, parts washer, piping components, gas releases, storage tanks and truck loading operations to be installed as part of the NEXUS project at the Wadsworth Compressor Station. Appendix B provides the detailed emission calculations for the project.

Table 1-1 provides a summary of the facility-wide potential annual emissions attributable to the installation of the Wadsworth Compressor Station, including particulate matter, particulate matter with an aerodynamic diameter of less than 10 microns, and particulate matter with an aerodynamic diameter of less than 2.5 microns ($PM/PM_{10}/PM_{2.5}$); nitrogen oxides (NO_X); sulfur dioxide (SO_2); carbon monoxide (CO); volatile organic compounds (VOC); greenhouse gases (i.e., carbon dioxide [CO_2], methane [CH_4], and nitrous oxide [N_2O]) expressed as carbon dioxide equivalents (CO_2e); total hazardous air pollutants (HAP); and hexane.

Table 1-1. Potential Emissions for the Wadsworth Compressor Station

EU ID	Emission Unit Description	Annual Emissions (tpy)							
		NO_X	CO	VOC	SO_2	$PM/PM_{10}/PM_{2.5}$	CO_2e [a]	Hexane	Total HAP
P001	Combustion Turbine	30.99	7.79	3.30	3.21	6.23	111,925	-	0.59
P002	Emergency Generator [b]	0.97	1.94	0.87	1.02E-03	0.02	432	0.01	0.53
P003	Gas Releases	-	-	19.82	-	-	15,401	0.58	1.64
P801	Equipment Leaks	-	-	6.28	-	-	997	0.11	0.76
P004	Separator Vessel #1	-	-	0.14	-	-	8	4.02E-03	8.70E-03
P005	Separator Vessel #2	-	-	0.14	-	-	8	4.02E-03	8.70E-03
P006	Separator Vessel #3	-	-	0.11	-	-	6	3.15E-03	6.80E-03
P007	Separator Vessel #4	-	-	0.60	-	-	18	0.02	0.04
P008	Separator Vessel #5	-	-	0.01	-	-	1	3.89E-04	8.00E-04
T001	Storage Tank #1[d]	-	-	0.28	-	-	15	8.15E-03	0.02
T002	Storage Tank #2[c]	-	-	2.10E-03	-	-	-	-	-
T003	Storage Tank #3[c]	-	-	8.00E-04	-	-	-	-	-
B001	Process Heater [c]	0.71	0.43	0.17	2.80E-03	0.04	554	3.66E-02	0.04
L001	Parts Washer[c]	-	-	0.41	-	-	-	-	-
J001	Loading Operation	-	-	0.01	-	-	1	2.77E-04	6.00E-04
Totals		32.67	10.16	32.15	3.21	6.29	129,365	0.78	3.63

a. Carbon dioxide equivalent (CO_2e) emissions. Represents the sum of carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4) emissions adjusted by each pollutant's global warming potential as identified in Table A-1 to 40 CFR 98, Subpart A.

b. This unit qualifies for coverage under a Permit by Rule pursuant to OAC 3745-31-03(A)(4)(b).

c. These units are classified as *de minimis* sources under OAC 3745-15-05.

d. This unit qualifies for permanent permit exemption pursuant to OAC 3745-31-03(A)(1)(l)(iv).

1.3.1. Turbine Emissions

Emissions are estimated for operation during normal steady-state operating conditions, and operation during startup and shutdown events as described in the following sections.[1]

1.3.1.1. Turbine Normal Steady-State Operation Hourly Emissions

One new Solar turbine is proposed as part of this project. The turbine will utilize an oxidation catalyst to reduce potential emissions of CO and organic emissions and will utilize SoLoNO$_X$™ technology to reduce emissions of NO$_X$. Table 1-2 provides a summary of the uncontrolled emission factors used for each pollutant during normal steady-state operation.

Table 1-2. Turbine Pre-Control Emission Factors – Normal Operations

Pollutant	Emission Factor [a]	Source
NO$_X$	9 ppmvd at 15% O$_2$ for Titan 250	Vendor guaranteed emission rate
CO	25 ppmvd at 15% O$_2$	Vendor guaranteed emission rate
VOC	25 ppmvd of TOC at 15% O$_2$	Based on vendor data for TOC, scaled to VOC based on ratio of TOC:VOC in Table 3.1-2a of AP-42 (April 2000)
CH$_4$	25 ppmvd of TOC at 15% O$_2$	Based on vendor data for TOC, scaled to CH$_4$ based on ratio of TOC:CH$_4$ in Table 3.1-2a of AP-42 (April 2000)
PM$_{10}$/PM$_{2.5}$	0.0066 lb/MMBtu (HHV)	Table 3.1-2a of AP-42 (April 2000)
SO$_2$	0.0034 lb/MMBtu (HHV)	Table 3.1-2a of AP-42 (April 2000)
CO$_2$	53.06 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-1 (effective January 2014)
N$_2$O	0.0001 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-2 (effective January 2014)
Total HAPs	Multiple HAP factors	Table 3.1-3 of AP-42 (April 2000). Organic HAPs were scaled using vendor data and AP-42 emission rates for TOC

a. The emission factors provided in this table represent uncontrolled emissions (excluding add-on controls not inherent to the equipment) at temperatures above 0 °F.

Although the general publically available manufacturer's guarantee information currently states that the NO$_X$ guarantee is 15 ppmvd, for this project Solar® has guaranteed NO$_X$ emissions for the new Titan 250 units at 9 ppmvd (15 percent O$_2$) during steady-state operation at 50-100 percent engine load for all ambient temperatures above 0°F.

[1] NGT also evaluated emissions during cold weather operation (temperatures below 0°F). Due to the location of the Wadsworth Compressor Station, NGT has assumed 26 hours of potential low temperature operation.

In order to calculate hourly emissions during normal operation, the emission factors provided in the table above are converted to factors in pounds per million standard cubic feet (lb/MMscf) as described in subsequent sections.

1.3.1.2. Turbine Emission Factors – NO_X, CO, and TOC

NO_X, CO, and Total Organic Carbon (TOC)[2] emitted by the combustion turbines during normal operation are calculated based on the vendor-supplied emission rates provided in Table 1-2. Although TOC is not a criteria pollutant, it is used to derive the emission factors for VOC, methane (CH_4 – a greenhouse gas), and organic HAPs. Vendor data for several ambient temperatures and vendor literature for emissions were compiled to develop the data listed below:

- Fuel: Lower Heating Value (939.2 BTU/scf);
- Turbine Performance: Net Output Power (30,282 hp at 49.51 °F), Heat Input at LHV (193.97 MMBtu/hr), Heat Rate at LHV (6,405 BTU/hp-hr);
- Exhaust Parameters: Exhaust Temperature (864 °F), Water Fraction (6.42 %), O_2 Content (15.36 %, dry), Molecular Weight (28.53 lb/lb-mol), Flowrate (547,091 lb/hr and 309,084 acfm); and
- Vendor Supplied Emission Rates for NO_X, CO and UHC (9 ppmvd, 25 ppmvd, and 25 ppmvd @ 15% O_2).

Operating and emissions data at other ambient temperatures are estimated by fitting the vendor-provided data to a curve that best represents the data and interpolating/extrapolating to the desired temperatures. Since the effectiveness of the emissions control inherent in the turbine's combustor design (e.g., SoLoNO$_X$™) is only guaranteed at temperatures above 0 °F, the ppm values provided in Table 1- 2 do not apply to sub-zero operating conditions. Further, the rated output power and the mass emission rates of NO_X, CO, and TOC at a given percent load decrease with increasing ambient temperature conditions (i.e., fuel consumption at 100 percent load is highest at lower ambient temperatures). As such, short-term, maximum hourly emission rates are estimated based on operating and emissions data at 0.01 °F to provide a conservative estimate. Annual emissions estimates are based on the annual average ambient conditions at the Wadsworth Compressor Station. As such, for annual emissions estimates, the operating data (turbine performance and exhaust gas parameters) are interpolated to estimate emissions at the average annual ambient temperature at the station (i.e., 49.51 °F).[3] The emission factor at a given ambient temperature is calculated as illustrated in Equation 1-1 through Equation 1-3:

[2] TOC would be the same as UHC (As defined in Section 1.1.1.1).

[3] A weighted daily average ambient temperature is used in estimating annual emissions for the Wadsworth Compressor Station and is based on meteorological information in USEPA's TANKS 4.09d database. To determine ambient temperatures, the three meteorological stations in closest proximity to the station are reviewed, and the station with the lowest ambient temperatures is conservatively selected. The weighted daily average ambient temperature is also adjusted to account for the proposed utilization limit. NEXUS interpolates the performance and exhaust parameters using operating data provided by the manufacturer at the following ambient temperatures: 0, 20, 40, 60, 80, and 100 °F.

Equation 1-1:

$$NO_x, CO, TOC\ EF\ (ppmw) = ppmvd, 15\%\ O_2 \times nonwater\% \times \frac{20.9 - (\ vol\%\ O_2, dry\ \times 100)}{20.9 - 15} = ppmw$$

Equation 1-2:

$$NO_x, CO, TOC\ hourly\ emissions\ \left(\frac{lb}{hr}\right) @\ T = \frac{ppmw}{1{,}000{,}000} \times \left[\frac{lb\ exhaust}{hr}\right]_T \times \frac{\frac{lb\ pollutant}{lbmol}}{\left[\frac{lb\ exhaust}{lbmol}\right]_T}$$

$$= \left[\frac{lb\ pollutant}{hr}\right]_T$$

Equation 1-3:

$$NO_x, CO, TOC\ EF\ @\ T = \left[\frac{lb}{hr}\right]_T \times \frac{1{,}000{,}000\ \frac{scf}{MMscf}}{\left[\frac{scf\ fuel}{hr}\right]_T} = \left[\frac{lb}{MMscf}\right]_T$$

Where: *EF = Emission factor*
T = ambient temperature
Maximum hourly emissions estimated at T = 0.01 °F
Annual average hourly emissions estimated at T = 49.51 °F

1.3.1.3. Turbine Emission Factors – VOC, CH_4, and HAPs

VOC, CH_4, and HAP emitted by the combustion turbines are calculated using the vendor-guaranteed TOC emission rate and AP-42 emission factors, as VOC, CH_4, and HAP are constituents of TOC. The TOC emission factor in terms of lb/MMscf at a given ambient temperature is calculated as outlined above in Section 1.3.1.2.

Standard emission factors for VOC, CH_4, HAP, and TOC from stationary gas turbines are provided in Chapter 3.1 of EPA's Compilation of Air Pollutant Emission Factors (AP-42). Table 3.1-2a of AP-42 (version dated April 2000) provides emission factors of 0.0021 lb VOC per MMBtu, 0.0086 lb CH_4 per MMBtu, and 0.011 lb TOC per MMBtu from natural gas-fired turbines. Table 3.1-3 of AP-42 (version dated April 2000) provides emission factors for HAPs emitted from natural gas fired turbines. These HAPs include:

- 1,3-butadiene;
- Acetaldehyde;
- Acrolein;
- Benzene;

- Ethylbenzene;
- Formaldehyde;
- Naphthalene;
- Polycyclic aromatic hydrocarbons (PAH);
- Propylene oxide;
- Toluene; and
- Xylenes.

A total HAP emission factor is calculated as the sum of all individual HAP emission factors.

Ratios of VOC, CH_4, and HAP to TOC from the AP-42 factors are applied to the TOC factor derived from vendor information to obtain emission factors for VOC, CH_4, and HAP. For normal operation, the uncontrolled VOC, CH_4, and HAP factors are derived as follows:

Equation 1-4:

$$VOC, CH_4, HAP\ EF = \frac{lb\ TOC_{(vendor\ guarantee)}}{MMscf} \times \frac{\left(\frac{lb\ pollutant_{(AP-42)}}{MMBtu} \times 1{,}020\ \frac{MMBtu}{MMscf}\right)}{\left(0.011 \frac{lb\ TOC_{(AP-42)}}{MMBtu} \times 1{,}020\ \frac{MMBtu}{MMscf}\right)} = \frac{lb}{MMscf}$$

The scaled emission factors were calculated as 0.0068 lb VOC/MMBtu and 0.0279 lb CH_4/MMBtu. Organic HAP emission factors are included in the emission calculations found in Appendix B.

1.3.1.4. Turbine Emission Factors – PM_{10}, $PM_{2.5}$, and SO_2

As indicated in Table 1-2, PM10, $PM_{2.5}$, and SO_2 emitted by the combustion turbine during normal operation are calculated based on the emission factors listed in Table 3.1-2a of AP-42 (version dated April 2000) for stationary gas turbines. The AP-42 emission factors are converted to lb/MMscf as follows:

Equation 1-5:

$$PM_{10}, PM_{2.5}, or\ SO_2\ EF = \frac{lb}{MMBtu} \times 1{,}020\ \frac{MMBtu}{MMscf} = \frac{lb}{MMscf}$$

It is conservatively assumed that PM = PM_{10} = $PM_{2.5}$.

1.3.1.5. Turbine Emission Factors – CO_2, N_2O, and CO_2e

Emission factors for CO_2 and nitrous oxides (N_2O) emitted by the combustion of natural gas are calculated based on the emission factors provided for pipeline natural gas combustion in 40 CFR 98, Subpart C, Tables C-1 and C-2 (effective January 2014), as follows:[4]

Equation 1-6:

$$CO_2\ EF = 53.06\frac{kg}{MMBtu} \times 2.2046\frac{lb}{kg} \times 1{,}026\frac{Btu}{scf} = 120{,}017.5\frac{lb\ CO_2}{MMscf}$$

A chemical reaction will occur as a result of the oxidation catalyst controlling CO emissions to produce CO_2. NGT quantified the additional CO_2 emissions using the following equation:

Equation 1-7:

$$CO_2\ Emissions\ \left(\frac{lb}{hr}\right) = CO_2\ EF\left(\frac{lb\ CO_2}{MMscf}\right) * Fuel\ Consumption\ \left(\frac{MMscf}{hr}\right) + [CO\ Emissions\left(\frac{lb\ CO}{hr}\right) * 95\%\ CO\ Control * \frac{Molecular\ Weight_{CO2}}{Molecular\ Weight_{CO}}]$$

Equation 1-8:

$$N_2O\ EF = 0.0001\frac{kg}{MMBtu} \times 2.2046\frac{lb}{kg} \times 1{,}026\frac{Btu}{scf} = 0.23\frac{lb\ N_2O}{MMscf}$$

Total GHG emissions in terms of CO_2 equivalents (CO_2e) are equal to the sum of all individual GHGs emitted by the turbine, accounting for the respective global warming potential of each GHG. The global warming potentials (GWPs) used to calculate CO_2e emissions for each pollutant emitted by the Project are contained in Table 1-3.

Table 1-3. Applicable Global Warming Potentials

Pollutant [a]	GWP [b]
CO_2	1
CH_4	25
N_2O	298

a. Only those GHGs for which quantifiable emissions increases are expected due to this project are listed.

[4] Note that emission factors utilized the corresponding natural gas heating value from the same subpart or reference (Part 98 for GHG, AP-42 for other factors). In this way, the factors and heating value are consistent with each other, although slightly different heating values were reference for different factors.

b. GWPs are based on a 100-year time horizon, as identified in Table A-1 to 40 CFR Part 98, Subpart A as amended on November 29, 2013, and effective January 1, 2014, to incorporate revised GWPs as published in the Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Report (AR4). See 78 Fed Reg 71903-71981.

As such, the CO_2e factor is derived as follows:

Equation 1-9:

$$CO_2e\ EF = \left(\frac{lb\ CO_2}{MMscf} \times 1\ GWP\right) + \left(\frac{lb\ CH_4}{MMscf} \times 25\ GWP\right) + \left(\frac{lb\ N_2O}{MMscf} \times 298\ GWP\right) = \frac{lb\ CO_2e}{MMscf}$$

1.3.2. Turbine Startup and Shutdown Operation Hourly Emissions

Emissions during startups and shutdowns are calculated based on vendor-specified transient operation profiles which are used to determine the maximum pound per startup or shutdown event as described in further detail in the following sections.

1.3.2.1. Turbine Startup Operation

The startup process for the turbine is estimated to take approximately nine minutes from the initiation of startup to normal operation (startup sequence ends at approximately 50 percent load for most Solar® turbines). This includes approximately three minutes of ignition-idle operation and six minutes of loading/thermal stabilization operation. [5]

Table 1-4 provides a summary of the emission factors used for each pollutant during the ignition-idle and loading/thermal stabilization phases of each startup event per turbine type. It is assumed that the oxidation catalyst will not yet have a measureable destruction or removal efficiency (DRE) during startup, as it is designed to meet control specifications only during normal operation. It is also assumed that the SoLoNO$_X$™ will not result in reduced NO$_X$ during startup.

[5] These are referred to as "Step 2" and "Step 3", respectively in the emissions calculations in Appendix B. Step 1 of turbine startup includes energizing the starter and observing the RPM until the ignition range is reached. During Step 1, ignition and combustion have not yet occurred in the turbine, and thus the turbine combustor is not yet a source of air emissions.

Table 1-4. Solar® Titan 250-30002S4 Pre-Control Emission Factors – Startup Operation

Pollutant	Ignition-Idle Phase Emission Factor from Source [a]	Loading/Thermal Stabilization Phase Emission Factor from Source [a]	Source
NO_X	50 ppmvd at 15% O_2	50 ppmvd at 15% O_2	Based on vendor data
CO	2,000 ppmvd at 15% O_2	1,013 ppmvd at 15% O_2	Based on vendor data
VOC	200 ppmvd TOC at 15% O_2 0.011 lb_{TOC}/MMBtu (HHV) : 0.0021 lb_{VOC}/MMBtu (HHV)	110 ppmvd TOC at 15% O_2 0.011 lb_{TOC}/MMBtu (HHV) : 0.0021 lb_{VOC}/MMBtu (HHV)	Based on vendor data for TOC, scaled to VOC based on ratio of TOC:VOC in Table 3.1-2a of AP-42 (April 2000)
CH_4	200 ppmvd TOC at 15% O_2 0.0086 lb/MMBtu (HHV) CH_4	110 ppmvd TOC at 15% O_2 0.0086 lb/MMBtu (HHV) CH_4	Based on vendor data for TOC, scaled to CH_4 based on ratio of TOC:CH_4 in Table 3.1-2a of AP-42 (April 2000)
$PM_{10}/PM_{2.5}$	Same as normal operation		
SO_2	Same as normal operation		
CO_2	Same as normal operation		
N_2O	Same as normal operation		
Total HAPs	200 ppmvd TOC at 15% O_2 Multiple HAP factors	110 ppmvd TOC at 15% O_2 Multiple HAP factors	Based on vendor data for TOC, scaled to HAP based on ratio of TOC:HAP in Table 3.1-2a of AP-42 (April 2000)

a. The emission factors provided in this table represent uncontrolled emissions. The Solar® Titan 250 turbine will be equipped with oxidation catalyst, however it is assumed that the catalyst does not have a DRE during startups.

All pollutants emitted by the combustion turbine during startup events are calculated based on the same methodology that is used to calculate emissions during normal operation (i.e., the techniques described in Section 1.3.1).[6] However, rather than calculate a lb/MMscf emission factor, pounds per startup event (lb/event) are calculated for each pollutant based on the fuel consumed during the 3-minute ignition-idle phase and during the 6-minute loading/thermal stabilization phase as follows:

[6] NEXUS will not operate any control device to reduce emissions of NO_X from the turbines; however, NO_X emission rates during startup events may nevertheless differ from the emission rates observed during normal operation given that the low-NO_X burners are designed to operate at optimal combustion temperatures which may not be achieved until the end of the startup sequence.

Equation 1-10:

$$EF\ during\ SU\ event = ppmvw_{S2-i} \times \frac{Exhaust\ Mass\ Flow}{10^6} \times \frac{MW_{pol}}{MW_{ex}} \times \frac{3\ min}{60\ min} + ppmvw_{S3-i} \times \frac{Exhaust\ Mass\ Flow}{10^6} \times \frac{MW_{pol}}{MW_{ex}} \times \frac{6\ min}{60\ min} = \frac{lb\ Pollutant\ i}{event}$$

Where: EF is the emission factor for pollutant "i"

For example:

$$CO\ EF\ during\ SU\ event = 1{,}138.47 \times \frac{272{,}880}{10^6} \times \frac{28.01}{28.66} \times \frac{3\ min}{60\ min} + 688.66 \times \frac{347{,}124}{10^6} \times \frac{28.01}{28.61} \times \frac{6\ min}{60\ min} = 38.59$$

1.3.2.2. Turbine Shutdown Operation

The shutdown process for each turbine is estimated to take approximately 8.5 minutes from normal operation to shutdown for a Solar® Titan 250. The shutdown event consists of loading/thermal stabilization operation. The calculation for shutdowns is similar to that for startups as shown in Table 1-4, utilizing the same emission rates identified during loading/thermal stabilization for startup.

1.3.3. Turbine Annual Potential Emissions

The emission factors described in the previous sections are multiplied by the following activity data to estimate annual potential emissions:

- **Normal, Steady State Operation:** Annual fuel consumption as estimated from vendor-provided turbine parameters at the annual average ambient temperature for the Wadsworth Compressor Station. Annual potential to emit (PTE) estimates assume 100% utilization (8,760 hours per year). CO, VOC, and HAP PTE estimates take the control efficiency of the proposed oxidation catalyst into account. Further, since an oxidation catalyst provides more complete conversion of CO to CO_2, the controlled portion of the CO emissions is added back to the CO_2 emissions rate. Note however, that this increase is a small fraction of the overall CO_2 emissions.

  NO_X PTE estimates are based on the project-specific emissions guarantee of the proposed SoLoNO$_X$™ combustion technology.
- **Startup/Shutdown Operation:** The number of startup and shutdown events is conservatively estimated at 260 startup events and 260 shutdown events per year for each turbine. No credit for control by the oxidation catalyst is accounted for in the estimation of startup emissions even though the oxidation catalyst inlet temperature should reach the effective temperature very quickly. However, it is assumed that the oxidation catalyst will be operational during shutdown since the oxidation catalyst

inlet temperature would not be expected to drop below the effective temperature until the feed of fuel is discontinued.

- **Low Temperature Operation:** Fuel consumption during low temperature operation as estimated by extrapolating vendor-provided turbine parameters to an ambient temperature of 0°F. NGT has estimated emissions by assuming that the temperature will drop below 0°F for 26 hours per year.

For some pollutants (e.g., particulate matter), emission rates from the combustion turbine are higher during normal steady-state operation than they are during startup and shutdown. However, for other pollutants (e.g., CO), emission rates may be higher during startup and shutdown than during normal operation. Although emission concentration may be higher, load is typically lower during startup and shutdown such that short-term mass emission rate may still be lower. This varies, however, per pollutant. Therefore, for the sake of conservatism, maximum annual emissions for the turbine are the maximum of potential combinations of normal, startup (SU), and shutdown (SD) operation as summarized in the equations below.

Equation 1-11:

$$Normal\ \frac{ton}{yr} = Average\ Normal\ \frac{lb}{hr} \times \frac{8{,}760\ hr \times \%\ utilization}{yr} \times \frac{ton}{2{,}000\ lb}$$

Equation 1-12:

$$Normal\ with\ Startup\ (SU)\ and\ Shutdown(SD)\ \frac{ton}{yr} = \max[normal\ \frac{ton}{yr},\ startup\ \frac{ton}{yr} + shutdown\ \frac{ton}{yr} + \left(normal\ \frac{ton}{yr} \times \left\{1 - \frac{startup\ hrs \mp shutdown\ hrs}{8{,}760\ \times\ \%\ utilization}\right\}\right)]$$

Equation 1-13:

$$Normal, SU, SD, and\ Low\ Temp(LT)\ \frac{ton}{yr} = startup\ \frac{ton}{yr} + shutdown\ \frac{ton}{yr} + low\ temp\ \frac{ton}{yr} + \left(normal\ \frac{ton}{yr} \times \left\{1 - \frac{startup\ hrs \mp shutdown\ hrs \mp low\ temp\ hrs}{8760\ \times\ \%\ utilization}\right\}\right)]$$

Equation 1-14:

$$Normal\ \ and\ Low\ Temp(LT)\ \frac{ton}{yr} = low\ \frac{ton}{yr} + normal\ \frac{ton}{yr}\ x\ \left[1 - \left\{\frac{low\ temp\ hrs}{8{,}760\ \times\ \%\ utilization}\right\}\right]$$

Equation 1-15:

$$Annual\ PTE\ \left(\frac{ton}{yr}\right)_{Pollutant\ i} = \text{MAX}\left[Normal\left(\frac{ton}{yr}\right), Normal\ with\ SU, SD\ \left(\frac{ton}{yr}\right), Normal\ with\ SU, SD, LT\ \left(\frac{ton}{yr}\right)\right]_i$$

1.3.4. Natural Gas Heater Emissions

NGT is proposing to install one (1) fuel gas heater rated at 0.750 MMBtu/hr. Table 1-5 provides information on the emission factors used to calculate emissions from the heaters.

Table 1-5. Cameron Heater Emission Factors

Pollutant	Emission Factor from Source	Source
NO_X	80 ppmvd at 3% O_2	Vendor specified emission rate
CO	200 ppmvd at 3% O_2	Vendor specified emission rate
TOC	140 ppmvd at 3% O_2	Vendor specified emission rate
VOC	0.035 lb/MMBtu	Table 1.4-3 of AP-42 (July 1998), scaled using the vendor guarantee and AP-42 emission rates for TOC
CH_4	0.00996 lb/MMBtu	Table 1.4-2 of AP-42 (July 1998), scaled using the vendor guarantee and AP-42 emission rates for TOC
$PM_{10}/PM_{2.5}$	7.60 lb/MMscf	Table 1.4-2 of AP-42 (July 1998)
SO_2	0.60 lb/MMscf	Table 1.4-2 of AP-42 (July 1998)
CO_2	53.06 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-1 (effective January 2014)
N_2O	0.0001 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-2 (effective January 2014)
Total HAPs	Multiple HAP factors	Table 1.4-3 of AP-42 (July 1998), scaled using the vendor guarantee and AP-42 emission rates for TOC

In order to calculate hourly emissions, the emission factors provided in Table 1-5 are converted to units of lb/MMscf. These converted factors are multiplied by each heater's hourly fuel consumption in scf/hr to obtain hourly emissions. Fuel consumption is calculated from the heat output of the heaters assuming a thermal efficiency of 70 percent and a natural gas heating value of 1,020 Btu/scf. Annual potential emissions are calculated based on average hourly fuel consumption. Maximum hourly potential emissions are calculated based on maximum hourly fuel consumption, assuming an overload capability of 105 percent. The following sections summarize the methods used to obtain lb/MMscf emission factors for each pollutant emitted from the new heaters.

1.3.4.1. Heater Emissions Factors – NO_X, CO, and TOC

NO_X, CO, and TOC emitted by the heaters are calculated based on vendor-specified emission rates and vendor-specified fuel consumption for the heaters. NO_X, CO, and TOC factors are derived as follows:

Equation 1-16:[7]

$$NO_x, CO, TOC\ EF = ppmvd, 3\%\ O_2 \times \frac{lb/MMBtu}{ppmvd, 3\%\ O_2} \times 1{,}020\ \frac{MMBtu}{MMscf} = \frac{lb}{MMscf}$$

1.3.4.2. Heater Emissions Factors – VOC, CH_4, and HAPs

VOC, CH_4, and HAP emissions are calculated using the TOC emission rate and AP-42 emission factors. Standard emission factors for TOC, VOC, CH_4, and HAP from natural gas fired heaters are provided in Chapter 1.4 of AP-42. Table 1.4-2 (version dated July 1998) provides a CH_4 emission factor for natural gas-fired external combustion sources. Instead, the TOC and VOC factors used in the calculations differ slightly from the factors provided in AP-42 Table 1.4-2. TOC and VOC factors are calculated as the sum of the factors for all speciated organic compounds listed in AP-42 Table 1.4-3 which are TOCs and VOCs, respectively. Table 1.4-3 of AP-42 (version dated July 1998) provides emission factors for the HAPs emitted from natural gas fired external combustion units.

Using the same ratio method used to calculate CH_4 and HAP emitted from turbines (detailed in Section 1.3.1.3), ratios for CH_4, HAP, and VOC emitted from heaters are based on the vendor-specified TOC emission rate.

1.3.4.3. Heater Emissions Factors – PM_{10}, $PM_{2.5}$, and SO_2

PM_{10} and $PM_{2.5}$ emitted by the heaters are calculated based on the emission factors listed in Table 1.4-2 of AP-42 (version dated July 1998) for natural gas fired external combustion sources. The total PM emission factor of 7.6 lb/MMscf, which includes filterable and condensable particulate, is used. It is assumed that all particulate emitted from natural gas combustion is less than 2.5 microns in diameters, so that PM equals PM_{10} and $PM_{2.5}$. The SO_2 emission factor of 0.6 lb/MMscf from Table 3.2-2 of AP-42 is used directly.

1.3.4.4. Heater Emission Factors – CO_2, N_2O, and CO_2e

CO_2 and N_2O emitted by the heaters are calculated based on the emission factors listed in 40 CFR 98, Subpart C, Tables C-1 and C-2. Equation 1-6 and Equation 1-8 show how factors in lb/MMscf are derived for these pollutants. GHGs emitted from the heaters include CO_2, CH_4, and N_2O. CO_2e emissions are calculated using the GWPs provided in Table 1-3.

1.3.5. Emergency Generator Emissions

NGT is proposing to install one new Waukesha (880 bhp) four stroke lean burn natural gas fired emergency generator or equivalent. The emergency generator potential emissions are calculated using 500 hours per year, which includes maintenance and testing, based on standard guidance from USEPA.[8] Table 1-6 provides information on the emission factors used to calculate emissions from the emergency generator.

[7] Conversion factors in units of lb/MMBtu over ppmvd, 3% O_2 are obtained from the North American Combustion Handbook.

[8] NGT will limit the operation of the emergency engine for maintenance checks and readiness testing to no more than 100 hr/yr as per 40 CFR 60.4243(d)(2), to be defined as an emergency engine under NSPS Subpart JJJJ.

Table 1-6: Waukesha Emergency Generator Emission Factors

Pollutant	Emission Factor from Source	Source
NO_X	2.0 g/bhp-hr	NSPS Subpart JJJJ
CO	4.0 g/bhp-hr	NSPS Subpart JJJJ
VOC	1.0 g/bhp-hr	VOC (without formaldehyde): NSPS Subpart JJJJ Table 3.2-2 of AP-42 (July 2000)
CH_4	1.0 g VOC/bhp-hr 1.25 lb/MMBtu (HHV)	VOC: NSPS Subpart JJJJ Table 3.2-2 of AP-42 (July 2000)
$PM_{10}/PM_{2.5}$	0.00999 lb/MMBtu (HHV)	Table 3.2-2 of AP-42 (July 2000)
SO_2	0.000588 lb/MMBtu (HHV)	Table 3.2-2 of AP-42 (July 2000)
CO_2	53.06 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-1 (effective January 2014)
N_2O	0.0001 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-2 (effective January 2014)
Total HAPs	1.0 g VOC/bhp-hr Multiple HAP factors	VOC: NSPS Subpart JJJJ Table 3.2-2 of AP-42 (July 2000)

In order to calculate hourly emissions, the emission factors provided in Table 1-6 are converted to factors in lb/MMscf. These converted factors are multiplied by the generator's hourly fuel consumption in scf/hr to obtain hourly emissions. The following sections summarize the methods used to obtain lb/MMscf emission factors for each pollutant emitted from the new emergency generator.

1.3.5.1. Emergency Generator Emission Factors – NO_X, CO, and VOC

NO_X, CO, and VOC emitted by the emergency generator are calculated based on the emission limits established under NSPS Subpart JJJJ in grams per brake horsepower-hour (g/bhp-hr) for emergency engines greater than 130 hp installed on and after January 1, 2009.[9]

The VOC emission limit of 1.0 g/bhp-hr in NSPS Subpart JJJJ excludes formaldehyde.[10] A VOC factor inclusive of formaldehyde is calculated using the relative emissions of formaldehyde and VOC provided in Table 3.2-2 of AP-42 (version dated July 2000). A VOC factor is calculated as the sum of the factors for all trace organic compounds listed in Table 3.2-2 which are VOCs. Formaldehyde emissions are proportional to VOC emissions, because formaldehyde is a constituent of VOC. The VOC factor is adjusted to account for formaldehyde as follows:

[9] Per Table 1 to Subpart JJJJ of Part 60.

[10] Per footnote "d" of Table 1 to Subpart JJJJ of Part 60.

Equation 1-17:

$$VOC\ EF = \frac{1.0\ g\ VOC\ (without\ formaldehyde)}{bhp-hr} \times \frac{\left(\frac{0.119\ lb\ VOC}{MMBtu}\right)}{\left(\frac{0.119\ lb\ VOC}{MMBtu} - \frac{0.0528\ lb\ formaldehyde}{MMBtu}\right)}$$
$$= 1.79\ \frac{g}{bhp-hr}$$

Vendor-specified power output and fuel consumption for the engine are used to convert the g/bhp-hr factors to a lb/MMBtu emission factor.

NO_X, CO, and VOC factors are derived as follows:

Equation 1-18:

$$NO_x, CO, VOC\ EF = \frac{g}{bhp-hr} \times \frac{lb}{453.6\ g} \times hp \times \frac{hr}{scf\ fuel} \times \frac{1{,}000{,}000\ scf}{MMscf} = \frac{lb}{MMscf}$$

1.3.5.2. Emergency Generator Emission Factors – CH_4 and HAP

CH_4 and HAP emissions are calculated using the VOC emission rate and AP-42 emission factors. Standard emission factors for VOC, CH_4, and HAP from natural gas fired engines are provided in Chapter 3.2 of AP-42. Table 3.2-2 (version dated July 2000) provides emission factors for VOC, CH_4, and HAPs from four stroke lean burn natural gas-fired engines.

Using the same ratio method used to calculate CH_4 and HAP emitted from turbines (detailed in 1.3.1.3), the ratio of CH_4 and HAP emitted from engines is based on the VOC emission rate from NSPS Subpart JJJJ.

1.3.5.3. Emergency Generator Emission Factors – PM_{10}, $PM_{2.5}$, and SO_2

PM_{10} and $PM_{2.5}$ emitted by the emergency generator are calculated based on the emission factors listed in Table 3.2-2 of AP-42 (version dated July 2000) for natural gas fired engines. PM_{10} and $PM_{2.5}$ emission factors are calculated as the sum of the filterable and condensable PM emission factors. The SO_2 emission factor utilized is also obtained from Table 3.2-2 of AP-42.

1.3.5.4. Emergency Generator Emission Factors – CO_2, N_2O, and CO_2e

CO_2 and N_2O emitted by the emergency generator are calculated based on the emission factors listed in 40 CFR 98, Subpart C, Tables C-1 and C-2 (effective January 1, 2014). GHGs emitted from the engine include CO_2, CH_4, and N_2O. CO_2e emissions are calculated using the GWPs provided in Table 1-3.

1.3.6. Miscellaneous Support Equipment

Fugitive emissions and gas releases at the Wadsworth Compressor Station will occur as a result of the proposed project. The methodologies used to calculate this potential increase are described in the following sections.

1.3.6.1. Emissions from Piping Components

Fugitive emissions from equipment leaks will occur during operation of the Wadsworth Compressor Station due to the installation of equipment and piping components. While the design is not yet final, component counts were estimated based on data from similar sized compressor stations. Components will include flanges, connectors, valves, open-ended lines, compressor seals, pump seals, etc.

Potential emissions are calculated from the piping components using emission factors from EPA's Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017), Table 2-4 (November 1995) which provides leak emission factors for oil and gas production operations. Gas service factors are used for components in natural gas service, light oil service factors are used for components in pipeline liquids service (e.g. condensate), and heavy oil service factors are used for components in oil service (e.g. oils on-site). Since an emission factor is not provided for leaks from pump seals in heavy oil service in Table 2-4, the average SOCMI without ethylene emission factor for pumps in heavy oil service from Table 2-1 is used to estimate emissions. Annual emissions are conservatively calculated assuming that the components are in continuous gas/liquid/oil service as follows:

Equation 1-19:

$$\text{Total Gas Emissions} = \#\ of\ components \times \frac{\frac{kg}{hr}}{component} \times \frac{8{,}760\ hrs}{yr} \times \frac{1{,}000\ g}{kg} \times \frac{lb}{453.6\ g} \times \frac{2{,}000\ ton}{lb}$$
$$= \frac{tons}{yr}$$

The equation above is used to calculate total fugitive gas emitted from the piping components at the Wadsworth Compressor Station. Emissions of individual VOCs, GHGs, and HAPs are calculated by multiplying the total fugitive gas emissions from piping components in gas, pipeline liquid, and oil service by the weight percent of each pollutant in gas, pipeline liquids, and oil. Gas, pipeline liquid, and oil compositions are engineering estimates based on available worst case data to be conservative.[11, 12]

1.3.6.2. Emissions from Gas Releases

Gas releases due to periodic blowdown of the new turbine-driven compressor units and other events occur with station operation. The majority of emissions from gas release events are associated with routine operations such as startup and shutdown, reduced pressure demand events, or maintenance activities. The potential volume of gas emitted was estimated in standard cubic feet per year based on the design data for other compressor stations. Emissions of individual VOCs, GHGs, and HAPs are calculated by multiplying the total gas emissions from gas releases by the weight percent of each pollutant in the natural gas compressed at the facility.[13]

[11] Oil is assumed to be 100 percent VOC and contain no GHGs or HAPs. Pipeline liquids composition is based on the composition of residual liquids following flashing, calculated based on a laboratory analysis of flashing from an operation in Atlanta, Texas in April 2009.

[12] Natural gas composition is conservatively estimated based on an extended gas analysis taken from a representative metering station.

[13] Ibid.

1.3.6.3. Emissions from Separator Vessels and Condensate Storage Tanks

Although stabilized condensate has no flashing losses, flashing losses do occur when the pressure of a liquid is decreased or the temperature is increased. At the Wadsworth Compressor Station, flashing losses occur at pipeline liquids storage tanks and include VOCs, GHGs, and HAPs. Total flashing losses are calculated based on a flash gas rate and a representative flash gas density. The flash gas rate is calculated based on a liquids input rate and a flash factor.[14] Emissions of individual VOCs, GHGs, and HAPs are calculated from total flashing losses using a representative pipeline liquids compositions.

Working and breathing losses occur at all tanks at the Wadsworth Compressor Station, including pipeline liquid tanks, lubricating oil tanks, and oil-water separators. Working and breathing losses include VOCs, GHGs, and HAPs and are calculated with EPA's TANKS 4.09d program using maximum potential throughputs for each tank.

1.3.6.4. Emissions from Truck Loading

Emissions occur during the loading of volatile organic liquids into tanker trucks and include VOCs, GHGs, and HAPs. Total loading losses are calculated based on calculation methods for submerged filling provided in AP-42 Section 5.2 (version dated January 1995). Emissions of individual VOCs, GHGs, and HAPs are calculated from total loading losses using representative pipeline liquids and lubricating oil compositions.

1.3.6.5. Parts Washer Emissions

NGT is proposing to install a new remote reservoir parts washer. Potential emissions from the parts washer are calculated based on the physical and chemical properties of a worst-case representative solvent used in the parts washer and the maximum throughput of the parts washer. In order to conservatively calculate potential emissions, it is assumed that all volatile organic compounds in the solvent are emitted to the atmosphere and that the VOC content is 100 percent. The maximum throughput of the parts washer will be 120 gallons of solvent per year, based on past experience and the addition of a safety factor. A worst-case specific gravity is assumed based on typical solvents used.

Potential VOC emissions from the parts washer are calculated as follows:

Equation 1-20:

$$VOC = 120\frac{gal\ solvent}{year} \times (0.82\ \times 8.34\frac{lb}{gal})\ \times 1\frac{lb\ VOC}{lb\ solvent} = 0.4103\frac{tons\ VOC}{yr}$$

[14] The liquids input rate is determined based on operator experience with the incorporation of a safety factor, and the flash factor in standard cubic foot per barrel (scf/bbl) was determined in a laboratory analysis of a gas sample taken from Atlanta, Texas.

This section of the permit application includes a discussion of potentially applicable federal and state air quality permitting and regulatory requirements.

2.1. FEDERAL REGULATORY APPLICABILITY

2.1.1. Prevention of Significant Deterioration Applicability

The applicability of the Prevention of Significant Deterioration (PSD) permitting program is evaluated for proposed construction, reconstruction, and modification projects that result in an emission increase of a regulated New Source Review (NSR) pollutant for which the area is in attainment with the National Ambient Air Quality Standards (NAAQS). Medina County has been designated as "attainment" or "unclassifiable" for all regulated NSR pollutants except for 8-Hour Ozone.[15] Natural gas compressor stations are not among the 28 listed source categories in OAC 3745-31-01(NNN)(2)(a); therefore the facility is subject to the PSD major source threshold of 250 tpy provided in OAC 3745-31-01(NNN)(2)(b) for SO_2, CO, PM, PM_{10}, and $PM_{2.5}$, and is subject to the nonattainment NSR major source threshold of 100 tpy for NO_X and VOC . As shown in Table 1-1, the proposed Wadsworth Compressor Station will have potential emissions of NO_X and VOC less than 100 tpy, and potential emissions of other criteria pollutants (SO_2, CO, PM, PM_{10}, and $PM_{2.5}$) less than 250 tpy. Therefore, the proposed Wadsworth Compressor Station will be a minor source of criteria pollutants with respect to the PSD permitting program.

2.1.2. GHG Tailoring Rule Applicability

Additionally, the final PSD and Title V Greenhouse Gas (GHG) Tailoring Rule was published in the Federal Register on June 3, 2010 (75 FR 31514) but was ultimately overturned on June 23, 2014 by the US Supreme Court.[16] Under the formerly effective rule, GHGs could, as of July 1, 2011, become "subject to regulation" under the PSD program for construction projects that would result in potential GHG emissions of 100,000 tpy carbon dioxide equivalents (CO_2e) or more. However, the June 23, 2014 Supreme Court Decision clarifies that construction projects cannot trigger major NSR for GHGs unless major NSR is otherwise triggered for criteria pollutants.[17] Furthermore, in accordance with OAC 3745-31-34(C)(2), Ohio EPA's permit to install permitting requirements for GHGs cease to be effective if a federal court issues a ruling limiting the administrator's authority to regulate GHGs under the Clean Air Act.

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[15] Attainment designations for Ohio counties are established in 40 CFR 81.336.

[16] As defined in 40 CFR 98.6, regulated GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).

[17] On June 23, 2014, the U.S. Supreme Court issued its decision in *Utility Air Regulatory Group v. EPA* (No. 12-1146). The Court said that EPA may not treat greenhouse gases as an air pollutant for purposes of determining whether a source is a major source required to obtain a PSD or Title V permit. The Court also said that PSD permits that are otherwise required (based on emissions of other pollutants) may continue to require limitations on greenhouse gases emissions based on the application of Best Available Control Technology (BACT). EPA is currently evaluating the implications of the Court's decision and awaiting further action by the U.S. Courts. [adapted from 7/24/14 letter from Janet G. McCabe, U.S. EPA, Acting Administrator, to Regional Administrators, "Next Steps and Preliminary Views on the Application of Clean Air Act Permitting Programs to Greenhouse Gases Following the Supreme Court's Decision in *Utility Air Regulatory Group v. Environmental Protection Agency*].

2.1.2.1. Ohio EPA GHG Permitting Status

On June 23, 2014, the U.S. Supreme Court issued a decision addressing stationary source permitting requirements for greenhouse gases (GHGs).[18] Subsequently, on July 24, 2014, Janet McCabe, Acting Assistant Administrator, Office of Air and Radiation, U.S. EPA issued preliminary guidance concerning the impact of the decision on various aspects of the court decision.[19] The Supreme Court decision and subsequent U.S. EPA guidance changes how Ohio EPA permits GHG sources. Ohio EPA has issued Engineering Guide #85 that discusses the revised approach Ohio EPA will use to regulate GHGs through the air pollution permitting program.[20] Therefore, emission of GHGs do not trigger permitting for the proposed project.

2.1.3. Title V Operating Permit Program Applicability

The Title V operating permit program consolidates state and federal requirements applicable to major sources into a single comprehensive operating permit for the purposes of facilitating ongoing compliance. In accordance with OAC 3745-77, sources with a PTE of 100 tpy or more for criteria pollutants, 25 tpy or more for total HAP, or 10 tpy or more for individual HAP are considered major sources for which applicants must obtain a Title V operating permit.

As mentioned previously, the final PSD and Title V Greenhouse Gas (GHG) Tailoring Rule was published in the Federal Register on June 3, 2010 (75 FR 31514) but was ultimately overturned on June 23, 2014 by the U.S. Supreme Court. Under the formerly effective rule, GHGs could, as of July 1, 2011, become "subject to regulation" under the Title V program for facilities that have a GHG potential to emit of 100,000 tpy CO_2e or more.

U.S. EPA has since issued guidance following the U.S. Supreme Court ruling indicating that, "EPA will no longer apply or enforce federal regulatory provisions or provisions of the EPA-approved Title V programs that require a stationary source to obtain a Title V permit solely because the source emits or has the potential to emit greenhouse gases above the major source thresholds." EPA also clarifies in this guidance that, "The EPA also does not intend to continue applying regulations that would require Title V programs submitted for approval by the EPA to require that such sources obtain Title V permits."[21]

Furthermore, in accordance with OAC 3745-77-11(D)(2), Ohio EPA's Title V permitting requirements for greenhouse gases cease to be effective if a federal court issues a ruling limiting the administrator's authority to regulate greenhouse gases under the Clean Air Act. **As a result, the GHG PTE for Wadsworth Compressor Station cannot trigger major source applicability under the Title V permitting program.**

Finally, Table 1-1 shows that facility-wide emissions will not exceed Title V thresholds for criteria pollutants or HAP; therefore, NGT is not required to obtain a Title V operating permit for the Wadsworth Compressor Station.

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[18] http://www.supremecourt.gov/opinions/13pdf/12-1146_4g18.pdf

[19] http://www.epa.gov/nsr/documents/20140724memo.pdf

[20] A copy of this guidance can be found on the web at: http://epa.ohio.gov/dapc/engineer/eguides.aspx.

[21] U.S. EPA memorandum from Ms. Janet G. McCabe to U.S. EPA Regional Administrators dated July 24, 2014.

2.1.4. New Source Performance Standards

NSPS require new, modified, or reconstructed sources in specified source categories to control emissions to the level achievable by the best demonstrated technology as specified in the applicable provisions. Any source subject to an NSPS is also subject to the general provisions of NSPS Subpart A, except as noted.

2.1.4.1. 40 CFR 60, Subpart A - General Provisions – Applicable

All affected sources subject to source specific NSPS are subject to the general provisions of NSPS Subpart A unless specifically excluded by the source-specific NSPS. Subpart A requires initial notification, performance testing, recordkeeping and monitoring, provides reference methods, and mandates general control device requirements for all other subparts as applicable.

2.1.4.2. 40 CFR 60, Subpart D – Fossil-Fuel-Fired Steam Generators – Not Applicable

NSPS Subpart D applies to fossil fuel-fired steam generating units with a heat input capacity greater than or equal to 250 MMBtu/hr that have been constructed or modified since August 17, 1971. The rule defines a fossil fuel-fired steam generating unit as:[22]

> *A furnace or boiler used in the process of burning fossil fuel for the purpose of producing steam by heat transfer.*

The combustion turbine will not be subject to Subpart D, because:

1. The turbine has a heat input capacity less than 250 MMBtu/hr;
2. The turbine does not burn fossil fuel for the purpose of producing steam; and

Per 40 CFR 60.40(e), units that are subject to 40 CFR 60 Subpart KKKK, which includes the Wadsworth Compressor Station's combustion turbines, are not subject to 40 CFR 60 Subpart D.

2.1.4.3. 40 CFR 60, Subpart Da – Electrical Utility Steam Generating Units – Not Applicable

This regulation applies to electric utility steam generating units with a heat input capacity greater than 250 MMBtu/hr for which construction, reconstruction, or modification commenced after September 18, 1978. Since the NEXUS Gas Transmission combustion turbine will neither generate steam nor produce electricity for sale to the grid, and since each turbine will have a heat input capacity less than 250 MMBtu/hr, the unit is not subject to Subpart Da. Furthermore, per 40 CFR 60.40Da(e)(1) units that meet the applicability requirements of and are subject to 40 CFR 60 Subpart KKKK, which includes the Wadsworth Compressor Station combustion turbine, are not subject to 40 CFR 60 Subpart Da.

[22] 40 CFR 60.41

2.1.4.4. 40 CFR 60, Subpart Db - Industrial Commercial – Institutional Steam Generating Units – Not Applicable

NSPS Subpart Db provides standards for steam generating units with a heat input capacity greater than 100 MMBtu/hr that commenced construction, reconstruction, or modification after June 19, 1984. The term "steam generating unit" is defined under this regulation as:[23]

> *A device that combusts any fuel and produces steam or heats water or any other heat transfer medium.*

The combustion turbine will have a heat input capacity greater than 100 MMBtu/hr; however, as previously stated, the units are not steam generating units. Furthermore, per 40 CFR 60.40b(i) units that meet the applicability requirements of 40 CFR 60 Subpart KKKK, which includes the Wadsworth Compressor Station's combustion turbines, are not subject to 40 CFR 60 Subpart Db.

2.1.4.5. 40 CFR 60, Subpart Dc – Small Industrial-Commercial-Institutional Steam Generating Units – Not Applicable

NSPS Subpart Dc applies to steam generating units for which construction, modification, or reconstruction is commenced after June 9, 1989 and that have a maximum design heat input capacity of greater than or equal to 10 MMBtu/hr and less than or equal to 100 MMBtu/hr. The Process Heater (B001) is sized to a maximum heat input capacity less than 10 MMBtu/hr. As such, Subpart Dc is not applicable.

2.1.4.6. 40 CFR 60, Subpart Kb – Volatile Organic Liquid Storage Vessels Constructed, Reconstructed, or Modified after July 23, 1984 – Not Applicable

Affected sources under 40 CFR 60, Subpart Kb (NSPS Kb) include all storage vessels with capacities of at least 75 cubic meters (m^3) (19,813 gallons) storing volatile organic liquids (VOL) constructed, reconstructed, or modified after July 23, 1984.

The Separator Vessels #1-5 (P004-P008) and the Storage Vessels #1-3 (T001-T003) are each sized to a nominal storage capacity less than 19,813 gallons which is less than the NSPS threshold; therefore, Subpart Kb is not applicable.

2.1.4.7. 40 CFR 60, Subpart GG – Stationary Gas Turbines – Not Applicable

NSPS Subpart GG applies to combustion turbines constructed or modified after October 3, 1977 with heat input equal to or greater than 10 MMBtu/hr based on lower heating value. However, NSPS Subpart GG has been superseded by a newer subpart (KKKK) that exempts subject units from NSPS Subpart GG [40 CFR 60.4305(b)]. The proposed combustion turbine at the Wadsworth Compressor Station is subject to the requirements of NSPS KKKK (refer to the discussion in Section 2.1.4.11 below) and is, therefore, exempt from NSPS Subpart GG.

[23] 40 CFR 60.41b

2.1.4.8. 40 CFR 60, Subpart KKK – Equipment Leaks of VOC from Onshore Natural Gas Processing Plants – Not Applicable

NSPS Subpart KKK applies to equipment leaks from natural gas processing plants that were constructed after June 20, 1984 but before August 23, 2011. The facility is not a natural gas processing plant (as defined in 40 CFR 60.631). Therefore, this subpart does not apply.

2.1.4.9. 40 CFR 60, Subpart LLL – SO_2 Emissions from Onshore Natural Gas Processing Plants – Not Applicable

NSPS Subpart LLL applies to onshore natural gas processing facilities that contain sweetening units that commence construction or modification after January 20, 1984. The Wadsworth Compressor Station is not a natural gas processing plant and will not contain any sweetening units, as defined in 40 CFR 60.641, and therefore is not subject to this subpart.

2.1.4.10. 40 CFR 60, Subpart JJJJ – Spark Ignition Internal Combustion Engines – Applicable

NSPS Subpart JJJJ establishes requirements for owners or operators of spark ignition internal combustion engines that commence construction, modification, or reconstruction after June 12, 2006 (the date the engine is ordered constitutes construction). The spark ignition internal combustion engine (P002) used at this facility will be considered an emergency stationary internal combustion engine, as defined by 40 CFR 60.4248, and will be constructed and manufactured after the dates mentioned above; therefore, it is subject to the provisions of NSPS Subpart JJJJ.

Per 40 CFR 60.4233(e) the unit will meet the emission standards specified in Table 1 of Subpart JJJJ. NGT will ensure that the engine satisfies the monitoring requirements specified in 40 CFR 60.4237(a) by installing a non-resettable hour meter. NGT will also ensure that the Emergency Generator (P002) satisfies the compliance requirements for periodic testing and maintenance specified in 40 CFR 60.4243(b)(2), the operational restrictions for emergency engines in 40 CFR 60.4243(d), and the notification, reporting and recordkeeping requirements specified in 40 CFR 60.4245.

2.1.4.10.1. *Emission Limits*

The emergency generator will be subject to the following emissions standards from Table 1 of Subpart JJJJ (emergency engines greater than 130 hp):[24]

- NO_X: 2.0 g/hp-hr or 160 ppmvd @15% O_2
- CO: 4.0 g/hp-hr or 540 ppmvd @15% O_2
- VOC: 1.0 g/hp-hr or 86 ppmvd @15% O_2

2.1.4.10.2. *Testing*

NGT will comply with the requirements for a non-certified generator pursuant to 40 CFR 60.4243(a)(2)(iii), including conducting an initial performance test within one year of startup and subsequent tests every 8,760 hours or three (3) years, whichever comes first. 40 CFR 60.4245(d) requires the submittal of a copy of the performance test within 60 days of its completion.

[24] 40 CFR 60.4233(e) Emission standards for operators of stationary SI ICE with a maximum engine power greater than 100 HP

2.1.4.10.3. *Monitoring, Recordkeeping, and Reporting*

Since the engine will be used as an emergency generator, a non-resettable hour meter is required.[25] Per 40 CFR 60.4243(d), emergency engines are allowed to be operated according to the following time constraints:

There is no time limit on use in emergency situations.
The emergency ICE can operate for up to 100 hours per year total for the following reasons:

- Maintenance checks and readiness testing, provided that the tests are recommended by federal, state, or local government, the manufacturer, the vendor, the regional transmission organization or equivalent balancing authority and transmission operator, or the insurance company associated with the engine;
- Emergency demand response for periods specified in 40 CFR 60.4243(d)(2)(ii); and
- Periods where there is a deviation of voltage or frequency of 4 percent or greater below standard voltage or frequency.

The emergency ICE can operate for up to 50 hours per year in non-emergency situations. The 50 hours of operation in non-emergency situations are counted as part of the 100 hours per year for maintenance and testing and emergency demand response described in the previous bullet point.

NGT will track the engine's run time and the reason for use in order to demonstrate compliance with the run time requirements.[26]

Initial notification is required for this engine, which is a non-certified RICE greater than 500 hp[27]. Since performance testing is required, advanced notification and results reporting are required, in addition to semiannual compliance reports.

2.1.4.11. 40 CFR 60, Subpart KKKK – Stationary Combustion Turbines – Applicable

NSPS Subpart KKKK applies to combustion turbines constructed, modified, or reconstructed after February 18, 2005 with heat input equal to or greater than 10 MMBtu/hr based on the higher heating value of the fuel [40 CFR 60.4305(a)]. The proposed combustion turbine for the Wadsworth Compressor Station has a heat input greater than 10 MMBtu/hr. Therefore, the combustion turbine is subject to NSPS Subpart KKKK. As provided in 40 CFR 60.4305(b), the combustion turbine is exempt from NSPS Subpart GG. The applicable requirements for each pollutant are outlined in the following subsections.

2.1.4.11.1. *NO_X Emission Limits*

Units subject to the requirements of Subpart KKKK must meet the emissions standards listed in Table 1 of the subpart [40 CFR 60.4320(a)]. New turbines firing natural gas with a heat input capacity greater than 50 MMBtu/hr and less than 850 MMBtu/hr are required to limit NO_X emissions to less than 25 ppm at 15 percent (%) O_2 [Table 1 to Subpart KKKK of Part 60]. The proposed combustion turbine at the Wadsworth

[25] 40 CFR 60.4237(a)

[26] 40 CFR 60.4245(b)

[27] 40 CFR 60.4245(c)

Compressor Station is designed with maximum NO_X emissions of 9 ppm at 15% O_2, which is lower than the applicable NSPS emission limits.

- NO_X Emissions:[28,29]
  - 25 ppm at 15% O_2; OR
  - 150 ng/J (1.2 lb/MWh) of useful output

2.1.4.11.2. *SO_2 Emission Limits*

In accordance with 40 CFR 60.4330(a), each combustion turbine must comply with one of the following:

1. Limit emissions to less than 110 nanograms per Joule (ng/J) of SO_2 (0.90 lb/MWh) gross output; or
2. Burn fuel which contains total potential sulfur emissions equal to or less than 26 ng/J of SO_2 (0.060 lb/MMBtu HHV) heat input.

The SO_2 limits will be met by firing only pipeline quality natural gas in the combustion turbine, which will satisfy the requirements of 40 CFR 60.4330(a)(2).

2.1.4.11.3. *Monitoring and Testing Requirements*

Pursuant to 40 CFR 60.4333(a), the new turbine, the air pollution control equipment, and the monitoring equipment will be maintained in a manner that is consistent with good air pollution control practices for minimizing emissions. This requirement applies at all times including during startup, shutdown, and malfunction.

Since the turbines will not be equipped with water or steam injection, NGT will perform the required initial and annual performance testing to demonstrate compliance with the NO_X emission limit.[30] If the results of a NO_X performance test are under 75% of the NO_X emissions limits, then the Wadsworth Compressor Station will only be required to perform the performance tests for that turbine every two years (no more than 26 calendar months following the previous performance test), provided that subsequent performance test results are less than 75% of the emission limit. If the results of subsequent performance tests indicate NO_X emissions greater than 75% of the limit, then annual performance testing for NO_X will resume.[31] The Wadsworth Compressor Station may also choose to install, calibrate, and maintain continuous emissions monitoring systems (CEMS) for NO_X on the turbines and operate them in accordance with NSPS Subpart A and Subpart KKKK, in which case NO_X performance testing will not be required.[32] However, at this time the Wadsworth Compressor Station elects not to install CEMS and plans to verify compliance using stack tests.

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[28] 40 CFR 60.4320(a) and Table 1 to Subpart KKKK

[29] Subpart KKKK, Table 1 also includes a NO_X limit of 150 ppmvd at 15% O_2 or 8.7 lb/MWh for turbine operation at temperatures less than 0°F and turbine operation at loads less than 75% of peak load which the new turbine will meet.

[30] Per 40 CFR 60.8(a), the initial NO_X performance tests for the new/modified turbines are required to be conducted within 60 days after achieving the maximum production rate (i.e. the turbine's maximum rated heat output), but no later than 180 days after initial startup.

[31] 40 CFR 60.4340(a)

[32] 40 CFR 60.4340(b)(1)

For compliance with the SO_2 emission limit, facilities are required to perform regular determinations of the total sulfur content of the combustion fuel and to conduct initial and annual compliance demonstrations. The total sulfur content of gaseous fuel combusted in the turbines must be determined and recorded once per operating day or using a custom schedule as approved by Ohio EPA;[33] however, the Wadsworth Compressor Station can elect to opt out of this provision of the rule by using a fuel that is demonstrated not to exceed potential sulfur emissions of 0.060 lb/MMBtu SO_2.[34] This demonstration can be made using one of the following methods:

1. By using a purchase contract specifying that the fuel sulfur content for the natural gas is less than or equal to 20 grains of sulfur per 100 standard cubic feet and results in potential emissions not exceeding 0.060 lb/MMBtu.
2. By using representative fuel sampling data which show that the sulfur content of the fuel does not exceed 0.060 lb SO_2/MMBtu heat input. At a minimum, the amount of fuel sampling data specified in Section 2.3.1.4 or 2.3.2.4 of Appendix D to Part 75 is this chapter is required.

Pursuant to 40 CFR 60.4365(a), in order to demonstrate continuous compliance with the applicable 0.060 lb/MMBtu potential SO_2 emissions limit, the Wadsworth Compressor Station, will obtain a current tariff sheet for the fuel specifying that the maximum total sulfur content for natural gas use is 20 grains of sulfur or less per 100 scf and potential sulfur emissions are less than 26 ng SO_2/J (0.060 lb SO_2/MMBtu) heat input for continental areas.

2.1.4.11.4. *Reporting Requirements*

Pursuant to 40 CFR 60.4375(b), since the Wadsworth Compressor Station will be conducting annual performance testing in accordance with 40 CFR 60.4340(a), a written report of the results of each performance test will be submitted to Ohio EPA and the USEPA before the close of business on the 60th day following the completion of the performance test.

Per 40 CFR 60.7(a)(1), the Wadsworth Compressor Station will submit notification of the date construction of each new turbines commenced. The submittal will be postmarked by no later than 30 days after the commencement of construction date. Per 40 CFR 60.7(a)(3), the submittal of the notification of the actual date of initial startup of each new turbine will be postmarked by no later than 15 days after the initial startup date.

2.1.4.12. 40 CFR 60, Subpart KKKK – Stationary Combustion Turbines – Proposed Amendments - Applicable

On August 29, 2012, U.S. EPA published proposed amendments to the Standards of Performance for Stationary Combustion Turbines established in 40 CFR 60, Subpart KKKK (NSPS KKKK).[35] These proposed amendments have yet to be finalized and are not currently effective, but because the effective date will be established as the proposal date (i.e., August 29, 2012) once finalized, the following section evaluates the applicability of the amended standards of NSPS KKKK. NGT requests that the PTIO for the Wadsworth Compressor Station include language acknowledging the proposed amendments to NSPS KKKK and

[33] 40 CFR 60.4370(b) and (c)

[34] 40 CFR 60.4365

[35] 77 FR 52564

clarifying that the affected combustion turbine will comply with the final effective requirements of NSPS KKKK upon promulgation.

According to the amended provisions of 40 CFR 60.4305(a), affected sources under NSPS KKKK include stationary combustion turbines constructed, modified, or reconstructed after February 18, 2005, rated at a heat input of at least 10 MMBtu/hr. The proposed combustion turbine for the Wadsworth Compressor Station will have a heat input greater than 10 MMBtu/hr. Therefore, the combustion turbine is subject to NSPS Subpart KKKK. The applicable requirements for each pollutant are outlined in the following subsections.

2.1.4.12.1. *NO_X Emission Limits*

In accordance with the amended standards of 40 CFR 60.4320(a) and (c), NGT must identify for each hour of operation the NO_X emission standard applicable to new mechanical drive turbines firing only natural gas with a heat input capacity greater than 50 MMBtu/hr as provided in Table 2-1. These NO_X limits are applicable to the combustion turbine during all periods of operation including startups, shutdowns, and malfunctions as specified in 40 CFR 60.4320(e).

Table 2-1. NO_X Emission Standards for Various Operating Scenarios

Operating Scenario	Heat Input Limit (lb/MMBtu)	NO_X Conc. Limit (ppmvd)
At least 75% of base load	0.093	25
Less than 75% of base load or during Startup or Shutdown	0.59	150

a. These limits are established in Table 1 of the proposed amendments to NSPS KKKK.

NGT will not use water injection, steam injection, or post-combustion controls to reduce NO_X emissions from the combustion turbine. Therefore, in accordance with 40 CFR 60.4333(c)(2) and 4340(a)(1), NGT will demonstrate compliance with the applicable emissions limitation by conducting stack tests pursuant to the requirements of 40 CFR 60.4333(b) and 4400. The required frequency of stack tests will depend on the result of the initial test.

2.1.4.12.2. *SO_2 Emission Limits*

In accordance with 40 CFR 60.4330(a) and (g), the combustion turbine must comply with one of the following:

1. Limit emissions to less than 110 ng/J of SO_2 (0.90 lb/MWh) gross output; or
2. Burn fuel which contains total potential sulfur emissions equal to or less than 26 ng/J of SO_2 (0.060 lb/MMBtu HHV) heat input.

NGT may establish compliance by either monitoring the total sulfur content of the fuel in accordance with 40 CFR 60.4360 and 60.4365 or demonstrate that the natural gas does not exceed 0.060 lb SO_2/MMBtu heat input using one of the methods identified in 40 CFR 60.4370.

If NGT elects to demonstrate compliance with the SO_2 limitations using the procedures in 40 CFR 60.4370, personnel at the Wadsworth Compressor Station must maintain on-site records (e.g., purchase contracts, tariff sheets, or transportation contracts) documenting that the total sulfur content of the natural gas combusted in the turbines does not exceed 0.060 lb/MMBtu or must maintain representative fuel sampling data collected in accordance with Section 2.3.1.4 or 2.3.2.4 in Appendix D to 40 CFR 75 documenting that the fuel meets the requirements to be considered either pipeline natural gas or natural gas.

2.1.4.13. 40 CFR 60, Subpart OOOO – Crude Oil and Natural Gas Production, Transmission, and Distribution – Not Applicable

NSPS Subpart OOOO establishes emission standards and compliance schedules for the control of VOC and SO_2 emissions from affected facilities that commence construction, modification or reconstruction after August 23, 2011. Affected facilities include certain units and operations located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment. "Custody transfer" is defined under 40 CFR 60.5430 as the transfer of natural gas after processing and/or treatment in the producing operations, or from storage vessels or automatic transfer facilities or other such equipment, including product loading racks, to pipelines or any other forms of transportation. "Natural gas transmission" is defined under 40 CFR 60.5430 as the pipelines used for long distance transport of natural gas (excluding processing). Specific equipment used in natural gas transmission includes the land, mains, valves, meters, boosters, regulators, storage vessels, dehydrators, compressors, and their driving units and appurtenances, and equipment used for transporting gas from a production plant, delivery point of purchased gas, gathering system, storage area, or other wholesale source of gas to one or more distribution area(s). NGT will gain custody of natural gas from production operations, or at "the point of custody transfer." NGT and its operations, including the Wadsworth Compressor Station, will be located in the natural gas transmission segment.[36]

Affected facilities include storage vessels located in the natural gas transmission and storage segment that have the potential for VOC emissions equal to or greater than 6 tpy per 40 CFR 60.5365(e). This requirement specifies that,

> *"The potential for VOC emissions must be calculated using a generally accepted model or calculation methodology, based on the maximum average daily throughput determined for a 30-day period of production prior to the applicable emission determination deadline specified in this section. The determination may take into account requirements under a legally and practically enforceable limit in an operating permit or other requirement established under a Federal, State, local or tribal authority."*

The Separator Vessels #1-5 (P004-P008) and the Storage Vessels #1-3 (T001-T003) each will have an annual potential to emit VOC that is less than 6 tpy, and are therefore not subject to the requirements of this subpart.

2.1.4.14. Non-Applicability of All Other NSPS

NSPS standards are developed for particular industrial source categories and the applicability of a particular NSPS to a facility can be readily ascertained based on the industrial source category covered. All other NSPS are categorically not applicable to the proposed project.

2.1.5. National Emission Standards for Hazardous Air Pollutants

NESHAPs, located in 40 CFR 63, are typically applicable to specific categories of sources that have the potential to emit HAP in levels greater than 10 tpy for any individual HAP or 25 tpy for any combination of HAP (i.e., major HAP sources). Emissions and operational limitations provided in the NESHAPs are established on the basis of a Maximum Achievable Control Technology (MACT) determination for a particular major source category.

Furthermore, generally available control technology (GACT)-based NESHAPs (located in 40 CFR 63) require area (i.e., non-major) sources to control emissions to the level achievable by the use of generally available control technologies or management practices to reduce emissions of HAP.

The Wadsworth Compressor Station will operate as an area (i.e., non-major) source of HAP as demonstrated in Table 1-1. Each potentially applicable subpart of 40 CFR Part 63 is discussed in the subsections below.

2.1.5.1. 40 CFR 63, Subpart A – General Provisions - Applicable

NESHAP Subpart A, *General Provisions*, contains national emission standards for HAP defined in Section 112(b) of the Clean Air Act. All affected sources, which are subject to another NESHAP, are subject to the general provisions of NESHAP Subpart A, unless specifically excluded by the source-specific NESHAP.

2.1.5.2. 40 CFR 63, Subpart T – Halogenated Solvent Cleaning – Not Applicable

NESHAP Subpart T is applicable to the use of halogenated solvent cleaners at both major and area sources of HAP. The parts washer will not use solvent cleaners containing halogens. Therefore, NESHAP Subpart T does not apply.

2.1.5.3. 40 CFR 63, Subpart HH – Oil and Natural Gas Production Facilities – Not Applicable

MACT Subpart HH applies to emission points at oil and natural gas production facilities that are HAP major or HAP area sources and that process, upgrade, or store either hydrocarbon liquids or natural gas prior to the point of custody transfer. For area sources, the affected source includes each triethylene glycol (TEG) dehydration unit located at a facility that meets the criteria specified in paragraph (a) of the regulation. Also, the natural gas production facility to which the rule applies ends at the point that the natural gas enters a facility in the natural gas transmission and storage category per 63.760(a)(3). The Wadsworth Compressor Station will not operate a TEG dehydration unit and the station is considered a natural gas transmission and storage facility; therefore, NESHAP Subpart HH does not apply.

2.1.5.4. 40 CFR 63, Subpart HHH – Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities – Not Applicable

MACT Subpart HHH applies to natural gas transmission and storage facilities that transport or store natural gas prior to entering the pipeline to a local distribution company or to a final end user and are major sources of HAP emissions. The proposed Wadsworth Compressor Station is an area source for HAP; therefore this subpart is not applicable.

2.1.5.5. 40 CFR 63, Subpart YYYY – Stationary Combustion Turbines – Not Applicable

MACT Subpart YYYY establishes emission limitations and operating limits for HAP emissions from stationary combustion turbines located at major sources of HAP. The proposed Wadsworth Compressor Station is not a major source of HAP; therefore the combustion turbine at the Wadsworth Compressor Station is not subject to Subpart YYYY.

2.1.5.6. 40 CFR 63, Subpart ZZZZ – Reciprocating Internal Combustion Engines (RICE) – Applicable

The NESHAP found in 40 CFR 63, Subpart ZZZZ (RICE NESHAP) was designed to regulate emissions from stationary reciprocating internal combustion engines at both major and area sources of hazardous air pollutants. The proposed emergency generator engine is classified as a new RICE because it will be constructed after June 12, 2006 and located at an area source of HAP [40 CFR 63.6590(a)(2)(iii)]. Subpart ZZZZ requires all new spark-ignition RICE located at an area source of HAP to comply with NSPS Subpart JJJJ with no additional applicable requirements under the RICE NESHAP [40 CFR 63.6590(c)(1)]. The Emergency Generator (P002) will meet the requirements under the RICE NESHAP by complying with NSPS Subpart JJJJ for spark ignition RICE (refer to the discussion in Section 2.1.4.10).

2.1.5.7. 40 CFR 63, Subpart DDDDD – Industrial, Commercial, and Institutional Boilers and Process Heaters at Major Sources of HAP Emissions – Not Applicable

MACT Subpart DDDDD establishes emission limits, operational standards, and compliance demonstration requirements for HAP emissions from industrial, commercial, and institutional boilers and process heaters at major sources of HAP emissions. The Wadsworth Compressor Station is not a major source of HAP emissions; therefore, this regulation is not applicable.

2.1.5.8. 40 CFR 63, Subpart JJJJJJ – Industrial, Commercial, and Institutional Boilers at Area Sources of HAP Emissions – Not Applicable

The provisions of 40 CFR 63, Subpart JJJJJJ establish emission limits, operational standards, and energy assessment requirements for HAP emissions from industrial, commercial, and institutional boilers at area sources of HAP emissions. According to 40 CFR 63.11194(a)(2), affected sources include the collection of all new industrial, commercial, and institutional boilers within a subcategory (e.g., coal, biomass, oil). Furthermore, Subpart JJJJJJ specifically excludes natural gas fired boilers [40 CFR 63.11195(e)]. The proposed Process Heater (B001) is a natural gas fired catalytic style heater and does not meet the definition of industrial, commercial, or institutional boilers as defined in 40 CFR 63.11237; therefore, this regulation is not applicable.

2.1.5.9. Non-Applicability of All Other NESHAP

NESHAP standards are developed for particular industrial source categories, and the applicability of a particular NESHAP to a facility can be readily ascertained based on the industrial source covered. All other NESHAP are categorically not applicable to the proposed project.

2.2. STATE REGULATORY APPLICABILITY

2.2.1. OAC 3745-17-07 – Control of Visible Particulate Emissions from Stationary Sources – *Applicable*

OAC 3745-17-07(A) limits visible particulate emissions from all stacks to less than 20 percent opacity, as a 6-minute average, except during periods of startup, shutdown, and malfunction. However, visible emissions may exceed 20 percent opacity, as a 6-minute average, but not for more than 6 consecutive minutes in any 1-hour period. Visible emissions may not exceed 60 percent opacity, as a 6-minute average, at any time. The exhaust stacks associated with the Combustion Turbine (P001) and Emergency Generator (P002) will be subject to this visible emissions standards.

2.2.2. OAC 3745-17-10 – Restrictions on Particulate Emissions from Fuel Burning Equipment – *Not Applicable*

Pursuant to OAC 3745-17-10(A), OAC 3745-17-10 applies to facilities in which fuel, including any product or by-product of a manufacturing process, is burned for the primary purpose of producing heat or power by indirect heat transfer. The proposed Combustion Turbine (P001) and Emergency Generator (P002) will not be subject to the requirements of this rule given that these units do not produce heat or power by indirect heat transfer.

2.2.3. OAC 3745-17-11 – Restrictions of Particulate Emissions from Industrial Processes - *Applicable*

The emission limits of OAC 3745-17-11 apply to any operation, process, or activity that releases or may release particulate emissions into the ambient air. Pursuant to OAC 3745-17-11(B)(4), particulate emission from any stationary gas turbine shall not exceed 0.04 pounds per million British thermal units (lb/MMBtu) of actual heat input. Combustion Turbine (P001) will be subject to this emissions standard.

Additionally, OAC 3745-17-11(B)(5)(b) limits particulate emissions from large (i.e., greater than 600 hp) stationary internal combustion engines to 0.062 lb/MMBtu of heat input. The Emergency Generator (P002) will be subject to this emissions standard.

2.2.4. OAC 3745-18-06 – General SO_2 Emission Limit Provisions – *Not Applicable*

The emission limits of OAC 3745-18-06 apply to any operation, process, or activity that releases or may release SO_2 emissions into the ambient air. Per OAC 3745-18-06(A), stationary gas turbines and stationary IC engines are exempt from OAC 3745-18-06(D), (F), and (G) during any calendar day in which natural gas is the only fuel burned. The proposed Combustion Turbine (P001) and Emergency Generator (P002) will

burn pipeline quality natural gas only, and are therefore exempt from the requirements of OAC 3745-18-06.

2.2.5. OAC 3745-21-09(L) – Storage of Petroleum Liquids in Fixed Roof Tanks – *Not Applicable*

The provisions of OAC 3745-21-09(L) prohibit the storage of any petroleum liquid with a true vapor pressure (TVP) greater than 1.52 actual pounds per square inch (psia) in fixed roof tanks unless such tanks meet the specified design requirements. Fixed roof tanks with capacities less than 40,000 gallons are exempt from the requirements of OAC 3745-21-09(L)(1) pursuant to OAC 3745-21-09(L)(2)(a). The Separator Vessels #1-5 (P004-P008) and the Storage Vessels #1-3 (T001-T003) are each sized to a nominal storage capacity less than 40,000 gallons. Therefore, OAC 3741-21-09(L) is not applicable.

2.2.6. OAC 3745-21-21 – Storage of Volatile Organic Liquids in Fixed Roof Tanks and External Floating Roof Tanks – *Not Applicable*

The Wadsworth Compressor Station will have a combined total potential to emit for VOC emissions less than 100 tpy; therefore, the storage vessel is not subject to the standards of OAC 3745-21-21.

2.2.7. OAC 3745-110-03 – RACT Requirements and/or Limitations for Emissions of NO_X from Stationary Sources - *Applicable*

The emission limitations in OAC 3745-110-03 apply to any new stationary source of NO_X emissions that meets the conditions in OAC 3745-110-02(A)(2). The Combustion Turbine (P001) and Emergency Generator (P002) will be new stationary sources that meet the conditions in OAC 3745-110-02(A)(2).

In accordance with OAC 3745-110-03(K)(2), the Emergency Generator (P002) will be exempt from the emission standards of OAC 3745-110-03 given that NGT will maintain a monthly log of emergency and non-emergency operating hours per month.

Additionally, the emission limitation applicable to the Combustion Turbine (P001) under standards of NSPS KKKK is more stringent than the limit established in OAC 3745-110-03(E)(1)(c). Therefore, NGT will comply with the requirements of NSPS KKKK applicable to P001 rather than the standards of OAC 3745-110-03 pursuant to OAC 3745-110-02(A)(2)(b).

Pursuant to the provisions added to Ohio Revised Code (ORC) 3704 as a result of Senate Bill 265, sources modified or constructed after August 3, 2009, are to have rule-based best available technology (BAT) limits established by Ohio EPA for specific source categories. However, Ohio EPA has yet to promulgate the rule-based BAT limits. To address this regulatory gap, the Ohio EPA's Division of Air Pollution Control (DAPC) released a memo (February 2014 Memo) indicating that permits filed on or after August 3, 2009, must go through an interim case-by-case BAT procedure.[37]

The first step in determining BAT, according to the February 2014 Memo, is to review MACT, GACT, BACT, and LAER applicability. The next step is to determine whether the operations are of the type and size that are regulated by Reasonable Available Control Technology (RACT) requirements for VOC emissions.

The third step in the BAT analysis is to determine BAT on a case-by-case basis by: 1) reviewing past BAT determinations, and 2) determining the format for the BAT limit, which should be expressed in one of the following ways:

(1) Work practices;
(2) Source design characteristics or design efficiency of applicable air contaminant control devices;
(3) Raw material specifications or throughput limitations averaged over a 12-month rolling period; or
(4) Monthly allowable emissions averaged over a 12-month rolling period.

Furthermore, the existing "less than 10 tpy" BAT exemption pursuant to OAC 3745-31-05(A)(3)(a)(ii) is not currently approved as part of Ohio's State Implementation Plan (SIP). Ohio EPA is currently in the process of revising the procedures for specifying BAT for sources that have potential emissions less than 10 tpy. In the interim, Ohio EPA is establishing BAT for these sources based on the guidance presented in the February 2014 memo.[38]

3.1. COMBUSTION TURBINE BAT

The Combustion Turbine (P001) is expected to generate emissions of gaseous pollutants (e.g., CO, VOC, NO_X, and SO_2) and particulate matter through the combustion of natural gas. **NGT is requesting that the use of the oxidation catalyst as a control device on the combustion turbine be considered as BAT**. Section 2.1.4.11 describes the emission limitations that apply to the turbine under NSPS KKKK including a NO_X limitation of 25 ppm at 15% O_2. In accordance with footnote 5 of the February 2014 memo, applicants may evaluate NSPS limitations when identifying and requesting appropriate limits as BAT. Therefore, NGT proposes that compliance with NSPS KKKK satisfies the requirement to establish BAT for emissions of NO_X from the Combustion Turbine (P001).

[37] Ohio EPA Memo from Mike Hopkins, Assistant Chief, Permitting, DAPC, to Permit Writers and Reviewers "BAT Requirements for Permits Issued On or After February 7, 2014" dated February 7, 2014, which supersedes the BAT guidance issued on August 30, 2013. Ohio's BAT policy will be in place only until such time when the Ohio EPA develops and promulgates rules that define BAT in accordance with Ohio Revised Code (ORC) 3704.03(T) requirements.

[38] Question 34 of the February 2014 Memo.

Notwithstanding the guidance presented in the February 2014 Memo, NGT is proposing the use of the control device be accompanied by short-term and annual emissions limits of controlled pollutants (CO and VOC), as shown in Table 3-1. Refer to Appendix C for a formal request of the establishment of BAT in this format. Additionally, NGT is requesting as BAT for the remaining uncontrolled pollutants (SO_2 and PM) monthly limits as rolling, 12-month averages as specified in Table 3-2.

3.2. GAS RELEASES BAT

The evacuation of piping during maintenance and routine operations results in the release of gases directly to the atmosphere. In accordance with Item 4.f of the February 2014 memo, NGT requests as BAT for gas releases a monthly VOC limit as a rolling, 12-month average as specified in Table 3-2.

3.3. EQUIPMENT LEAKS BAT

Various piping components, including valves, connectors, flanges, and open-ended lines may result in fugitive emissions due to leaks. In accordance with Item 4.f of the February 2014 memo, NGT requests as BAT for the equipment leaks a monthly VOC limit as a rolling, 12-month average as specified in Table 3-2.

3.4. SEPARATOR VESSELS BAT

Separator Vessels #1 through 5 (P004-P008) will generate emissions of VOC through flashing, working, and standing losses. In accordance with Item 4.f of the February 2014 memo, NGT requests as BAT for each storage vessel a monthly VOC limit as a rolling, 12-month average as specified in Table 3-2.

3.5. TRUCK LOADING OPERATION BAT

The loading of pipeline liquids and used lubricating oil into tank trucks via the truck loading operation will generate emissions of VOC. In accordance with Item 4.f of the February 2014 memo, NGT requests as BAT for the truck loading operation a monthly VOC limit as a rolling, 12-month average as specified in Table 3-2. As described in Item 4.f of the February 2014 Memo, monitoring, recordkeeping, and reporting requirements will not be necessary to support this BAT limit given that potential VOC emissions will not exceed 1 tpy.

3.6. SUMMARY OF SELECTED BAT EMISSION LIMITS

Tables 3-1 and 3-2 summarize the requested BAT limits for each emission unit at the Wadsworth Compressor Station.

Table 3-1. Summary of Proposed Historical Format BAT Limits

EU ID	Emission Unit Description	CO		VOC	
		(lb/hr)	(tpy)	(lb/hr)	(tpy)
P001	Combustion Turbine	13.15	7.79	1.65	3.30

Table 3-2. Summary of Proposed BAT Limits

EU ID	Emission Unit Description	Emission Limits (ton/month, averaged over 12-month rolling period)			
		VOC	NO_X	SO_2	PM
P001	Combustion Turbine		2.58	0.27	0.52
P003	Gas Releases	1.65			
P801	Equipment Leaks	0.52			
P004	Separator Vessel #1	1.16E-02			
P005	Separator Vessel #2	1.16E-02			
P006	Separator Vessel #3	9.10E-03			
P007	Separator Vessel #4	5.02E-02			
P008	Separator Vessel #5	1.13E-03			
J001	Loading Operation	8.50E-04			

Air dispersion modeling is sometimes necessary to demonstrate that a source will not: 1) violate Ohio EPA's policy whereby no new source exceeds the Ohio Acceptable Incremental Impact (AII) levels (i.e., consumes more than half of the available PSD increments), or 2) causes ground-level concentrations that exceed Ohio EPA's Maximum Allowable Ground Level Concentrations (MAGLCs) for toxic air pollutants.[39] This section of the PTIO application describes the analysis that was conducted to address Ohio modeling requirements for the installation of the Wadsworth Compressor Station.

4.1. REGULATED NSR POLLUTANT MODELING ANALYSIS

Engineering Guide #69: Air Dispersion Modeling Guidance (Engineering Guide #69) requires that increases in allowable emissions of regulated NSR pollutants from all new or modified sources be evaluated to determine whether the increases in allowable emissions exceed the Ohio modeling significant emission rates (SERs). For each regulated NSR pollutant for which the increase in allowable emissions exceeds the applicable SER, an air dispersion modeling analysis is required to demonstrate that the ambient incremental impact (AII) is less than the Ohio AII levels (one half of any PSD increment). Table 4-1 lists the Ohio modeling SERs and the corresponding Ohio AII levels.

Table 4-1. Ohio Modeling Significant Emission Rates

Pollutant	Ohio Modeling SER (tpy)	Project Increase (tpy)	Modeling Required? (Y/N)	Ohio Acceptable Incremental Impact ($\mu g/m^3$)
PM_{10}	15	6.29	N	8.5 – Annual
				15 – 24-hr
$PM_{2.5}$	10	6.29	N	2 – Annual
				4.5 – 24-hr
NO_2	40	32.67	N	12.5 – Annual
				188 – 1-hr
SO_2	40	3.21	N	10 – Annual
				45.5 – 24-hr
				256 – 3-hr
				196 – 1-hr
CO	100	10.16	N	2,500 – 8-hr
				10,000 – 1-hr

As demonstrated in Table 1-1, the installation of the Wadsworth Compressor Station will not result in emissions of any NSR regulated pollutant exceeding the Ohio modeling SERs, and NGT will not be required to conduct an air dispersion modeling analysis as part of this application.

[39] Engineering Guide #69: Air Dispersion Modeling Guidance, Ohio EPA Air Quality Modeling and Planning Section, 2014, Pg. 4.

4.2. AIR TOXICS MODELING ANALYSIS

Item 1 of Ohio EPA's Engineering Guide #69 requires air dispersion modeling for each toxic pollutant for which the increase in allowable emissions exceeds one (1) tpy.[40] The air dispersion modeling must demonstrate that the ambient incremental impact is less than the Maximum Allowable Ground Level Concentrations (MAGLCs) established in accordance with Ohio EPA guidance as required by ORC 3704.03(F)(4)(b).[41]

Table 1-1 and Appendix B demonstrate that the project will not result in emissions of any toxic pollutant exceeding one (1) tpy. Therefore, NGT is not required to perform an air toxics dispersion modeling analysis as part of this application.

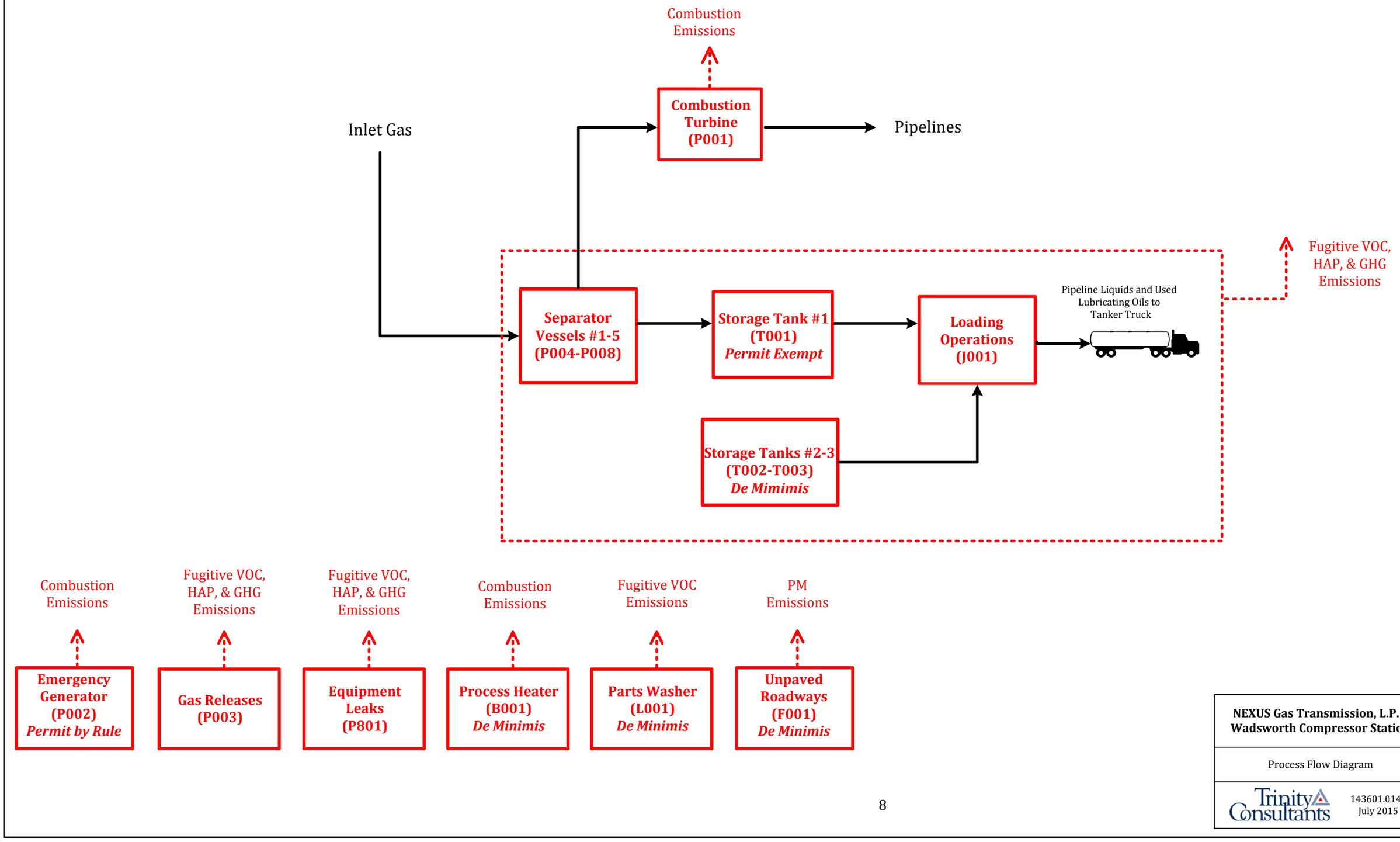
[40] Air toxic pollutants include any pollutant listed in OAC 3745-114-01.

[41] ORC 3704.03(F)(4)(b) requires that applicable MAGLCs be determined in accordance with Option A: Review of New Sources of Air Toxic Emissions, Ohio EPA Air Quality Modeling and Planning Section (May 1986).

APPENDIX A

Process Flow Diagram

FIGURE 1-2. PROCESS FLOW DIAGRAM FOR THE WADSWORTH COMPRESSOR STATION



NEXUS Gas Transmission, L.P. – Wadsworth Compressor Station
Process Flow Diagram
Trinity Consultants 143601.0141 July 2015

APPENDIX B

Emission Calculations Documentation

TABLE A-1
Potential to Emit
Basis
After Permitting Activity

Emission Source				Rated Capacity	Operational Limits								Data Sources
ID	FIN	EPN	Description		Short-Term -- Material Flow		Short-Term -- Capacity		Annual Material Flow		Annual Utilization		
WADS TBC 01	WADS TBC 01	WADS TBC 01	Turbine	26,000 bhp (NEMA)	Natural Gas	234,728 scfh	Power Output	33,900 bhp	Natural Gas	1,851,779,210 scf/yr	Runtime	8,760 hrs/yr	TABLE B-1Ac
WADS ENGEN 01	WADS ENGEN 01	WADS ENGEN 01	IC Engine	880 bhp	Natural Gas	6,820 scfh	Power Output	880 bhp	Natural Gas	3,409,760 scf/yr	Runtime	500 hrs/yr	TABLE C-1A
WADS FHTR 01	WADS FHTR 01	WADS FHTR 01	Boilers/Heaters	0.750 MMBTU/hr (output)	Natural Gas	1,050 scfh	Heat Input	1.071 MMBTU/hr	Natural Gas	9,201,681 scf/yr	Runtime	8,760 hrs/yr	TABLE D-1A
WADS SV V1S	WADS SV V1S	WADS SV V1S	Separator Vessel	530 gal (accumulation)	Pipeline Liquids	530 gal/hr			Pipeline Liquids	71 gal/yr	Runtime	N/A	TABLE F-2
WADS SV V1D	WADS SV V1D	WADS SV V1D	Separator Vessel	530 gal (accumulation)	Pipeline Liquids	530 gal/hr			Pipeline Liquids	71 gal/yr	Runtime	N/A	TABLE F-3
WADS SV V1C1	WADS SV V1C1	WADS SV V1C1	Separator Vessel	400 gal (accumulation)	Pipeline Liquids	400 gal/hr			Pipeline Liquids	53 gal/yr	Runtime	N/A	TABLE F-4
WADS SV V2	WADS SV V2	WADS SV V2	Separator Vessel	317 gal (accumulation)	Pipeline Liquids	317 gal/hr			Pipeline Liquids	4,000 gal/yr	Runtime	N/A	TABLE F-5
WADS SV V4SD	WADS SV V4SD	WADS SV V4SD	Separator Vessel	43 gal (accumulation)	Pipeline Liquids	43 gal/hr			Pipeline Liquids	6 gal/yr	Runtime	N/A	TABLE F-6
WADS TK V5	WADS TK V5	WADS TK V5	Storage Tank	2,000 gal	Pipeline Liquids	2,000 gal/hr			Pipeline Liquids	4,000 gal/yr	Runtime	N/A	TABLE F-7
WADS TK OIL1	WADS TK OIL1	WADS TK OIL1	Storage Tank	570 gal	Oil	570 gal/hr			Oil	208,050 gal/yr	Runtime	N/A	TABLE F-8
WADS TK OW1	WADS TK OW1	WADS TK OW1	Storage Tank	3,000 gal	Oily Water	3,000 gal/hr			Oily Water	36,000 gal/yr	Runtime	N/A	TABLE F-9
WADS TL PL	WADS TL PL	WADS TL PL	Truck Loading	150 gal/min	Pipeline Liquids	2,000 gal/hr			Pipeline Liquids	4,000 gal/yr	Runtime	N/A	TABLE F-10
WADS TL OIL	WADS TL OIL	WADS TL OIL	Truck Loading	150 gal/min	Oil	570 gal/hr			Oil	6,840 gal/yr	Runtime	N/A	TABLE F-11
WADS TL OW	WADS TL OW	WADS TL OW	Truck Loading	150 gal/min	Oily Water	3,000 gal/hr			Oily Water	36,000 gal/yr	Runtime	N/A	TABLE F-12
WADS GR	WADS GR ST	WADS GR ST	Gas Release Events	Natural Gas	Natural Gas	6,635,000 scfh			Natural Gas	29,450,000 scf/yr	Runtime	N/A	TABLE G-1a
	WADS GR PL	WADS GR PL	Gas Release Events	Natural Gas									
WADS PC	WADS PC NG	WADS PC NG	Piping Components	Natural Gas	Valves: 724; Connectors: 2,631; Flanges: 501; Open-Ended Lines: 9; Pump Seals: 0; Other (blowdown valves, relief valves, and compressor seals): 66								TABLE H-1a
	WADS PC PL	WADS PC PL	Piping Components	Pipeline Liquids	Valves: 100; Connectors: 666; Flanges: 161; Open-Ended Lines: 11; Pump Seals: 2; Other (blowdown valves, relief valves, and compressor seals): 2								TABLE H-2a
	WADS PC OIL	WADS PC OIL	Piping Components	Oil	Valves: 59; Connectors: 278; Flanges: 94; Open-Ended Lines: 0; Pump Seals: 6; Other (blowdown valves, relief valves, and compressor seals): 2								TABLE H-3a
WADS PW	WADS PW	WADS PW	Parts Washer	Remote Reservoir	Solvent	N/A	Solvent Make-up	0.329 gal/hr	Solvent Make-up	120 gal/yr	Runtime	N/A	TABLE I-1

TABLE A-1
Potential to Emit
Emissions
After Permitting Activity

Emission Source				Rated Capacity	Potential to Emit (tpy)										Data
ID	FIN	EPN	Description		CO_{2-e}	NO_X	CO	$PM_{10/2.5}$	SO_2	VOC (Total)	HAP (Total)	Benzene	Formaldehyde	Hexane (n-)	Sources
WADS TBC 01	WADS TBC 01	WADS TBC 01	Turbine	26,000 bhp (NEMA)	111,925	30.9875	7.7945	6.2331	3.2110	3.3045	0.5942	0.0189	0.1318		TABLE B-1Aj
WADS ENGEN 01	WADS ENGEN 01	WADS ENGEN 01	IC Engine	880 bhp	432	0.9700	1.9400	0.0174	0.0010	0.8695	0.5257	0.0032	0.3845	0.0081	TABLE C-1A
WADS FHTR 01	WADS FHTR 01	WADS FHTR 01	Boilers/Heaters	0.750 MMBTU/hr (output)	554	0.7076	0.4313	0.0350	0.0028	0.1663	0.0383	0.0000	0.0015	0	TABLE D-1A
WADS SV V1S	WADS SV V1S	WADS SV V1S	Separator Vessel	530 gal (accumulation)	8					0.1391	0.0087	0.0021		0	TABLE F-2
WADS SV V1D	WADS SV V1D	WADS SV V1D	Separator Vessel	530 gal (accumulation)	8					0.1391	0.0087	0.0021		0	TABLE F-3
WADS SV V1C1	WADS SV V1C1	WADS SV V1C1	Separator Vessel	400 gal (accumulation)	6					0.1092	0.0068	0.0016		0	TABLE F-4
WADS SV V2	WADS SV V2	WADS SV V2	Separator Vessel	317 gal (accumulation)	18					0.6027	0.0363	0.0076		0	TABLE E-4a & TABLE F-5
WADS SV V4SD	WADS SV V4SD	WADS SV V4SD	Separator Vessel	43 gal (accumulation)	1					0.0135	0.0008	0.0002		0	TABLE F-6
WADS TK V5	WADS TK V5	WADS TK V5	Storage Tank	2,000 gal	15					0.2823	0.0176	0.0043		0	TABLE F-7
WADS TK OIL1	WADS TK OIL1	WADS TK OIL1	Storage Tank	570 gal						0.0021					TABLE F-8
WADS TK OW1	WADS TK OW1	WADS TK OW1	Storage Tank	3,000 gal						0.0008					TABLE F-9
WADS TL PL	WADS TL PL	WADS TL PL	Truck Loading	150 gal/min	1					0.0096	0.0006	0.0001		0	TABLE F-10
WADS TL OIL	WADS TL OIL	WADS TL OIL	Truck Loading	150 gal/min						0.0001					TABLE F-11
WADS TL OW	WADS TL OW	WADS TL OW	Truck Loading	150 gal/min						0.0005					TABLE F-12
WADS GR	WADS GR ST	WADS GR ST	Gas Release Events	Natural Gas	15,401					19.8198	1.6383	0.5781		0.5766	TABLE G-1a
	WADS GR PL	WADS GR PL	Gas Release Events	Natural Gas											
WADS PC	WADS PC NG	WADS PC NG	Piping Components	Natural Gas	997					1.2837	0.1061	0.0374		0.0373	TABLE H-1a
	WADS PC PL	WADS PC PL	Piping Components	Pipeline Liquids	0					4.4738	0.6515	0.0645		0.0759	TABLE H-2a
	WADS PC OIL	WADS PC OIL	Piping Components	Oil						0.5252					TABLE H-3a
WADS PW	WADS PW	WADS PW	Parts Washer	Remote Reservoir						0.4103					TABLE I-1
TOTAL					129,365	32.6652	10.1658	6.2854	3.2148	32.1522	3.6335	0.7203	0.5179	0.7790	

TABLE B-1Aa
Ambient Temperature, Start Model, and Utilization Data
PTE - 100% Fuel Utilization at 100% Power Output

Month	#Days	Daily Average	Weighted Daily Average
JAN	31.00	24.45	2.07
FEB	28.50	26.95	2.10
MAR	31.00	37.60	3.19
APR	30.00	48.40	3.97
MAY	31.00	58.80	4.99
JUN	30.00	67.75	5.56
JUL	31.00	72.05	6.11
AUG	31.00	70.25	5.96
SEP	30.00	63.85	5.24
OCT	31.00	52.70	4.47
NOV	30.00	41.55	3.41
DEC	31.00	29.75	2.52
Annual	365.50	49.51	**49.60**

Low Temperature Data	
Below 0˚F Hours	26 hrs/yr
Below -20˚F Hours	0 hrs/yr

NOTES
1. Please refer to TABLE B-0.

Start Model and Utilization	
Utilization	100.00%
Start Model	TET - High
Starts	260.00 starts/yr

TABLE B-1Ab
Manufacturer's Operating and Emissions Data
Normal Operations
PTE - 100% Fuel Utilization at 100% Power Output

Parameters			Curve Fitting			Vendor Data						
Ambient	Temperature	°F	-20.00	-20.00	49.51	-0.01	0.01	20.00	40.00	60.00	80.00	100.00
	Altitude	ft	0	0	0	0	0	0	0	0	0	0
	Pressure	psia	14.702	14.702	14.702	14.702	14.702	14.702	14.702	14.702	14.702	14.702
	Relative Humidity	%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$	0.0003	0.0003	0.0039	0.0006	0.0006	0.0013	0.0028	0.0058	0.0124	0.0262
Fuel	Lower Heating Value (LHV)	BTU/scf	939.2	939.2	939.2	939.2	939.2	939.2	939.2	939.2	939.2	939.2
	Higher Heating Value (HHV)	BTU/scf	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6
Turbine	Net Output Power	hp	35,209	35,209	30,282	33,900	33,900	32,592	31,146	29,151	26,280	23,613
	Fuel Consumption	scf/hr	238,158	238,158	206,525	229,429	229,429	220,709	211,595	200,266	185,977	173,041
	Heat Input at LHV	MMBTU/hr	223.68	223.68	193.97	215.48	215.48	207.29	198.73	188.09	174.67	162.52
	Heat Input at HHV	MMBTU/hr	248.53	248.53	215.52	239.42	239.42	230.32	220.81	208.99	194.08	180.58
	Heat Rate at LHV	BTU/hp-hr	6,353	6,353	6,405	6,356	6,356	6,360	6,381	6,452	6,646	6,883
	Heat Rate at HHV	BTU/hp-hr	7,059	7,059	7,117	7,063	7,063	7,067	7,090	7,169	7,385	7,647
Exhaust	Temperature	°F	830	830	864	839	839	848	858	873	897	924
	Water Fraction	%, by vol	5.94%	5.94%	6.42%	6.00%	6.00%	6.06%	6.25%	6.70%	7.61%	9.28%
	Non-Water Fraction	%, by vol	94.06%	94.06%	93.58%	94.00%	94.00%	93.94%	93.75%	93.30%	92.39%	90.72%
	O_2 Content	%, by vol (dry)	15.13%	15.13%	15.36%	15.20%	15.20%	15.27%	15.33%	15.39%	15.43%	15.44%
	Molecular Weight	lb/lb-mol	28.60	28.60	28.53	28.59	28.59	28.58	28.55	28.50	28.39	28.21
	Flow Rate	lb/hr	607,028	607,028	547,091	591,246	591,246	575,480	557,800	533,101	498,286	464,319
		scfm (1 atm, 68°F)	136,511	136,511	123,277	132,949	132,949	129,440	125,614	120,237	112,851	105,846
		acfm	333,391	333,391	309,084	326,960	326,960	320,535	313,439	303,438	289,926	277,339
NO_X Emissions		lb/lb-mol	46.01	46.01	46.01	46.01	46.01	46.01	46.01	46.01	46.01	46.01
		ppmvd, 15% O_2	120	9	9	9	9	9	9	9	9	9
		ppmvw	110.39	8.28	7.91	8.17	8.17	8.07	7.97	7.84	7.71	7.56
		lb/hr	107.80	8.08	6.98	7.78	7.78	7.47	7.16	6.75	6.23	5.72
CO Emissions		lb/lb-mol	28.01	28.01	28.01	28.01	28.01	28.01	28.01	28.01	28.01	28.01
		ppmvd, 15% O_2	150	25	25	25	25	25	25	25	25	25
		ppmvw	137.98	23.00	21.97	22.70	22.70	22.41	22.13	21.78	21.41	20.99
		lb/hr	82.03	13.67	11.80	13.15	13.15	12.64	12.11	11.41	10.53	9.68
UHC Emissions		lb/lb-mol	18.37	18.37	18.37	18.37	18.37	18.37	18.37	18.37	18.37	18.37
		ppmvd, 15% O_2	75	25	25	25	25	25	25	25	25	25
		ppmvw	68.99	23.00	21.97	22.70	22.70	22.41	22.13	21.78	21.41	20.99
		lb/hr	26.90	8.97	7.74	8.63	8.63	8.29	7.94	7.49	6.91	6.35

NOTES

1. Operating and emissions data was provided by the manufacturer for the following ambient temperatures: 0°F, 20°F, 40°F, 60°F, 80°F, and 100°F.
   Specific Humidity is estimate using curve fitting equation: $6.15E\text{-}04e^{3.75E\text{-}02T}$
   All other parameter values estimated using cubic spline.
2. Pollutant concentrations (ppmvd at 15% O2) for 0°F and -20°F based on information provided in a document published by the manufacturer.
3. Ambient pressure and humidity will vary. However, it is believed that any variation would not affect compliance with the proposed emission representations.
4. The heating value of the natural gas used to fuel the turbine will vary. However, it is believed that any variation would not affect compliance with the proposed emission representations.

TABLE B-1Ab
Manufacturer's Operating and Emissions Data
Normal Operations
PTE - 100% Fuel Utilization at 100% Power Output

Vendor Data												
Make:	Solar											
Model:	250-30002S4											
Rate	30,000 hp (ISO)											
Capacity:	26,000 hp (NEMA)											
Load:	100%											
Ambient	Temperature	°F				-0.01	0.01	20.00	40.00	60.00	80.00	100.00
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$				0.0006	0.0006	0.0014	0.0031	0.0066	0.0133	0.0253
Fuel	Lower Heating Value (LHV)	BTU/scf				939.2	939.2	939.2	939.2	939.2	939.2	939.2
Turbine	Net Output Power	hp				33,900	33,900	32,592	31,146	29,151	26,280	23,613
	Heat Input at LHV	MMBTU/hr				215.48	215.48	207.29	198.73	188.09	174.67	162.52
Exhaust	Temperature	°F				839	839	848	858	873	897	924
	Water Fraction	%				6.00%	6.00%	6.06%	6.25%	6.70%	7.61%	9.28%
	O_2 Content	% (dry)				15.20%	15.20%	15.27%	15.33%	15.39%	15.43%	15.44%
	Molecular Weight	lb/lb-mol				28.59	28.59	28.58	28.55	28.50	28.39	28.21
	Flow Rate	lb/hr				591,246	591,246	575,480	557,800	533,101	498,286	464,319
		acfm				326,960	326,960	320,535	313,439	303,438	289,926	277,339
Guaranteed	NO_X	ppmvd, 15% O_2	120	9		9	9	9	9	9	9	9
Emissions	CO	ppmvd, 15% O_2	150	25		25	25	25	25	25	25	25
	UHC	ppmvd, 15% O_2	75	25		25	25	25	25	25	25	25

TABLE B-1Ac
Gas-Fired Turbines
Emission Estimates
Normal Operations
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar				
Model	250-30002S4				
Normal Operating Load	100%				
Fuel	Natural Gas				
Fuel Higher Heating Value (HHV)	1,020 BTU/scf			1,020 BTU/scf	
Ambient Temperature	49.51 °F			0.01 °F	
Power Output	30,282 bhp (mech.)			33,900 bhp (mech.)	
	22,581 kW (elec.)			25,280 kW (elec.)	
Heat Rate at HHV	7,117 BTU/hp-hr			7,063 BTU/hp-hr	
Operating Hours	8,760 hrs/yr				
Fuel Consumption	211,294 scfh			234,728 scfh	
	1,850.938 MMscf/yr				
Heat Input at HHV	215.52 MMBTU/hr			239.42 MMBTU/hr	
	1,887,957 MMBTU/yr	Average	Maximum		Maximum
NO_X	33.02 lb/MMscf	6.9773 lb/hr	30.5605 tpy	33.13 lb/MMscf	7.7768 lb/hr
CO	55.84 lb/MMscf	11.7990 lb/hr	51.6796 tpy	56.03 lb/MMscf	13.1510 lb/hr
SO_2	3.47 lb/MMscf	0.7328 lb/hr	3.2095 tpy	3.47 lb/MMscf	0.8140 lb/hr
$PM_{10/2.5}$	6.73 lb/MMscf	1.4224 lb/hr	6.2303 tpy	6.73 lb/MMscf	1.5802 lb/hr
$CO_{2\text{-}e}$	120,801 lb/MMscf	25,525 lb/hr	111,797 tpy	120,803 lb/MMscf	28,356 lb/hr
CO_2	120,017 lb/MMscf	25,359 lb/hr	111,072 tpy	120,017 lb/MMscf	28,171 lb/hr
N_2O	0.23 lb/MMscf	0.0478 lb/hr	0.2093 tpy	0.23 lb/MMscf	0.0531 lb/hr
TOC (Total)	36.63 lb/MMscf	7.7390 lb/hr	33.8967 tpy	36.75 lb/MMscf	8.6257 lb/hr
Methane	28.64 lb/MMscf	6.0505 lb/hr	26.5010 tpy	28.73 lb/MMscf	6.7438 lb/hr
Ethane	1.00 lb/MMscf	0.2111 lb/hr	0.9245 tpy	1.00 lb/MMscf	0.2352 lb/hr
VOC (Total)	6.99 lb/MMscf	1.4774 lb/hr	6.4712 tpy	7.02 lb/MMscf	1.6467 lb/hr
VOC (non-HAP)	3.57 lb/MMscf	0.7547 lb/hr	3.3055 tpy	3.58 lb/MMscf	0.8411 lb/hr
HAP (Total)	3.42 lb/MMscf	0.7228 lb/hr	3.1657 tpy	3.43 lb/MMscf	0.8056 lb/hr
Acetaldehyde	1.33E-01 lb/MMscf	0.0281 lb/hr	0.1233 tpy	1.34E-01 lb/MMscf	0.0314 lb/hr
Acrolein	2.13E-02 lb/MMscf	0.0045 lb/hr	0.0197 tpy	2.14E-02 lb/MMscf	0.0050 lb/hr
Benzene	4.00E-02 lb/MMscf	0.0084 lb/hr	0.0370 tpy	4.01E-02 lb/MMscf	0.0094 lb/hr
Biphenyl					
Butadiene (1,3-)	1.43E-03 lb/MMscf	0.0003 lb/hr	0.0013 tpy	1.44E-03 lb/MMscf	0.0003 lb/hr
Carbon Tetrachloride					
Chlorobenzene					
Chloroform					
Dichloropropene (1,3-)					
Ethylbenzene	1.07E-01 lb/MMscf	0.0225 lb/hr	0.0986 tpy	1.07E-01 lb/MMscf	0.0251 lb/hr
Ethylene Dibromide					
Formaldehyde	2.36E+00 lb/MMscf	0.4995 lb/hr	2.1879 tpy	2.37E+00 lb/MMscf	0.5568 lb/hr
Hexane (n-)					
Methanol					
Methylene Chloride					
Methylnaphthalene (2-)					
Naphthalene	4.33E-03 lb/MMscf	0.0009 lb/hr	0.0040 tpy	4.34E-03 lb/MMscf	0.0010 lb/hr
PAH	7.33E-03 lb/MMscf	0.0015 lb/hr	0.0068 tpy	7.35E-03 lb/MMscf	0.0017 lb/hr
Phenol					
Propylene Oxide	9.66E-02 lb/MMscf	0.0204 lb/hr	0.0894 tpy	9.69E-02 lb/MMscf	0.0227 lb/hr
Styrene					
Tetrachloroethane (1,1,2,2-)					
Toluene	4.33E-01 lb/MMscf	0.0915 lb/hr	0.4006 tpy	4.34E-01 lb/MMscf	0.1019 lb/hr
Trichloroethane (1,1,2-)					
Trimethylpentane (2,2,4-)					
Vinyl Chloride					
Xylenes	2.13E-01 lb/MMscf	0.0450 lb/hr	0.1972 tpy	2.14E-01 lb/MMscf	0.0502 lb/hr

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Manufacturer provided operating and emissions data (TABLE B-1Ab).
3. The annual emissions are based on a representative annual average ambient temperature (TABLE B-1Aa).
   Maximum hourly emissions are based on an ambient temperature of 0°F.
4. NOX, CO, and TOC (Total) emission factor based on Vendor Guarantee.
5. CO2 and N2O emission factors based on 40 CFR 98, Subpart C, Table C-1 and 40 CFR 98, Subpart C, Table C-2, respectively.
6. SO2 emission factor based on AP-42, Section 3.1 (Revised 4/00), Table 3.1-2a.
7. PM10/2.5 emission factor based on AP-42, Section 3.1 (Revised 4/00), Table 3.1-2a, not Solar's PIL 171 dated 06/01/2012 (173% greater).
8. Methane, Ethane, and VOC (Total) emissions based on scaling of AP-42, Section 3.1 (Revised 4/00), Table 3.1-2a using Vendor Guarantee.
   Speciated VOC (non-HAP) emissions based on scaling of AP-42, Section 3.1 (Revised 4/00), Table 3.1-2a using Vendor Guarantee.
   $EF_{Scaled} = (EF_{AP42})(EF_{TOC}/EF_{TOC\text{-}AP42})$

TABLE B-1Ad
Manufacturer's Operating and Emissions Data
Startup/Shutdown Step 2: Iginition-Idle
PTE - 100% Fuel Utilization at 100% Power Output

Parameters			Interpolated	Vendor Data					
Ambient	Temperature	°F	49.51	0.01	20.00	40.00	60.00	80.00	100.00
	Altitude	ft	0	0	0	0	0	0	0
	Pressure	psia	14.702	14.702	14.702	14.702	14.702	14.702	14.702
	Relative Humidity	%	60%	60%	60%	60%	60%	60%	60%
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$	0.0039	0.0006	0.0013	0.0028	0.0058	0.0124	0.0262
Fuel	Lower Heating Value (LHV)	BTU/scf	939.2	939.2	939.2	939.2	939.2	939.2	939.2
	Higher Heating Value (HHV)	BTU/scf	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6
Turbine	Net Output Power	hp	3,031	3,390	3,259	3,115	2,915	2,628	2,361
	Fuel Consumption	scf/hr	66,346	68,761	67,920	66,983	65,503	63,511	60,796
	Heat Input at LHV	MMBTU/hr	62.31	64.58	63.79	62.91	61.52	59.65	57.10
	Heat Input at HHV	MMBTU/hr	69.24	71.76	70.88	69.90	68.36	66.28	63.44
	Heat Rate at LHV	BTU/hp-hr	20,557	19,050	19,573	20,196	21,105	22,698	24,185
	Heat Rate at HHV	BTU/hp-hr	22,841	21,167	21,748	22,440	23,450	25,220	26,872
Exhaust	Temperature	°F	840	737	779	821	861	900	935
	Water Fraction	%, by vol	4.43%	3.58%	3.81%	4.18%	4.80%	5.91%	7.72%
	Non-Water Fraction	%, by vol	95.57%	96.42%	96.19%	95.82%	95.20%	94.09%	92.28%
	O_2 Content	%, by vol (dry)	17.39%	17.64%	17.53%	17.43%	17.33%	17.20%	17.11%
	Molecular Weight	lb/lb-mol	28.66	28.74	28.72	28.68	28.62	28.50	28.30
	Flow Rate	lb/hr	272,880	301,815	289,208	277,244	263,781	230,080	214,821
		scfm (1 atm, 68°F)	61,210	67,517	64,740	62,117	59,234	51,881	48,805
		acfm	150,670	153,006	151,860	150,647	148,141	133,583	128,897
NO_X Emissions		lb/lb-mol	46.01	46.01	46.01	46.01	46.01	46.01	46.01
		ppmvd, 15% O_2	50	50	50	50	50	50	50
		ppmvw	28.46	26.64	27.47	28.18	28.80	29.50	29.64
		lb/hr	12.47	12.87	12.73	12.53	12.21	10.96	10.35
CO Emissions		lb/lb-mol	28.01	28.01	28.01	28.01	28.01	28.01	28.01
		ppmvd, 15% O_2	2,000	2,000	2,000	2,000	2,000	2,000	2,000
		ppmvw	1,138.47	1,065.52	1,098.85	1,127.10	1,152.08	1,180.11	1,185.56
		lb/hr	303.66	313.42	309.94	305.18	297.42	266.85	252.07
UHC Emissions		lb/lb-mol	18.37	18.37	18.37	18.37	18.37	18.37	18.37
		ppmvd, 15% O_2	200	200	200	200	200	200	200
		ppmvw	113.85	106.55	109.88	112.71	115.21	118.01	118.56
		lb/hr	19.92	20.56	20.33	20.02	19.51	17.50	16.53

NOTES

1. Footnotes 1 thru 4 of TABLE B-1Ab.

TABLE B-1Ad
Manufacturer's Operating and Emissions Data
Startup/Shutdown Step 2: Iginition-Idle
PTE - 100% Fuel Utilization at 100% Power Output

Vendor Data									
Make:	Solar								
Model:	250-30002S4								
Rate Capacity:	30,000 hp (ISO)								
	26,000 hp (NEMA)								
Load:	10%								
Ambient	Temperature	°F		0.01	20.00	40.00	60.00	80.00	100.00
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$		0.0006	0.0014	0.0031	0.0066	0.0133	0.0253
Fuel	Lower Heating Value (LHV)	BTU/scf		939.2	939.2	939.2	939.2	939.2	939.2
Turbine	Net Output Power	hp		3,390	3,259	3,115	2,915	2,628	2,361
	Heat Input at LHV	MMBTU/hr		64.58	63.79	62.91	61.52	59.65	57.10
Exhaust	Temperature	°F		737	779	821	861	900	935
	Water Fraction	%		3.58%	3.81%	4.18%	4.80%	5.91%	7.72%
	O_2 Content	% (dry)		17.64%	17.53%	17.43%	17.33%	17.20%	17.11%
	Molecular Weight	lb/lb-mol		28.74	28.72	28.68	28.62	28.50	28.30
	Flow Rate	lb/hr		301,815	289,208	277,244	263,781	230,080	214,821
		acfm		153,006	151,860	150,647	148,141	133,583	128,897
Estimated Emissions	NO_X	ppmvd, 15% O_2		50	50	50	50	50	50
	CO	ppmvd, 15% O_2		2,000	2,000	2,000	2,000	2,000	2,000
	UHC	ppmvd, 15% O_2		200	200	200	200	200	200

TABLE B-1Ae
Manufacturer's Operating and Emissions Data
Startup/Shutdown Step 3: Loading/Thermal Stabilization
PTE - 100% Fuel Utilization at 100% Power Output

Parameters			Interpolated	Vendor Data					
Ambient	Temperature	°F	49.51	0.01	20.00	40.00	60.00	80.00	100.00
	Altitude	ft	0	0	0	0	0	0	0
	Pressure	psia	14.702	14.702	14.702	14.702	14.702	14.702	14.702
	Relative Humidity	%	60%	60%	60%	60%	60%	60%	60%
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$	0.0039	0.0006	0.0013	0.0028	0.0058	0.0124	0.0262
Fuel	Lower Heating Value (LHV)	BTU/scf	939.2	939.2	939.2	939.2	939.2	939.2	939.2
	Higher Heating Value (HHV)	BTU/scf	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6
Turbine	Net Output Power	hp	7,578	8,475	8,148	7,787	7,288	6,570	5,903
	Fuel Consumption	scf/hr	101,453	106,846	104,546	102,609	99,872	95,848	90,503
	Heat Input at LHV	MMBTU/hr	95.28	100.35	98.19	96.37	93.80	90.02	85.00
	Heat Input at HHV	MMBTU/hr	105.87	111.50	109.10	107.08	104.22	100.02	94.44
	Heat Rate at LHV	BTU/hp-hr	12,574	11,841	12,051	12,376	12,870	13,702	14,399
	Heat Rate at HHV	BTU/hp-hr	13,971	13,156	13,390	13,751	14,301	15,224	15,999
Exhaust	Temperature	°F	899	796	838	880	921	960	984
	Water Fraction	%, by vol	5.15%	4.28%	4.52%	4.90%	5.51%	6.55%	8.28%
	Non-Water Fraction	%, by vol	94.85%	95.72%	95.48%	95.10%	94.49%	93.45%	91.72%
	O_2 Content	%, by vol (dry)	16.67%	16.94%	16.83%	16.72%	16.62%	16.54%	16.51%
	Molecular Weight	lb/lb-mol	28.61	28.69	28.67	28.64	28.57	28.46	28.27
	Flow Rate	lb/hr	347,124	389,910	370,850	354,836	338,013	318,919	299,026
		scfm (1 atm, 68°F)	77,991	87,321	83,036	79,645	76,029	72,024	68,003
		acfm	200,727	207,638	204,052	202,052	198,781	193,628	185,907
NO_X Emissions		lb/lb-mol	46.01	46.01	46.01	46.01	46.01	46.01	46.01
		ppmvd, 15% O_2	50	50	50	50	50	50	50
		ppmvw	33.99	32.12	32.93	33.69	34.27	34.53	34.12
		lb/hr	18.97	20.09	19.60	19.20	18.66	17.80	16.61
CO Emissions		lb/lb-mol	28.01	28.01	28.01	28.01	28.01	28.01	28.01
		ppmvd, 15% O_2	1,013	1,013	1,013	1,013	1,013	1,013	1,013
		ppmvw	688.66	650.81	667.21	682.52	694.36	699.56	691.33
		lb/hr	234.03	247.74	241.74	236.85	230.10	219.57	204.82
UHC Emissions		lb/lb-mol	18.37	18.37	18.37	18.37	18.37	18.37	18.37
		ppmvd, 15% O_2	110	110	110	110	110	110	110
		ppmvw	74.78	70.67	72.45	74.11	75.40	75.96	75.07
		lb/hr	16.67	17.65	17.22	16.87	16.39	15.64	14.59

NOTES

1. Footnotes 1 thru 4 of TABLE B-1Ab.

TABLE B-1Ae
Manufacturer's Operating and Emissions Data
Startup/Shutdown Step 3: Loading/Thermal Stabilization
PTE - 100% Fuel Utilization at 100% Power Output

Vendor Data									
Make:	Solar								
Model:	250-30002S4								
Rate Capacity:	30,000 hp (ISO)								
	26,000 hp (NEMA)								
Load:	24%								
Ambient	Temperature	°F		0.01	20.00	40.00	60.00	80.00	100.00
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$		0.0006	0.0014	0.0031	0.0066	0.0133	0.0253
Fuel	Lower Heating Value (LHV)	BTU/scf		939.2	939.2	939.2	939.2	939.2	939.2
Turbine	Net Output Power	hp		8,475	8,148	7,787	7,288	6,570	5,903
	Heat Input at LHV	MMBTU/hr		100.35	98.19	96.37	93.80	90.02	85.00
Exhaust	Temperature	°F		796	838	880	921	960	984
	Water Fraction	%		4.28%	4.52%	4.90%	5.51%	6.55%	8.28%
	O_2 Content	% (dry)		16.94%	16.83%	16.72%	16.62%	16.54%	16.51%
	Molecular Weight	lb/lb-mol		28.69	28.67	28.64	28.57	28.46	28.27
	Flow Rate	lb/hr		389,910	370,850	354,836	338,013	318,919	299,026
		acfm		207,638	204,052	202,052	198,781	193,628	185,907
Estimated Emissions	NO_X	ppmvd, 15% O_2		50	50	50	50	50	50
	CO	ppmvd, 15% O_2		1,013	1,013	1,013	1,013	1,013	1,013
	UHC	ppmvd, 15% O_2		110	110	110	110	110	110

TABLE B-1Af
Gas-Fired Turbines
Emission Estimates
Startup
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar				
Model	250-30002S4				
Fuel	Natural Gas				
Ambient Temperature	49.51 °F			0.01 °F	
Maximum Event Frequency		2 events/hr	260 events/yr		2 events/hr
Maximum Startup Time		18.00 min/hr	39 hrs/yr		18.00 min/hr
Fuel Consumption		26,925 scf/hr	3.50 MMscf/yr		28,245 scf/hr
		Average	Maximum		Maximum
NO_X	2.5209 lbs/event	5.0419 lb/hr	0.3277 tpy	2.6522 lbs/event	5.3044 lb/hr
CO	38.5858 lbs/event	77.1716 lb/hr	5.0162 tpy	40.4455 lbs/event	80.8909 lb/hr
SO_2	0.0467 lbs/event	0.0934 lb/hr	0.0061 tpy	0.0490 lbs/event	0.0980 lb/hr
$PM_{10/2.5}$	0.0906 lbs/event	0.1813 lb/hr	0.0118 tpy	0.0951 lbs/event	0.1901 lb/hr
CO_{2-e}	1,669 lbs/event	3,337 lb/hr	217 tpy	1,750 lbs/event	3,501 lb/hr
CO_2	1,616 lbs/event	3,231 lb/hr	210 tpy	1,695 lbs/event	3,390 lb/hr
N_2O	0.0030 lbs/event	0.0061 lb/hr	0.0004 tpy	0.0032 lbs/event	0.0064 lb/hr
TOC (Total)	2.6627 lbs/event	5.3254 lb/hr	0.3461 tpy	2.7924 lbs/event	5.5848 lb/hr
Methane	2.0817 lbs/event	4.1635 lb/hr	0.2706 tpy	2.1831 lbs/event	4.3663 lb/hr
Ethane	0.0726 lbs/event	0.1452 lb/hr	0.0094 tpy	0.0762 lbs/event	0.1523 lb/hr
VOC (Total)	0.5083 lbs/event	1.0167 lb/hr	0.0661 tpy	0.5331 lbs/event	1.0662 lb/hr
VOC (non-HAP)	0.2597 lbs/event	0.5193 lb/hr	0.0338 tpy	0.2723 lbs/event	0.5446 lb/hr
HAP (Total)	0.2487 lbs/event	0.4974 lb/hr	0.0323 tpy	0.2608 lbs/event	0.5216 lb/hr
Acetaldehyde	9.68E-03 lbs/event	0.0194 lb/hr	0.0013 tpy	1.02E-02 lbs/event	0.0203 lb/hr
Acrolein	1.55E-03 lbs/event	0.0031 lb/hr	0.0002 tpy	1.62E-03 lbs/event	0.0032 lb/hr
Benzene	2.90E-03 lbs/event	0.0058 lb/hr	0.0004 tpy	3.05E-03 lbs/event	0.0061 lb/hr
Biphenyl					
Butadiene (1,3-)	1.04E-04 lbs/event	0.0002 lb/hr	0.0000 tpy	1.09E-04 lbs/event	0.0002 lb/hr
Carbon Tetrachloride					
Chlorobenzene					
Chloroform					
Dichloropropene (1,3-)					
Ethylbenzene	7.75E-03 lbs/event	0.0155 lb/hr	0.0010 tpy	8.12E-03 lbs/event	0.0162 lb/hr
Ethylene Dibromide					
Formaldehyde	1.72E-01 lbs/event	0.3437 lb/hr	0.0223 tpy	1.80E-01 lbs/event	0.3605 lb/hr
Hexane (n-)					
Methanol					
Methylene Chloride					
Methylnaphthalene (2-)					
Naphthalene	3.15E-04 lbs/event	0.0006 lb/hr	0.0000 tpy	3.30E-04 lbs/event	0.0007 lb/hr
PAH	5.33E-04 lbs/event	0.0011 lb/hr	0.0001 tpy	5.58E-04 lbs/event	0.0011 lb/hr
Phenol					
Propylene Oxide	7.02E-03 lbs/event	0.0140 lb/hr	0.0009 tpy	7.36E-03 lbs/event	0.0147 lb/hr
Styrene					
Tetrachloroethane (1,1,2,2-)					
Toluene	3.15E-02 lbs/event	0.0629 lb/hr	0.0041 tpy	3.30E-02 lbs/event	0.0660 lb/hr
Trichloroethane (1,1,2-)					
Trimethylpentane (2,2,4-)					
Vinyl Chloride					
Xylenes	1.55E-02 lbs/event	0.0310 lb/hr	0.0020 tpy	1.62E-02 lbs/event	0.0325 lb/hr

NOTES

1. Emissions of NOx, CO, and UHC are estimated using information provided in TABLE B-1Ad and TABLE B-1Ae.

	49.51 °F		0.01 °F	
	Step 2	Step 3	Step 2	Step 3
Duration	3.00 min/event	6.00 min/event	3.00 min/event	6.00 min/event
NO_X	0.6235 lb/event	1.8974 lb/event	0.6435 lb/event	2.0086 lb/event
CO	15.1832 lb/event	23.4026 lb/event	15.6711 lb/event	24.7743 lb/event
UHC	0.9959 lb/event	1.6668 lb/event	1.0279 lb/event	1.7645 lb/event
Fuel	3,317 scf/event	10,145 scf/event	3,438 scf/event	10,685 scf/event

2. Footnotes 4 thru 8 of TABLE B-1Ac.
3. The frequency of startup events was provided by Technical Services.

TABLE B-1Ag
Gas-Fired Turbines
Emission Estimates
Shutdown
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar				
Model	250-30002S4				
Fuel	Natural Gas				
Ambient Temperature	49.51 °F			0.01 °F	
Maximum Event Frequency		2 events/hr	260 events/yr		2 events/hr
Maximum Startup Time		17.00 min/hr	36.83 hrs/yr		17.00 min/hr
Fuel Consumption		28,745 scf/hr	3.74 MMscf/yr		30,273 scf/hr
		Average	Maximum		Maximum
NO_X	2.6880 lbs/event	5.3760 lb/hr	0.3494 tpy	2.8456 lbs/event	5.6911 lb/hr
CO	33.1537 lbs/event	66.3074 lb/hr	4.3100 tpy	35.0970 lbs/event	70.1940 lb/hr
SO_2	0.0498 lbs/event	0.0997 lb/hr	0.0065 tpy	0.0525 lbs/event	0.1050 lb/hr
$PM_{10/2.5}$	0.0968 lbs/event	0.1935 lb/hr	0.0126 tpy	0.1019 lbs/event	0.2038 lb/hr
CO_{2-e}	1,772 lbs/event	3,544 lb/hr	230 tpy	1,867 lbs/event	3,733 lb/hr
CO_2	1,725 lbs/event	3,450 lb/hr	224 tpy	1,817 lbs/event	3,633 lb/hr
N_2O	0.0033 lbs/event	0.0065 lb/hr	0.0004 tpy	0.0034 lbs/event	0.0068 lb/hr
TOC (Total)	2.3613 lbs/event	4.7226 lb/hr	0.3070 tpy	2.4997 lbs/event	4.9994 lb/hr
Methane	1.8461 lbs/event	3.6922 lb/hr	0.2400 tpy	1.9543 lbs/event	3.9087 lb/hr
Ethane	0.0644 lbs/event	0.1288 lb/hr	0.0084 tpy	0.0682 lbs/event	0.1363 lb/hr
VOC (Total)	0.4508 lbs/event	0.9016 lb/hr	0.0586 tpy	0.4772 lbs/event	0.9544 lb/hr
VOC (non-HAP)	0.2303 lbs/event	0.4605 lb/hr	0.0299 tpy	0.2438 lbs/event	0.4875 lb/hr
HAP (Total)	0.2205 lbs/event	0.4411 lb/hr	0.0287 tpy	0.2335 lbs/event	0.4669 lb/hr
Acetaldehyde	8.59E-03 lbs/event	0.0172 lb/hr	0.0011 tpy	9.09E-03 lbs/event	0.0182 lb/hr
Acrolein	1.37E-03 lbs/event	0.0027 lb/hr	0.0002 tpy	1.45E-03 lbs/event	0.0029 lb/hr
Benzene	2.58E-03 lbs/event	0.0052 lb/hr	0.0003 tpy	2.73E-03 lbs/event	0.0055 lb/hr
Biphenyl					
Butadiene (1,3-)	9.23E-05 lbs/event	0.0002 lb/hr	0.0000 tpy	9.77E-05 lbs/event	0.0002 lb/hr
Carbon Tetrachloride					
Chlorobenzene					
Chloroform					
Dichloropropene (1,3-)					
Ethylbenzene	6.87E-03 lbs/event	0.0137 lb/hr	0.0009 tpy	7.27E-03 lbs/event	0.0145 lb/hr
Ethylene Dibromide					
Formaldehyde	1.52E-01 lbs/event	0.3048 lb/hr	0.0198 tpy	1.61E-01 lbs/event	0.3227 lb/hr
Hexane (n-)					
Methanol					
Methylene Chloride					
Methylnaphthalene (2-)					
Naphthalene	2.79E-04 lbs/event	0.0006 lb/hr	0.0000 tpy	2.95E-04 lbs/event	0.0006 lb/hr
PAH	4.72E-04 lbs/event	0.0009 lb/hr	0.0001 tpy	5.00E-04 lbs/event	0.0010 lb/hr
Phenol					
Propylene Oxide	6.23E-03 lbs/event	0.0125 lb/hr	0.0008 tpy	6.59E-03 lbs/event	0.0132 lb/hr
Styrene					
Tetrachloroethane (1,1,2,2-)					
Toluene	2.79E-02 lbs/event	0.0558 lb/hr	0.0036 tpy	2.95E-02 lbs/event	0.0591 lb/hr
Trichloroethane (1,1,2-)					
Trimethylpentane (2,2,4-)					
Vinyl Chloride					
Xylenes	1.37E-02 lbs/event	0.0275 lb/hr	0.0018 tpy	1.45E-02 lbs/event	0.0291 lb/hr

NOTES

1. Emissions of NOx, CO, and UHC are estimated using information provided in TABLE B-1Ad and TABLE B-1Ae.

	49.51 °F		0.01 °F	
	Step 2	Step 3	Step 2	Step 3
Duration	0.00 min/event	8.50 min/event	0.00 min/event	8.50 min/event
NO_X	0.0000 lb/event	2.6880 lb/event	0.0000 lb/event	2.8456 lb/event
CO	0.0000 lb/event	33.1537 lb/event	0.0000 lb/event	35.0970 lb/event
UHC	0.0000 lb/event	2.3613 lb/event	0.0000 lb/event	2.4997 lb/event
Fuel	0 scf/event	14,373 scf/event	0 scf/event	15,137 scf/event

2. Footnotes 4 thru 8 of TABLE B-1Ac.
3. The frequency of startup events was provided by Technical Services.

TABLE B-1Ah
Gas-Fired Turbines
Emission Estimates
Low Temperatures
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar					
Model	250-30002S4					
Normal Operating Load	100%					
Fuel	Natural Gas					
Fuel Higher Heating Value (HHV)	1,020 BTU/scf			1,020 BTU/scf		
Ambient Temperature	-20.00 °F			-20.00 °F		
Power Output	35,209 bhp (mech.)			35,209 bhp (mech.)		
	26,256 kW (elec.)			26,256 kW (elec.)		
Heat Rate at HHV	7,059 BTU/hp-hr			7,059 BTU/hp-hr		
Operating Hours	26 hrs/yr			0 hrs/yr		
Fuel Consumption	243,658 scfh			243,658 scfh		
	6.335 MMscf/yr			0.000 MMscf/yr		
Heat Input at HHV	248.53 MMBTU/hr	0°F ≥ T > -20°F		248.53 MMBTU/hr	T ≤ -20°F	
	6,462 MMBTU/yr	Hourly	Annual	0 MMBTU/yr	Hourly	Annual
NO_X	33.18 lb/MMscf	8.0848 lb/hr	0.1051 tpy	442.41 lb/MMscf	107.7979 lb/hr	0.0000 tpy
CO	56.11 lb/MMscf	13.6719 lb/hr	0.1777 tpy	336.67 lb/MMscf	82.0316 lb/hr	0.0000 tpy
SO_2	3.47 lb/MMscf	0.8450 lb/hr	0.0110 tpy	3.47 lb/MMscf	0.8450 lb/hr	0.0000 tpy
$PM_{10/2.5}$	6.73 lb/MMscf	1.6403 lb/hr	0.0213 tpy	6.73 lb/MMscf	1.6403 lb/hr	0.0000 tpy
CO_{2-e}	120,804 lb/MMscf	29,435 lb/hr	383 tpy	122,243 lb/MMscf	29,785 lb/hr	0 tpy
CO_2	120,017 lb/MMscf	29,243 lb/hr	380 tpy	120,017 lb/MMscf	29,243 lb/hr	0 tpy
N_2O	0.23 lb/MMscf	0.0551 lb/hr	0.0007 tpy	0.23 lb/MMscf	0.0551 lb/hr	0.0000 tpy
TOC (Total)	36.80 lb/MMscf	8.9674 lb/hr	0.1166 tpy	110.41 lb/MMscf	26.9023 lb/hr	0.0000 tpy
Methane	28.77 lb/MMscf	7.0109 lb/hr	0.0911 tpy	86.32 lb/MMscf	21.0327 lb/hr	0.0000 tpy
Ethane	1.00 lb/MMscf	0.2446 lb/hr	0.0032 tpy	3.01 lb/MMscf	0.7337 lb/hr	0.0000 tpy
VOC (Total)	7.03 lb/MMscf	1.7120 lb/hr	0.0223 tpy	21.08 lb/MMscf	5.1359 lb/hr	0.0000 tpy
VOC (non-HAP)	3.59 lb/MMscf	0.8745 lb/hr	0.0114 tpy	10.77 lb/MMscf	2.6234 lb/hr	0.0000 tpy
HAP (Total)	3.44 lb/MMscf	0.8375 lb/hr	0.0109 tpy	10.31 lb/MMscf	2.5125 lb/hr	0.0000 tpy
Acetaldehyde	1.34E-01 lb/MMscf	0.0326 lb/hr	0.0004 tpy	4.01E-01 lb/MMscf	0.0978 lb/hr	0.0000 tpy
Acrolein	2.14E-02 lb/MMscf	0.0052 lb/hr	0.0001 tpy	6.42E-02 lb/MMscf	0.0157 lb/hr	0.0000 tpy
Benzene	4.01E-02 lb/MMscf	0.0098 lb/hr	0.0001 tpy	1.20E-01 lb/MMscf	0.0293 lb/hr	0.0000 tpy
Biphenyl						
Butadiene (1,3-)	1.44E-03 lb/MMscf	0.0004 lb/hr	0.0000 tpy	4.32E-03 lb/MMscf	0.0011 lb/hr	0.0000 tpy
Carbon Tetrachloride						
Chlorobenzene						
Chloroform						
Dichloropropene (1,3-)						
Ethylbenzene	1.07E-01 lb/MMscf	0.0261 lb/hr	0.0003 tpy	3.21E-01 lb/MMscf	0.0783 lb/hr	0.0000 tpy
Ethylene Dibromide						
Formaldehyde	2.38E+00 lb/MMscf	0.5788 lb/hr	0.0075 tpy	7.13E+00 lb/MMscf	1.7364 lb/hr	0.0000 tpy
Hexane (n-)						
Methanol						
Methylene Chloride						
Methylnaphthalene (2-)						
Naphthalene	4.35E-03 lb/MMscf	0.0011 lb/hr	0.0000 tpy	1.30E-02 lb/MMscf	0.0032 lb/hr	0.0000 tpy
PAH	7.36E-03 lb/MMscf	0.0018 lb/hr	0.0000 tpy	2.21E-02 lb/MMscf	0.0054 lb/hr	0.0000 tpy
Phenol						
Propylene Oxide	9.70E-02 lb/MMscf	0.0236 lb/hr	0.0003 tpy	2.91E-01 lb/MMscf	0.0709 lb/hr	0.0000 tpy
Styrene						
Tetrachloroethane (1,1,2,2-)						
Toluene	4.35E-01 lb/MMscf	0.1060 lb/hr	0.0014 tpy	1.30E+00 lb/MMscf	0.3179 lb/hr	0.0000 tpy
Trichloroethane (1,1,2-)						
Trimethylpentane (2,2,4-)						
Vinyl Chloride						
Xylenes	2.14E-01 lb/MMscf	0.0522 lb/hr	0.0007 tpy	6.42E-01 lb/MMscf	0.1565 lb/hr	0.0000 tpy

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Operating hours for low ambient temperatures best on best fit of available data (see TABLE B-1Aa).
3. Manufacturer provided data on: power output, heat rate, along with NOx, CO, and UHC (or TOC) emissions.
4. Footnotes 4 thru 8 of TABLE B-1Ac.

TABLE B-1Ai
Gas-Fired Turbines
Maximum Emission Estimates
Normal Operations, Startup, Shutdown, and Low Temperature Operations
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar																	
Model	250-30002S4																	
Normal Operating Load	100%																	
Operations	Normal			Startup			Shutdown			Startup/Shutdown w/ Normal			Low Temperatures			Combined Operations		
Maximum Annual Combined Event Frequency	8,760 hrs/yr			39 hrs/yr			37 hrs/yr			8,760 hrs/yr			26 hrs/yr			8,760 hrs/yr		
	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum	Hourly			Hourly		Maximum	Hourly		Maximum
Pollutant	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Maximum Annual	Average	Maximum	Annual	Average	Maximum	Annual
NO_X	6.9773 lb/hr	7.7768 lb/hr	30.5605 tpy	5.0419 lb/hr	5.3044 lb/hr	0.3277 tpy	5.3760 lb/hr	5.6911 lb/hr	0.3494 tpy	7.0715 lb/hr	14.2358 lb/hr	30.9731 tpy	8.0848 lb/hr	107.7979 lb/hr	0.1051 tpy	7.0748 lb/hr	107.7979 lb/hr	30.9875 tpy
CO	11.7990 lb/hr	13.1510 lb/hr	51.6796 tpy	77.1716 lb/hr	80.8909 lb/hr	5.0162 tpy	66.3074 lb/hr	70.1940 lb/hr	4.3100 tpy	13.8261 lb/hr	156.5645 lb/hr	60.5584 tpy	13.6719 lb/hr	82.0316 lb/hr	0.1777 tpy	13.8317 lb/hr	156.5645 lb/hr	60.5827 tpy
SO_2	0.7328 lb/hr	0.8140 lb/hr	3.2095 tpy	0.0934 lb/hr	0.0980 lb/hr	0.0061 tpy	0.0997 lb/hr	0.1050 lb/hr	0.0065 tpy	0.7328 lb/hr	0.8140 lb/hr	3.2095 tpy	0.8450 lb/hr	0.8450 lb/hr	0.0110 tpy	0.7331 lb/hr	0.8450 lb/hr	3.2110 tpy
$PM_{10/2.5}$	1.4224 lb/hr	1.5802 lb/hr	6.2303 tpy	0.1813 lb/hr	0.1901 lb/hr	0.0118 tpy	0.1935 lb/hr	0.2038 lb/hr	0.0126 tpy	1.4224 lb/hr	1.5802 lb/hr	6.2303 tpy	1.6403 lb/hr	1.6403 lb/hr	0.0213 tpy	1.4231 lb/hr	1.6403 lb/hr	6.2331 tpy
CO_{2-e}	25,525 lb/hr	28,356 lb/hr	111,797 tpy	3,337 lb/hr	3,501 lb/hr	217 tpy	3,544 lb/hr	3,733 lb/hr	230 tpy	25,525 lb/hr	28,356 lb/hr	111,797 tpy	29,435 lb/hr	29,785 lb/hr	383 tpy	25,536 lb/hr	29,785 lb/hr	111,848 tpy
CO_2	25,359 lb/hr	28,171 lb/hr	111,072 tpy	3,231 lb/hr	3,390 lb/hr	210 tpy	3,450 lb/hr	3,633 lb/hr	224 tpy	25,359 lb/hr	28,171 lb/hr	111,072 tpy	29,243 lb/hr	29,243 lb/hr	380 tpy	25,371 lb/hr	29,243 lb/hr	111,123 tpy
N_2O	0.0478 lb/hr	0.0531 lb/hr	0.2093 tpy	0.0061 lb/hr	0.0064 lb/hr	0.0004 tpy	0.0065 lb/hr	0.0068 lb/hr	0.0004 tpy	0.0478 lb/hr	0.0531 lb/hr	0.2093 tpy	0.0551 lb/hr	0.0551 lb/hr	0.0007 tpy	0.0478 lb/hr	0.0551 lb/hr	0.2094 tpy
TOC (Total)	7.7390 lb/hr	8.6257 lb/hr	33.8967 tpy	5.3254 lb/hr	5.5848 lb/hr	0.3461 tpy	4.7226 lb/hr	4.9994 lb/hr	0.3070 tpy	7.8211 lb/hr	14.1782 lb/hr	34.2564 tpy	8.9674 lb/hr	26.9023 lb/hr	0.1166 tpy	7.8247 lb/hr	26.9023 lb/hr	34.2723 tpy
Methane	6.0505 lb/hr	6.7438 lb/hr	26.5010 tpy	4.1635 lb/hr	4.3663 lb/hr	0.2706 tpy	3.6922 lb/hr	3.9087 lb/hr	0.2400 tpy	6.1147 lb/hr	11.0848 lb/hr	26.7823 tpy	7.0109 lb/hr	21.0327 lb/hr	0.0911 tpy	6.1175 lb/hr	21.0327 lb/hr	26.7947 tpy
Ethane	0.2111 lb/hr	0.2352 lb/hr	0.9245 tpy	0.1452 lb/hr	0.1523 lb/hr	0.0094 tpy	0.1288 lb/hr	0.1363 lb/hr	0.0084 tpy	0.2133 lb/hr	0.3867 lb/hr	0.9343 tpy	0.2446 lb/hr	0.7337 lb/hr	0.0032 tpy	0.2134 lb/hr	0.7337 lb/hr	0.9347 tpy
VOC (Total)	1.4774 lb/hr	1.6467 lb/hr	6.4712 tpy	1.0167 lb/hr	1.0662 lb/hr	0.0661 tpy	0.9016 lb/hr	0.9544 lb/hr	0.0586 tpy	1.4931 lb/hr	2.7068 lb/hr	6.5399 tpy	1.7120 lb/hr	5.1359 lb/hr	0.0223 tpy	1.4938 lb/hr	5.1359 lb/hr	6.5429 tpy
VOC (non-HAP)	0.7547 lb/hr	0.8411 lb/hr	3.3055 tpy	0.5193 lb/hr	0.5446 lb/hr	0.0338 tpy	0.4605 lb/hr	0.4875 lb/hr	0.0299 tpy	0.7627 lb/hr	1.3826 lb/hr	3.3405 tpy	0.8745 lb/hr	2.6234 lb/hr	0.0114 tpy	0.7630 lb/hr	2.6234 lb/hr	3.3421 tpy
HAP (Total)	0.7228 lb/hr	0.8056 lb/hr	3.1657 tpy	0.4974 lb/hr	0.5216 lb/hr	0.0323 tpy	0.4411 lb/hr	0.4669 lb/hr	0.0287 tpy	0.7304 lb/hr	1.3242 lb/hr	3.1993 tpy	0.8375 lb/hr	2.5125 lb/hr	0.0109 tpy	0.7308 lb/hr	2.5125 lb/hr	3.2008 tpy
Acetaldehyde	2.81E-02 lb/hr	3.14E-02 lb/hr	1.23E-01 tpy	1.94E-02 lb/hr	2.03E-02 lb/hr	1.26E-03 tpy	1.72E-02 lb/hr	1.82E-02 lb/hr	1.12E-03 tpy	2.84E-02 lb/hr	5.16E-02 lb/hr	1.25E-01 tpy	3.26E-02 lb/hr	9.78E-02 lb/hr	4.24E-04 tpy	2.85E-02 lb/hr	9.78E-02 lb/hr	1.25E-01 tpy
Acrolein	4.50E-03 lb/hr	5.02E-03 lb/hr	1.97E-02 tpy	3.10E-03 lb/hr	3.25E-03 lb/hr	2.01E-04 tpy	2.75E-03 lb/hr	2.91E-03 lb/hr	1.79E-04 tpy	4.55E-03 lb/hr	8.25E-03 lb/hr	1.99E-02 tpy	5.22E-03 lb/hr	1.57E-02 lb/hr	6.78E-05 tpy	4.55E-03 lb/hr	1.57E-02 lb/hr	1.99E-02 tpy
Benzene	8.44E-03 lb/hr	9.41E-03 lb/hr	3.70E-02 tpy	5.81E-03 lb/hr	6.09E-03 lb/hr	3.78E-04 tpy	5.15E-03 lb/hr	5.45E-03 lb/hr	3.35E-04 tpy	8.53E-03 lb/hr	1.55E-02 lb/hr	3.74E-02 tpy	9.78E-03 lb/hr	2.93E-02 lb/hr	1.27E-04 tpy	8.54E-03 lb/hr	2.93E-02 lb/hr	3.74E-02 tpy
Biphenyl																		
Butadiene (1,3-)	3.03E-04 lb/hr	3.37E-04 lb/hr	1.33E-03 tpy	2.08E-04 lb/hr	2.18E-04 lb/hr	1.35E-05 tpy	1.85E-04 lb/hr	1.95E-04 lb/hr	1.20E-05 tpy	3.06E-04 lb/hr	5.54E-04 lb/hr	1.34E-03 tpy	3.51E-04 lb/hr	1.05E-03 lb/hr	4.56E-06 tpy	3.06E-04 lb/hr	1.05E-03 lb/hr	1.34E-03 tpy
Carbon Tetrachloride																		
Chlorobenzene																		
Chloroform																		
Dichloropropene (1,3-)																		
Ethylbenzene	2.25E-02 lb/hr	2.51E-02 lb/hr	9.86E-02 tpy	1.55E-02 lb/hr	1.62E-02 lb/hr	1.01E-03 tpy	1.37E-02 lb/hr	1.45E-02 lb/hr	8.93E-04 tpy	2.28E-02 lb/hr	4.12E-02 lb/hr	9.97E-02 tpy	2.61E-02 lb/hr	7.83E-02 lb/hr	3.39E-04 tpy	2.28E-02 lb/hr	7.83E-02 lb/hr	9.97E-02 tpy
Ethylene Dibromide																		
Formaldehyde	5.00E-01 lb/hr	5.57E-01 lb/hr	2.19E+00 tpy	3.44E-01 lb/hr	3.60E-01 lb/hr	2.23E-02 tpy	3.05E-01 lb/hr	3.23E-01 lb/hr	1.98E-02 tpy	5.05E-01 lb/hr	9.15E-01 lb/hr	2.21E+00 tpy	5.79E-01 lb/hr	1.74E+00 lb/hr	7.52E-03 tpy	5.05E-01 lb/hr	1.74E+00 lb/hr	2.21E+00 tpy
Hexane (n-)																		
Methanol																		
Methylene Chloride																		
Methylnaphthalene (2-)																		
Naphthalene	9.15E-04 lb/hr	1.02E-03 lb/hr	4.01E-03 tpy	6.29E-04 lb/hr	6.60E-04 lb/hr	4.09E-05 tpy	5.58E-04 lb/hr	5.91E-04 lb/hr	3.63E-05 tpy	9.24E-04 lb/hr	1.68E-03 lb/hr	4.05E-03 tpy	1.06E-03 lb/hr	3.18E-03 lb/hr	1.38E-05 tpy	9.25E-04 lb/hr	3.18E-03 lb/hr	4.05E-03 tpy
PAH	1.55E-03 lb/hr	1.73E-03 lb/hr	6.78E-03 tpy	1.07E-03 lb/hr	1.12E-03 lb/hr	6.92E-05 tpy	9.45E-04 lb/hr	1.00E-03 lb/hr	6.14E-05 tpy	1.56E-03 lb/hr	2.84E-03 lb/hr	6.85E-03 tpy	1.79E-03 lb/hr	5.38E-03 lb/hr	2.33E-05 tpy	1.56E-03 lb/hr	5.38E-03 lb/hr	6.85E-03 tpy
Phenol																		
Propylene Oxide	2.04E-02 lb/hr	2.27E-02 lb/hr	8.94E-02 tpy	1.40E-02 lb/hr	1.47E-02 lb/hr	9.13E-04 tpy	1.25E-02 lb/hr	1.32E-02 lb/hr	8.09E-04 tpy	2.06E-02 lb/hr	3.74E-02 lb/hr	9.03E-02 tpy	2.36E-02 lb/hr	7.09E-02 lb/hr	3.07E-04 tpy	2.06E-02 lb/hr	7.09E-02 lb/hr	9.04E-02 tpy
Styrene																		
Tetrachloroethane (1,1,2,2-)																		
Toluene	9.15E-02 lb/hr	1.02E-01 lb/hr	4.01E-01 tpy	6.29E-02 lb/hr	6.60E-02 lb/hr	4.09E-03 tpy	5.58E-02 lb/hr	5.91E-02 lb/hr	3.63E-03 tpy	9.24E-02 lb/hr	1.68E-01 lb/hr	4.05E-01 tpy	1.06E-01 lb/hr	3.18E-01 lb/hr	1.38E-03 tpy	9.25E-02 lb/hr	3.18E-01 lb/hr	4.05E-01 tpy
Trichloroethane (1,1,2-)																		
Trimethylpentane (2,2,4-)																		
Vinyl Chloride																		
Xylenes	4.50E-02 lb/hr	5.02E-02 lb/hr	1.97E-01 tpy	3.10E-02 lb/hr	3.25E-02 lb/hr	2.01E-03 tpy	2.75E-02 lb/hr	2.91E-02 lb/hr	1.79E-03 tpy	4.55E-02 lb/hr	8.25E-02 lb/hr	1.99E-01 tpy	5.22E-02 lb/hr	1.57E-01 lb/hr	6.78E-04 tpy	4.55E-02 lb/hr	1.57E-01 lb/hr	1.99E-01 tpy

NOTES

1. See TABLE B-1Ac, TABLE B-1Af, TABLE B-1Ag, and TABLE B-1Ah.
2. If $E(t)_{normal} > E(t)_{transient}$, then $E(8{,}760\ hrs/yr)_{all} = E(8{,}760\ hrs/yr)_{normal}$
   Otherwise, $E(8{,}760\ hrs/yr)_{all} = E(8{,}760\ hrs/yr)_{normal} - E(t)_{normal} + E(t)_{transient}$.
   where t = the duration of transient operation.

TABLE B-1Aj
Gas-Fired Turbines
Maximum Emission Estimates
Normal Operations, Startup, Shutdown, and Low Temperature Operations
PTE - 100% Fuel Utilization at 100% Power Output

Make		Solar																		
Model		250-30002S4																		
Normal Operating Load		100%																		
Operations		Normal			Startup			Shutdown			Startup/Shutdown w/ Normal			Low Temperatures			Combined Operations		
Maximum Annual Combined Event Frequency		8,760 hrs/yr			39 hrs/yr			37 hrs/yr			8,760 hrs/yr			26 hrs/yr			8,760 hrs/yr		
Pollutant	Control Efficiency	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum
		Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual
NO_X		6.9773 lb/hr	7.7768 lb/hr	30.5605 tpy	5.0419 lb/hr	5.3044 lb/hr	0.3277 tpy	5.3760 lb/hr	5.6911 lb/hr	0.3494 tpy	7.0715 lb/hr	14.2358 lb/hr	30.9731 tpy	8.0848 lb/hr	107.7979 lb/hr	0.1051 tpy	7.0748 lb/hr	107.7979 lb/hr	30.9875 tpy
CO	95.00% by weight	0.5899 lb/hr	0.6575 lb/hr	2.5840 tpy	77.1716 lb/hr	80.8909 lb/hr	5.0162 tpy	3.3154 lb/hr	3.5097 lb/hr	0.2155 tpy	1.7793 lb/hr	84.6746 lb/hr	7.7933 tpy	0.6836 lb/hr	4.1016 lb/hr	0.0089 tpy	1.7796 lb/hr	84.6746 lb/hr	7.7945 tpy
SO_2		0.7328 lb/hr	0.8140 lb/hr	3.2095 tpy	0.0934 lb/hr	0.0980 lb/hr	0.0061 tpy	0.0997 lb/hr	0.1050 lb/hr	0.0065 tpy	0.7328 lb/hr	0.8140 lb/hr	3.2095 tpy	0.8450 lb/hr	0.8450 lb/hr	0.0110 tpy	0.7331 lb/hr	0.8450 lb/hr	3.2110 tpy
$PM_{10/2.5}$		1.4224 lb/hr	1.5802 lb/hr	6.2303 tpy	0.1813 lb/hr	0.1901 lb/hr	0.0118 tpy	0.1935 lb/hr	0.2038 lb/hr	0.0126 tpy	1.4224 lb/hr	1.5802 lb/hr	6.2303 tpy	1.6403 lb/hr	1.6403 lb/hr	0.0213 tpy	1.4231 lb/hr	1.6403 lb/hr	6.2331 tpy
CO_{2-e}		25,542 lb/hr	28,375 lb/hr	111,874 tpy	3,337 lb/hr	3,501 lb/hr	217 tpy	3,643 lb/hr	3,838 lb/hr	237 tpy	25,542 lb/hr	28,375 lb/hr	111,874 tpy	29,455 lb/hr	29,908 lb/hr	383 tpy	25,554 lb/hr	29,908 lb/hr	111,925 tpy
CO_2		25,377 lb/hr	28,191 lb/hr	111,150 tpy	3,231 lb/hr	3,390 lb/hr	210 tpy	3,549 lb/hr	3,738 lb/hr	231 tpy	25,377 lb/hr	28,191 lb/hr	111,150 tpy	29,264 lb/hr	29,366 lb/hr	380 tpy	25,388 lb/hr	29,366 lb/hr	111,200 tpy
N_2O		0.0478 lb/hr	0.0531 lb/hr	0.2093 tpy	0.0061 lb/hr	0.0064 lb/hr	0.0004 tpy	0.0065 lb/hr	0.0068 lb/hr	0.0004 tpy	0.0478 lb/hr	0.0531 lb/hr	0.2093 tpy	0.0551 lb/hr	0.0551 lb/hr	0.0007 tpy	0.0478 lb/hr	0.0551 lb/hr	0.2094 tpy
TOC (Total)	10.91% by weight	6.8947 lb/hr	7.6847 lb/hr	30.1989 tpy	5.3254 lb/hr	5.5848 lb/hr	0.3461 tpy	4.2074 lb/hr	4.4540 lb/hr	0.2735 tpy	6.9765 lb/hr	13.2408 lb/hr	30.5571 tpy	7.9892 lb/hr	23.9675 lb/hr	0.1039 tpy	6.9797 lb/hr	23.9675 lb/hr	30.5713 tpy
Methane	0.00% by weight	6.0505 lb/hr	6.7438 lb/hr	26.5010 tpy	4.1635 lb/hr	4.3663 lb/hr	0.2706 tpy	3.6922 lb/hr	3.9087 lb/hr	0.2400 tpy	6.1147 lb/hr	11.0848 lb/hr	26.7823 tpy	7.0109 lb/hr	21.0327 lb/hr	0.0911 tpy	6.1175 lb/hr	21.0327 lb/hr	26.7947 tpy
Ethane	50.00% by weight	0.1055 lb/hr	0.1176 lb/hr	0.4622 tpy	0.1452 lb/hr	0.1523 lb/hr	0.0094 tpy	0.0644 lb/hr	0.0682 lb/hr	0.0042 tpy	0.1077 lb/hr	0.2695 lb/hr	0.4719 tpy	0.1223 lb/hr	0.3668 lb/hr	0.0016 tpy	0.1078 lb/hr	0.3668 lb/hr	0.4721 tpy
VOC (Total)	50.00% by weight	0.7387 lb/hr	0.8234 lb/hr	3.2356 tpy	1.0167 lb/hr	1.0662 lb/hr	0.0661 tpy	0.4508 lb/hr	0.4772 lb/hr	0.0293 tpy	0.7541 lb/hr	1.8865 lb/hr	3.3030 tpy	0.8560 lb/hr	2.5679 lb/hr	0.0111 tpy	0.7545 lb/hr	2.5679 lb/hr	3.3045 tpy
VOC (non-HAP)	19.10% by weight	0.6106 lb/hr	0.6805 lb/hr	2.6742 tpy	0.5193 lb/hr	0.5446 lb/hr	0.0338 tpy	0.3726 lb/hr	0.3944 lb/hr	0.0242 tpy	0.6185 lb/hr	1.2226 lb/hr	2.7091 tpy	0.7075 lb/hr	2.1224 lb/hr	0.0092 tpy	0.6188 lb/hr	2.1224 lb/hr	2.7103 tpy
HAP (Total)	8.23E-01 by weight	0.1282 lb/hr	0.1428 lb/hr	0.5613 tpy	0.4974 lb/hr	0.5216 lb/hr	0.0323 tpy	0.0782 lb/hr	0.0828 lb/hr	0.0051 tpy	0.1356 lb/hr	0.6639 lb/hr	0.5939 tpy	0.1485 lb/hr	0.4455 lb/hr	0.0019 tpy	0.1357 lb/hr	0.6639 lb/hr	0.5942 tpy
Acetaldehyde	80.00% by weight	5.63E-03 lb/hr	6.27E-03 lb/hr	2.47E-02 tpy	1.94E-02 lb/hr	2.03E-02 lb/hr	1.26E-03 tpy	3.43E-03 lb/hr	3.64E-03 lb/hr	2.23E-04 tpy	5.92E-03 lb/hr	2.66E-02 lb/hr	2.59E-02 tpy	6.52E-03 lb/hr	1.96E-02 lb/hr	8.48E-05 tpy	5.92E-03 lb/hr	2.66E-02 lb/hr	2.59E-02 tpy
Acrolein	50.00% by weight	2.25E-03 lb/hr	2.51E-03 lb/hr	9.86E-03 tpy	3.10E-03 lb/hr	3.25E-03 lb/hr	2.01E-04 tpy	1.37E-03 lb/hr	1.45E-03 lb/hr	8.93E-05 tpy	2.30E-03 lb/hr	5.75E-03 lb/hr	1.01E-02 tpy	2.61E-03 lb/hr	7.83E-03 lb/hr	3.39E-05 tpy	2.30E-03 lb/hr	7.83E-03 lb/hr	1.01E-02 tpy
Benzene	50.00% by weight	4.22E-03 lb/hr	4.70E-03 lb/hr	1.85E-02 tpy	5.81E-03 lb/hr	6.09E-03 lb/hr	3.78E-04 tpy	2.58E-03 lb/hr	2.73E-03 lb/hr	1.67E-04 tpy	4.31E-03 lb/hr	1.08E-02 lb/hr	1.89E-02 tpy	4.89E-03 lb/hr	1.47E-02 lb/hr	6.36E-05 tpy	4.31E-03 lb/hr	1.47E-02 lb/hr	1.89E-02 tpy
Biphenyl	0.00% by weight																		
Butadiene (1,3-)	50.00% by weight	1.51E-04 lb/hr	1.69E-04 lb/hr	6.63E-04 tpy	2.08E-04 lb/hr	2.18E-04 lb/hr	1.35E-05 tpy	9.23E-05 lb/hr	9.77E-05 lb/hr	6.00E-06 tpy	1.54E-04 lb/hr	3.86E-04 lb/hr	6.76E-04 tpy	1.75E-04 lb/hr	5.26E-04 lb/hr	2.28E-06 tpy	1.54E-04 lb/hr	5.26E-04 lb/hr	6.77E-04 tpy
Carbon Tetrachloride	50.00% by weight																		
Chlorobenzene	50.00% by weight																		
Chloroform	50.00% by weight																		
Dichloropropene (1,3-)	50.00% by weight																		
Ethylbenzene	50.00% by weight	1.13E-02 lb/hr	1.25E-02 lb/hr	4.93E-02 tpy	1.55E-02 lb/hr	1.62E-02 lb/hr	1.01E-03 tpy	6.87E-03 lb/hr	7.27E-03 lb/hr	4.47E-04 tpy	1.15E-02 lb/hr	2.87E-02 lb/hr	5.03E-02 tpy	1.30E-02 lb/hr	3.91E-02 lb/hr	1.70E-04 tpy	1.15E-02 lb/hr	3.91E-02 lb/hr	5.04E-02 tpy
Ethylene Dibromide	50.00% by weight																		
Formaldehyde	95.00% by weight	2.50E-02 lb/hr	2.78E-02 lb/hr	1.09E-01 tpy	3.44E-01 lb/hr	3.60E-01 lb/hr	2.23E-02 tpy	1.52E-02 lb/hr	1.61E-02 lb/hr	9.91E-04 tpy	3.01E-02 lb/hr	3.88E-01 lb/hr	1.32E-01 tpy	2.89E-02 lb/hr	8.68E-02 lb/hr	3.76E-04 tpy	3.01E-02 lb/hr	3.88E-01 lb/hr	1.32E-01 tpy
Hexane (n-)	50.00% by weight																		
Methanol	95.00% by weight																		
Methylene Chloride	50.00% by weight																		
Methylnaphthalene (2-)	50.00% by weight																		
Naphthalene	50.00% by weight	4.57E-04 lb/hr	5.10E-04 lb/hr	2.00E-03 tpy	6.29E-04 lb/hr	6.60E-04 lb/hr	4.09E-05 tpy	2.79E-04 lb/hr	2.95E-04 lb/hr	1.81E-05 tpy	4.67E-04 lb/hr	1.17E-03 lb/hr	2.04E-03 tpy	5.30E-04 lb/hr	1.59E-03 lb/hr	6.89E-06 tpy	4.67E-04 lb/hr	1.59E-03 lb/hr	2.05E-03 tpy
PAH	50.00% by weight	7.74E-04 lb/hr	8.63E-04 lb/hr	3.39E-03 tpy	1.07E-03 lb/hr	1.12E-03 lb/hr	6.92E-05 tpy	4.72E-04 lb/hr	5.00E-04 lb/hr	3.07E-05 tpy	7.90E-04 lb/hr	1.98E-03 lb/hr	3.46E-03 tpy	8.97E-04 lb/hr	2.69E-03 lb/hr	1.17E-05 tpy	7.90E-04 lb/hr	2.69E-03 lb/hr	3.46E-03 tpy
Phenol	50.00% by weight																		
Propylene Oxide	50.00% by weight	1.02E-02 lb/hr	1.14E-02 lb/hr	4.47E-02 tpy	1.40E-02 lb/hr	1.47E-02 lb/hr	9.13E-04 tpy	6.23E-03 lb/hr	6.59E-03 lb/hr	4.05E-04 tpy	1.04E-02 lb/hr	2.61E-02 lb/hr	4.56E-02 tpy	1.18E-02 lb/hr	3.55E-02 lb/hr	1.54E-04 tpy	1.04E-02 lb/hr	3.55E-02 lb/hr	4.56E-02 tpy
Styrene	0.00% by weight																		
Tetrachloroethane (1,1,2,2-)	50.00% by weight																		
Toluene	50.00% by weight	4.57E-02 lb/hr	5.10E-02 lb/hr	2.00E-01 tpy	6.29E-02 lb/hr	6.60E-02 lb/hr	4.09E-03 tpy	2.79E-02 lb/hr	2.95E-02 lb/hr	1.81E-03 tpy	4.67E-02 lb/hr	1.17E-01 lb/hr	2.04E-01 tpy	5.30E-02 lb/hr	1.59E-01 lb/hr	6.89E-04 tpy	4.67E-02 lb/hr	1.59E-01 lb/hr	2.05E-01 tpy
Trichloroethane (1,1,2-)	50.00% by weight																		
Trimethylpentane (2,2,4-)	50.00% by weight																		
Vinyl Chloride	0.00% by weight																		
Xylenes	50.00% by weight	2.25E-02 lb/hr	2.51E-02 lb/hr	9.86E-02 tpy	3.10E-02 lb/hr	3.25E-02 lb/hr	2.01E-03 tpy	1.37E-02 lb/hr	1.45E-02 lb/hr	8.93E-04 tpy	2.30E-02 lb/hr	5.75E-02 lb/hr	1.01E-01 tpy	2.61E-02 lb/hr	7.83E-02 lb/hr	3.39E-04 tpy	2.30E-02 lb/hr	7.83E-02 lb/hr	1.01E-01 tpy

NOTES

1. See TABLE B-1Ai.
2. It's assumed that oxidation catalyst will be ineffective during startup events.
3. $CO2 = CO2_{uncontrolled} + CE_{CO\text{-}control\ efficiency} * CO_{uncontrolled} * (MW_{CO2}/MW_{CO}) = CO2_{uncontrolled} + CE_{CO\text{-}control\ efficiency} * CO_{uncontrolled} * (44.0095/28.0101)$.

TABLE C-1A
4-Stroke Lean-Burn Reciprocating Engines
Hourly and Annual Emission Estimates
Uncontrolled

Type		4slb				
Service		Emergency				
JJJJ Relevant Date		Manufactured: On or After 01/01/2009				
ZZZZ Status		New RICE at Area HAP Source				
Make		Waukesha				
Model		VGF36GL				
Fuel		Natural Gas				
Fuel Higher Heating Value (HHV)		1,020 BTU/scf			1,020 BTU/scf	
Ambient Temperature		80 °F			80 °F	
Power Output		880 bhp (mech.)			880 bhp (mech.)	
		625 kW (elec.)			625 kW (elec.)	
Heat Rate at HHV		7,904 BTU/hp-hr			7,904 BTU/hp-hr	
Operating Hours		500 hrs/yr				
Fuel Consumption		6,820 scfh			6,820 scfh	
		3.410 MMscf/yr				
Heat Input at HHV		6.96 MMBTU/hr			6.96 MMBTU/hr	
		3,478 MMBTU/yr	Uncontrolled			Uncontrolled
Pollutant	Control Efficiency	Uncontrolled	Average Hourly	Maximum Annual	Uncontrolled	Maximum Hourly
NO_X		568.97 lb/MMscf	3.8801 lb/hr	0.9700 tpy	568.97 lb/MMscf	3.8801 lb/hr
CO		1,137.93 lb/MMscf	7.7601 lb/hr	1.9400 tpy	1,137.93 lb/MMscf	7.7601 lb/hr
SO_2		0.60 lb/MMscf	0.0041 lb/hr	0.0010 tpy	0.60 lb/MMscf	0.0041 lb/hr
$PM_{10/2.5}$		10.19 lb/MMscf	0.0695 lb/hr	0.0174 tpy	10.19 lb/MMscf	0.0695 lb/hr
CO_{2-e}		253,565 lb/MMscf	1,729 lb/hr	432 tpy	253,565 lb/MMscf	1,729 lb/hr
CO_2		120,017 lb/MMscf	818 lb/hr	205 tpy	120,017 lb/MMscf	818 lb/hr
N_2O		0.23 lb/MMscf	0.0015 lb/hr	0.0004 tpy	0.23 lb/MMscf	0.0015 lb/hr
TOC (Total)		6,278.90 lb/MMscf	42.8191 lb/hr	10.7048 tpy	6,278.90 lb/MMscf	42.8191 lb/hr
Methane		5,339.20 lb/MMscf	36.4108 lb/hr	9.1027 tpy	5,339.20 lb/MMscf	36.4108 lb/hr
Ethane		429.69 lb/MMscf	2.9303 lb/hr	0.7326 tpy	429.69 lb/MMscf	2.9303 lb/hr
VOC (Total)		510.01 lb/MMscf	3.4780 lb/hr	0.8695 tpy	510.01 lb/MMscf	3.4780 lb/hr
VOC (non-HAP)		201.64 lb/MMscf	1.3751 lb/hr	0.3438 tpy	201.64 lb/MMscf	1.3751 lb/hr
HAP (Total)		308.37 lb/MMscf	2.1029 lb/hr	0.5257 tpy	308.37 lb/MMscf	2.1029 lb/hr
Acetaldehyde		3.57E+01 lb/MMscf	2.44E-01 lb/hr	6.09E-02 tpy	3.57E+01 lb/MMscf	2.44E-01 lb/hr
Acrolein		2.20E+01 lb/MMscf	1.50E-01 lb/hr	3.74E-02 tpy	2.20E+01 lb/MMscf	1.50E-01 lb/hr
Benzene		1.88E+00 lb/MMscf	1.28E-02 lb/hr	3.20E-03 tpy	1.88E+00 lb/MMscf	1.28E-02 lb/hr
Biphenyl		9.06E-01 lb/MMscf	6.18E-03 lb/hr	1.54E-03 tpy	9.06E-01 lb/MMscf	6.18E-03 lb/hr
Butadiene (1,3-)		1.14E+00 lb/MMscf	7.78E-03 lb/hr	1.94E-03 tpy	1.14E+00 lb/MMscf	7.78E-03 lb/hr
Carbon Tetrachloride		1.57E-01 lb/MMscf	1.07E-03 lb/hr	2.67E-04 tpy	1.57E-01 lb/MMscf	1.07E-03 lb/hr
Chlorobenzene		1.30E-01 lb/MMscf	8.86E-04 lb/hr	2.21E-04 tpy	1.30E-01 lb/MMscf	8.86E-04 lb/hr
Chloroform		1.22E-01 lb/MMscf	8.30E-04 lb/hr	2.08E-04 tpy	1.22E-01 lb/MMscf	8.30E-04 lb/hr
Dichloropropene (1,3-)		1.13E-01 lb/MMscf	7.69E-04 lb/hr	1.92E-04 tpy	1.13E-01 lb/MMscf	7.69E-04 lb/hr
Ethylbenzene		1.70E-01 lb/MMscf	1.16E-03 lb/hr	2.89E-04 tpy	1.70E-01 lb/MMscf	1.16E-03 lb/hr
Ethylene Dibromide		1.89E-01 lb/MMscf	1.29E-03 lb/hr	3.23E-04 tpy	1.89E-01 lb/MMscf	1.29E-03 lb/hr
Formaldehyde		2.26E+02 lb/MMscf	1.54E+00 lb/hr	3.84E-01 tpy	2.26E+02 lb/MMscf	1.54E+00 lb/hr
Hexane (n-)		4.74E+00 lb/MMscf	3.23E-02 lb/hr	8.08E-03 tpy	4.74E+00 lb/MMscf	3.23E-02 lb/hr
Methanol		1.07E+01 lb/MMscf	7.28E-02 lb/hr	1.82E-02 tpy	1.07E+01 lb/MMscf	7.28E-02 lb/hr
Methylene Chloride		8.54E-02 lb/MMscf	5.83E-04 lb/hr	1.46E-04 tpy	8.54E-02 lb/MMscf	5.83E-04 lb/hr
Methylnaphthalene (2-)		1.42E-01 lb/MMscf	9.67E-04 lb/hr	2.42E-04 tpy	1.42E-01 lb/MMscf	9.67E-04 lb/hr
Naphthalene		3.18E-01 lb/MMscf	2.17E-03 lb/hr	5.42E-04 tpy	3.18E-01 lb/MMscf	2.17E-03 lb/hr
PAH		1.15E-01 lb/MMscf	7.84E-04 lb/hr	1.96E-04 tpy	1.15E-01 lb/MMscf	7.84E-04 lb/hr
Phenol		1.03E-01 lb/MMscf	6.99E-04 lb/hr	1.75E-04 tpy	1.03E-01 lb/MMscf	6.99E-04 lb/hr
Propylene Oxide						
Styrene		1.01E-01 lb/MMscf	6.87E-04 lb/hr	1.72E-04 tpy	1.01E-01 lb/MMscf	6.87E-04 lb/hr
Tetrachloroethane (1,1,2,2-)		1.81E-01 lb/MMscf	1.24E-03 lb/hr	3.09E-04 tpy	1.81E-01 lb/MMscf	1.24E-03 lb/hr
Toluene		1.74E+00 lb/MMscf	1.19E-02 lb/hr	2.97E-03 tpy	1.74E+00 lb/MMscf	1.19E-02 lb/hr
Trichloroethane (1,1,2-)		1.36E-01 lb/MMscf	9.26E-04 lb/hr	2.32E-04 tpy	1.36E-01 lb/MMscf	9.26E-04 lb/hr
Trimethylpentane (2,2,4-)		1.07E+00 lb/MMscf	7.28E-03 lb/hr	1.82E-03 tpy	1.07E+00 lb/MMscf	7.28E-03 lb/hr
Vinyl Chloride		6.36E-02 lb/MMscf	4.34E-04 lb/hr	1.09E-04 tpy	6.36E-02 lb/MMscf	4.34E-04 lb/hr
Xylenes		7.86E-01 lb/MMscf	5.36E-03 lb/hr	1.34E-03 tpy	7.86E-01 lb/MMscf	5.36E-03 lb/hr

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Maximum hourly emissions based on 100% of rated capacity.
3. Vendor provided data on power output and heat rate.
4. SO2 and PM10/2.5 emission factors based on AP-42, Section 3.2 (Revised 7/00), Table 3.2-2.
5. CO2 and N2O emission factors based on 40 CFR 98, Subpart C, Table C-1 and 40 CFR 98, Subpart C, Table C-2, respectively.
6. NOX and CO emission factors based on 40 CFR 60, Subpart JJJJ.
7. TOC (Total) and TOC specie emissions are estimated based on scaling of AP-42 using 40 CFR 60, Subpart JJJJ (VOC - Formaldehyde) data.
   Emission factors based on: $EF_i = [EF_{(VOC - Formaldehyde)}]/[(EF_{VOC-AP42} - EF_{Formaldehyde-AP42})] (EF_{i-AP42})$

TABLE D-1A
Natural Gas Combustion
Hourly and Annual Emission Estimates
Uncontrolled

Application		Process Heater				
Combustion Process		Conventional				
Add-on Controls		None				
Package (Make: Model)		Engineering Technology, Inc.: N/A				
Burner (Make: Model)		Unknown: Unknown				
Fuel		Natural Gas				
Fuel Higher Heating Value (HHV)		1,020 BTU/scf			1,020 BTU/scf	
Heat Output at HHV		0.750 MMBTU/hr			0.788 MMBTU/hr	
Thermal Efficiency		70%			70%	
Operating Hours		8,760 hrs/yr				
Fuel Consumption		1,050 scfh			1,103 scfh	
		9.202 MMscf/yr				
Heat Input at HHV		1.071 MMBTU/hr			1.125 MMBTU/hr	
		9,386 MMBTU/yr	Uncontrolled			Uncontrolled
Pollutant	Control Efficiency	Uncontrolled	Average Hourly	Maximum Annual	Uncontrolled	Maximum Hourly
NO_X		153.80 lb/MMscf	0.1616 lb/hr	0.7076 tpy	153.80 lb/MMscf	0.1696 lb/hr
CO		93.75 lb/MMscf	0.0985 lb/hr	0.4313 tpy	93.75 lb/MMscf	0.1034 lb/hr
SO_2		0.60 lb/MMscf	0.0006 lb/hr	0.0028 tpy	0.60 lb/MMscf	0.0007 lb/hr
$PM_{10/2.5}$		7.60 lb/MMscf	0.0080 lb/hr	0.0350 tpy	7.60 lb/MMscf	0.0084 lb/hr
CO_{2-e}		120,338.86 lb/MMscf	126.4064 lb/hr	553.6599 tpy	120,338.86 lb/MMscf	132.7267 lb/hr
CO_2		120,017.45 lb/MMscf	126.0688 lb/hr	552.1811 tpy	120,017.45 lb/MMscf	132.3722 lb/hr
N_2O		0.23 lb/MMscf	0.0002 lb/hr	0.0010 tpy	0.23 lb/MMscf	0.0002 lb/hr
TOC (Total)		60.00 lb/MMscf	0.0630 lb/hr	0.2761 tpy	60.00 lb/MMscf	0.0662 lb/hr
Methane		10.16 lb/MMscf	0.0107 lb/hr	0.0467 tpy	10.16 lb/MMscf	0.0112 lb/hr
Ethane		13.69 lb/MMscf	0.0144 lb/hr	0.0630 tpy	13.69 lb/MMscf	0.0151 lb/hr
VOC (Total)		36.15 lb/MMscf	0.0380 lb/hr	0.1663 tpy	36.15 lb/MMscf	0.0399 lb/hr
VOC (non-HAP)		27.83 lb/MMscf	0.0292 lb/hr	0.1280 tpy	27.83 lb/MMscf	0.0307 lb/hr
HAP (Total)		8.32 lb/MMscf	0.0087 lb/hr	0.0383 tpy	8.32 lb/MMscf	0.0092 lb/hr
Acetaldehyde						
Acrolein						
Benzene		9.28E-03 lb/MMscf	9.74E-06 lb/hr	4.27E-05 tpy	9.28E-03 lb/MMscf	1.02E-05 lb/hr
Biphenyl						
Butadiene (1,3-)						
Carbon Tetrachloride						
Chlorobenzene						
Chloroform						
Dichloropropene (1,3-)						
Ethylbenzene						
Ethylene Dibromide						
Formaldehyde		3.31E-01 lb/MMscf	3.48E-04 lb/hr	1.52E-03 tpy	3.31E-01 lb/MMscf	3.65E-04 lb/hr
Hexane (n-)		7.95E+00 lb/MMscf	8.35E-03 lb/hr	3.66E-02 tpy	7.95E+00 lb/MMscf	8.77E-03 lb/hr
Methanol						
Methylene Chloride						
Methylnaphthalene (2-)		1.06E-04 lb/MMscf	1.11E-07 lb/hr	4.88E-07 tpy	1.06E-04 lb/MMscf	1.17E-07 lb/hr
Naphthalene		2.69E-03 lb/MMscf	2.83E-06 lb/hr	1.24E-05 tpy	2.69E-03 lb/MMscf	2.97E-06 lb/hr
PAH						
Phenol						
Propylene Oxide						
Styrene						
Tetrachloroethane (1,1,2,2-)						
Toluene		1.50E-02 lb/MMscf	1.58E-05 lb/hr	6.91E-05 tpy	1.50E-02 lb/MMscf	1.66E-05 lb/hr
Trichloroethane (1,1,2-)						
Trimethylpentane (2,2,4-)						
Vinyl Chloride						
Xylenes						

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Maximum hourly emissions based on 105% of rated capacity.
3. Vendor provided data on: heat output and heat input.
4. CO2 and N2O emission factors based on 40 CFR 98, Subpart C, Table C-1 and 40 CFR 98, Subpart C, Table C-2, respectively.
5. NOX, CO and TOC (Total) emission factors based on vendor data.
6. SO2 and PM10/2.5 emission factors based on AP-42, Section 1.4 (Revised 3/98), Table 1.4-2.
7. Remaining TOC specie emission factors based on scaling of AP-42, Section 1.4 (Revised 3/98), Table 1.4-3 using vendor HC data.
   $EF_i = (EF_{HC}/EF_{TOC\text{-}AP42})\ (EF_{i\text{-}AP42})$

TABLE E-1
Flash Analysis
Summary of Laboratory Analysis

	FEED Pressurized Liquid	VAPOR Flash Gas	LIQUID Residual Liquid
Pressure	575.000 psig	0.034 psig	0.034 psig
	589.696 psia	14.730 psia	14.730 psia
Temperature	72 °F	60 °F	60 °F
API Gravity at 60°F	73.960 n.d.	788.526 n.d.	61.227 n.d.
Specific Gravity at 60°F	0.6887 n.d. (water)	0.1538 n.d. (water)	0.7342 n.d. (water)
	3.3880 n.d. (air)	0.9301 n.d. (air)	4.4320 n.d. (air)
Molecular Weight	98.125 lb/lb-mol	26.938 lb/lb-mol	128.362 lb/lb-mol
Density at 60°F and 14.730 psia	5.747 lb/gal	1.283 lb/gal	6.126 lb/gal
	0.2593 lb/ft^3	0.0712 lb/ft^3	0.3392 lb/ft^3
	22.1622 ft^3/gal	18.0282 ft^3/gal	18.0610 ft^3/gal
	930.8120 ft^3/bbl	757.1853 ft^3/bbl	758.5600 ft^3/bbl
	378.4123 $ft^3/lb\text{-}mol$	378.4123 $ft^3/lb\text{-}mol$	378.4123 $ft^3/lb\text{-}mol$
	17.0747 gal/lb-mol	20.9900 gal/lb-mol	20.9520 gal/lb-mol
	2.4598 lb-mol/bbl	2.0010 lb-mol/bbl	2.0046 lb-mol/bbl
Density at 68°F and 14.696 psia	947.3299 scf/bbl	770.6220 scf/bbl	772.0211 scf/bbl
	385.1275 scf/lb-mol	385.1275 scf/lb-mol	385.1275 scf/lb-mol
	2.4598 lb-mol/bbl	2.0010 lb-mol/bbl	2.0046 lb-mol/bbl
Vapor to Liquid Mole Ratio (V/L)	0.4249 n.d. ($lb\text{-}mol_{VAPOR}/lb\text{-}mol_{LIQUID}$)		
Mole Balance	1.0000 bbl	0.3666 bbl	0.8612 bbl
	2.4598 lb-mol	0.7335 lb-mol	1.7263 lb-mol
	947.3299 scf	282.4903 scf	664.8396 scf
Flash Factor (FF)	328.0318 scf_{VAPOR}/bbl_{LIQUID}		

NOTES

1. Sample Data:
   - Location: Atlanta, TX
   - Date: 04/15/09
   - Time: Not Recorded
2. Reference Conditions:

	SPL	Standard
T =	60 °F	68 °F
P =	14.730 psia	14.696 psia
Water	8.344 lb/gal	8.338 lb/gal
Air	0.0765 lb/ft^3	0.0752 lb/ft^3

3. V + L = F => F = (1 + V/L)L {Overall Mole Balance}.

TABLE E-2
Flash Analysis
Extrapolation of Specie Mole Percentages

Component						Liquid Dump Flash Data				
						Input			Output	
						Liquid	Scaled	*Calculated*	Vapor	Liquid
Name (i)	GC Postition	SPL Class	Formula	Type	HAP	z_i ($mol_{i\text{-}F}/mol_F$)		z_i ($mol_{i\text{-}F}/mol_F$)	y_i ($mol_{i\text{-}V}/mol_V$)	x_i ($mol_{i\text{-}L}/mol_L$)
Nitrogen	1		N2			0.034%	0.034%	0.030%	0.101%	0.000%
Carbon Dioxide	3		CO2	GHG		0.968%	0.968%	0.970%	3.163%	0.038%
Methane	2		C01H04	GHG		20.922%	20.922%	20.921%	69.445%	0.303%
Ethane	4		C02H06			3.391%	3.391%	3.390%	10.467%	0.383%
Propane	5		C03H08	VOC		2.183%	2.183%	2.180%	5.339%	0.838%
Butane (i-)	6		C04H10	VOC		1.232%	1.232%	1.230%	2.126%	0.849%
Butane (n-)	7		C04H10	VOC		1.721%	1.721%	1.720%	2.495%	1.391%
Pentane (i-)	8		C05H12	VOC		2.354%	2.354%	2.350%	1.895%	2.543%
Pentane (n-)	9		C05H12	VOC		1.622%	1.622%	1.620%	1.056%	1.859%
Dimethylbutane (2,2-)	10	Hexanes	C06H14	VOC		0.174%	0.174%	0.174%	0.050%	0.227%
Dimethylbutane (2,3-)	11	Hexanes	C06H14	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Cyclopentane	12	Hexanes	C05H10	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylpentane (2-)	13	Hexanes	C06H14	VOC		1.218%	1.218%	1.218%	0.352%	1.586%
Methylpentane (3-)	14	Hexanes	C06H14	VOC		0.912%	0.912%	0.912%	0.264%	1.187%
Hexane (n-)	15	Hexanes	C06H14	VOC	X	1.937%	1.937%	1.937%	0.561%	2.522%
Dimethylpentane (2,2-)	16	Heptanes	C07H16	VOC		0.311%	0.311%	0.311%	0.032%	0.430%
Methylcyclopentane	17	Heptanes	C06H12	VOC		1.134%	1.134%	1.134%	0.116%	1.566%
Dimethylpentane (2,4-)	18	Heptanes	C07H16	VOC		0.128%	0.128%	0.128%	0.013%	0.177%
Trimethylbutane (2,2,3-)	19	Heptanes	C07H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Benzene	20	Heptanes	C06H06	VOC	X	1.713%	1.713%	1.713%	0.175%	2.366%
Dimethylpentane (3,3-)	21	Heptanes	C07H16	VOC		0.221%	0.221%	0.221%	0.023%	0.305%
Cyclohexane	22	Heptanes	C06H12	VOC		1.106%	1.106%	1.106%	0.113%	1.528%
Methylhexane (2-)	23	Heptanes	C07H16	VOC		2.292%	2.292%	2.292%	0.235%	3.166%
Dimethylpentane (2,3-)	24	Heptanes	C07H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclopentane (1,1-)	25	Heptanes	C07H14	VOC		0.603%	0.603%	0.603%	0.062%	0.833%
Methylhexane (3-)	26	Heptanes	C07H16	VOC		2.379%	2.379%	2.379%	0.244%	3.286%
Dimethylcyclopentane (1,t-3-)	27	Heptanes	C07H14	VOC		0.163%	0.163%	0.163%	0.017%	0.225%
Dimethylcyclopentane (1,c-3-)	28	Heptanes	C07H14	VOC		0.266%	0.266%	0.266%	0.027%	0.367%
Ethylpentane (3-)	29	Heptanes	C07H16	VOC		0.029%	0.029%	0.029%	0.003%	0.040%
Dimethylcyclopentane (1,t-2-)	30	Heptanes	C07H14	VOC		0.222%	0.222%	0.222%	0.023%	0.307%
Trimethylpentane (2,2,4-)	31	Heptanes	C08H18	VOC	X	0.021%	0.021%	0.021%	0.002%	0.029%
Heptane (n-)	32	Heptanes	C07H16	VOC		3.742%	3.742%	3.742%	0.383%	5.169%
Methylcyclohexane	33	Octanes	C07H14	VOC		3.301%	3.301%	3.301%	0.136%	4.646%
Trimethylcyclopentane (1,1,3-)	34	Octanes	C08H16	VOC		0.225%	0.225%	0.225%	0.009%	0.317%
Dimethylhexane (2,2-)	35	Octanes	C08H18	VOC		0.095%	0.095%	0.095%	0.004%	0.134%
Dimethylcyclopentane (1,c-2-)	36	Octanes	C07H14	VOC		0.848%	0.848%	0.848%	0.035%	1.193%
Dimethylhexane (2,5-)	37	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,4-)	38	Octanes	C08H18	VOC		0.143%	0.143%	0.143%	0.006%	0.201%
Ethylcyclopentane	39	Octanes	C07H14	VOC		0.464%	0.464%	0.464%	0.019%	0.653%
Trimethylpentane (2,2,3-)	40	Octanes	C08H18	VOC		0.028%	0.028%	0.028%	0.001%	0.039%
Trimethylcyclopentane (1,t-2,c-4-)	41	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (3,3-)	42	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	43	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylpentane (2,3,4-)	44	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,3-)	45	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Toluene	46	Octanes	C07H08	VOC	X	4.444%	4.444%	4.444%	0.183%	6.255%
Trimethylcyclopentane (1,1,2-)	47	Octanes	C08H16	VOC		0.371%	0.371%	0.371%	0.015%	0.522%
Dimethylhexane (3,4-)	48	Octanes	C08H18	VOC		3.505%	3.505%	3.505%	0.144%	4.933%
Methylheptane (2-)	49	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylheptane (4-)	50	Octanes	C08H18	VOC		2.896%	2.896%	2.896%	0.119%	4.076%
Dimethylhexane (3,4-)	51	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylheptane (3-)	52	Octanes	C08H18	VOC		0.416%	0.416%	0.416%	0.017%	0.585%
Ethylhexane (3-)	53	Octanes	C08H18	VOC		0.111%	0.111%	0.111%	0.005%	0.156%
Trimethylcyclopentane (1,c-2,t-4-)	54	Octanes	C08H16	VOC		0.028%	0.028%	0.028%	0.001%	0.039%
Dimethylcyclohexane (1,c-3-)	55	Octanes	C08H16	VOC		0.170%	0.170%	0.170%	0.007%	0.239%
Trimethylcyclopentane (1,c-2,t-3-)	56	Octanes	C08H16	VOC		0.170%	0.170%	0.170%	0.007%	0.239%
Dimethylcyclohexane (1,t-4-)	57	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,5-)	58	Octanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,1-)	59	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	60	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	61	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	62	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,4-)	63	Octanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	64	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Cycloheptane	65	Octanes	C07H14	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Octane (n-)	66	Octanes	C08H18	VOC		4.372%	4.372%	4.372%	0.180%	6.153%
Trimethylhexane (2,4,4-)	67	Nonanes	C09H20	VOC		0.190%	0.190%	0.190%	0.003%	0.269%
Tetramethylpentane (2,2,4,4-)	68	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	69	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Dimethylcyclohexane (1,c-4-)	70	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Trimethylcyclopentane (1,c-2,c-3-)	71	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Propylcyclopentane (i-)	72	Nonanes	C08H16	VOC		0.348%	0.348%	0.348%	0.006%	0.493%
Trimethylhexane (2,3,5-)	73	Nonanes	C09H20	VOC		0.006%	0.006%	0.006%	0.000%	0.009%
Dimethylheptane (2,2-)	74	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,4-)	75	Nonanes	C09H20	VOC		0.158%	0.158%	0.158%	0.003%	0.224%
Methylcyclopentane (1-ethyl-c-2-)	76	Nonanes	C08H16	VOC		0.181%	0.181%	0.181%	0.003%	0.257%
Trimethylhexane (2,2,3-)	77	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%

TABLE E-2
Flash Analysis
Extrapolation of Specie Mole Percentages

Component						Liquid Dump Flash Data				
						Input			Output	
						Liquid	Scaled	*Calculated*	Vapor	Liquid
Name (i)	GC Postition	SPL Class	Formula	Type	HAP	z_i ($mol_{i\text{-}F}/mol_F$)		z_i ($mol_{i\text{-}F}/mol_F$)	y_i ($mol_{i\text{-}V}/mol_V$)	x_i ($mol_{i\text{-}L}/mol_L$)
Dimethylcyclohexane (1,c-2-)	78	Nonanes	C08H16	VOC		0.510%	0.510%	0.510%	0.009%	0.723%
Dimethylheptane (2,6-)	79	Nonanes	C09H20	VOC		0.112%	0.112%	0.112%	0.002%	0.159%
Propylcyclopentane (n-)	80	Nonanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	81	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclohexane	82	Nonanes	C08H16	VOC		1.365%	1.365%	1.365%	0.023%	1.935%
Dimethylheptane (2,5-)	83	Nonanes	C09H20	VOC		0.067%	0.067%	0.067%	0.001%	0.095%
Dimethylheptane (3,5-)	84	Nonanes	C09H20	VOC		0.067%	0.067%	0.067%	0.001%	0.095%
Trimethylcyclohexane (1,1,3-)	85	Nonanes	C09H18	VOC		0.077%	0.077%	0.077%	0.001%	0.109%
Trimethylhexane (2,3,3-)	86	Nonanes	C09H20	VOC		0.038%	0.038%	0.038%	0.001%	0.054%
Dimethylheptane (3,3-)	87	Nonanes	C09H20	VOC		0.038%	0.038%	0.038%	0.001%	0.054%
Trimethylcyclohexane (1,1,4-)	88	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Tetramethylpentane (2,2,3,3-)	89	Nonanes	C09H20	VOC		0.261%	0.261%	0.261%	0.004%	0.370%
Ethylbenzene	90	Nonanes	C08H10	VOC	X	0.406%	0.406%	0.406%	0.007%	0.576%
Trimethylhexane (2,3,4-)	91	Nonanes	C09H20	VOC		0.007%	0.007%	0.007%	0.000%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	92	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,3-)	93	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	94	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Xylene (m-)	95	Nonanes	C08H10	VOC	X	2.462%	2.462%	2.462%	0.042%	3.490%
Xylene (p-)	96	Nonanes	C08H10	VOC	X	2.462%	2.462%	2.462%	0.042%	3.490%
Dimethylheptane (3,4-)	97	Nonanes	C09H20	VOC		0.092%	0.092%	0.092%	0.002%	0.130%
Methyloctane (2-)	98	Nonanes	C09H20	VOC		0.782%	0.782%	0.782%	0.013%	1.109%
Methyloctane (4-)	99	Nonanes	C09H20	VOC		0.782%	0.782%	0.782%	0.013%	1.109%
Dimethylheptane (3,4-)	100	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methyloctane (3-)	101	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Butylcyclopentane (i-)	102	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	103	Nonanes	C09H18	VOC		0.231%	0.231%	0.231%	0.004%	0.327%
Trimethylcyclohexane (1,t-2,c-4-)	104	Nonanes	C09H18	VOC		0.231%	0.231%	0.231%	0.004%	0.327%
Xylene (o-)	105	Nonanes	C08H10	VOC	X	0.547%	0.547%	0.547%	0.009%	0.775%
Trimethylcyclohexane (1,1,2-)	106	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	107	Nonanes	C09H18	VOC		0.200%	0.200%	0.200%	0.003%	0.284%
Trimethylcyclohexane (1,c-2,c-4-)	108	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Nonane (n-)	109	Nonanes	C09H20	VOC		2.884%	2.884%	2.884%	0.050%	4.088%
Unknowns	110	Decanes+	C10+	VOC		10.753%	10.753%	10.753%	0.079%	15.288%
TOTAL						100.001%	100.000%	99.984%	100.001%	99.976%
TOC (Total)						98.999%	98.998%	98.984%	96.737%	99.938%
VOC (Total)						74.686%	74.685%	74.673%	16.825%	99.252%
Hexanes						4.241%	4.240%	4.241%	1.227%	5.521%
Heptanes						14.330%	14.310%	14.330%	1.468%	19.795%
Octanes						21.587%	21.610%	21.587%	0.888%	30.382%
Nonanes						14.663%	14.660%	14.663%	0.252%	20.786%
Decanes+						10.753%	10.770%	10.753%	0.079%	15.288%
HAP (Total)						13.992%	13.992%	13.992%	1.022%	19.503%
Xylenes						1.209%	1.209%	1.209%	0.021%	1.714%

NOTES

1. Sample Data:
   Location: Atlanta, TX
   Date: 04/15/09
   Dimethyloctane (2,3-)
   Time: Not Recorded
2. $v_i + l_i = f_i$; $y_i = v_i/V$; $x_i = l_i/L$; $z_i = f_i/F$ => $y_iV + x_iL = z_iF$ => $y_i(V/L)L + x_iL = z_i(1 + V/L)L$ => $z_i = [y_i(V/L) + x_i]/[1 + (V/L)]$ {Mole Balance}.
3. V/L = 0.4249 1 + V/L = 1.4249
4. z_i is refined to the same number if significant digits as y_i and x_i using the component mole balance and laboratory results for V/L.
5. z_i is scale using the hydrocarbon (e.g., hexanes+) z_i percentage in the flash analysis results, with the exception of HAP species.
6. $[y_i ; x_i]$ mole percent for species of hydrocarbons is estimated using scaled lab mole percent results for z_i and $[y ; x]_{HC}$ for the hydrocarbon.
   (assumes v_i/l_i is same for all hydrocarbon species)

	$(v/l)_{hexanes}$ =	0.2219		
$y_{hexanes}$ = 1.227%		$x_{hexanes}$ = 5.520%	$z_{hexanes}$ =	4.240%
	$y_i = z_i(y/z)_{hexanes}$ =	0.2894 z_i		
	$x_i = z_i(x/z)_{hexanes}$ =	1.3019 z_i		
	$(v/l)_{heptanes}$ =	0.0740		
$y_{heptanes}$ = 1.466%		$x_{heptanes}$ = 19.767%	$z_{heptanes}$ =	14.310%
	$y_i = z_i(y/z)_{heptanes}$ =	0.1024 z_i		
	$x_i = z_i(x/z)_{heptanes}$ =	1.3814 z_i		
	$(v/l)_{octanes}$ =	0.0292		
$y_{octanes}$ = 0.889%		$x_{octanes}$ = 30.414%	$z_{octanes}$ =	21.610%
	$y_i = z_i(y/z)_{octanes}$ =	0.0411 z_i		
	$x_i = z_i(x/z)_{octanes}$ =	1.4074 z_i		
	$(v/l)_{nonanes}$ =	0.0121		
$y_{nonanes}$ = 0.252%		$x_{nonanes}$ = 20.782%	$z_{nonanes}$ =	14.660%
	$y_i = z_i(y/z)_{nonanes}$ =	0.0172 z_i		
	$x_i = z_i(x/z)_{nonanes}$ =	1.4176 z_i		
	$(v/l)_{decanes+}$ =	0.0051		
$y_{decanes+}$ = 0.079%		$x_{decanes+}$ = 15.313%	$z_{decanes+}$ =	10.770%
	$y_i = z_i(y/z)_{decanes+}$ =	0.0073 z_i		
	$x_i = z_i(x/z)_{decanes+}$ =	1.4218 z_i		

TABLE E-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Nitrogen			28.013	0.0727	0.030%	0.009%
Carbon Dioxide	GHG		44.010	0.1143	0.970%	0.435%
Methane	GHG		16.042	0.0417	20.924%	3.421%
Ethane			30.069	0.0781	3.391%	1.039%
Propane	VOC		44.096	0.1145	2.181%	0.980%
Butane (i-)	VOC		58.122	0.1509	1.230%	0.729%
Butane (n-)	VOC		58.122	0.1509	1.720%	1.019%
Pentane (i-)	VOC		72.149	0.1873	2.350%	1.728%
Pentane (n-)	VOC		72.149	0.1873	1.620%	1.191%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.174%	0.153%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	1.218%	1.070%
Methylpentane (3-)	VOC		86.175	0.2238	0.912%	0.801%
Hexane (n-)	VOC	X	86.175	0.2238	1.937%	1.701%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.311%	0.318%
Methylcyclopentane	VOC		84.159	0.2185	1.134%	0.973%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.128%	0.131%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	1.713%	1.364%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.221%	0.226%
Cyclohexane	VOC		84.159	0.2185	1.106%	0.949%
Methylhexane (2-)	VOC		100.202	0.2602	2.292%	2.341%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.603%	0.603%
Methylhexane (3-)	VOC		100.202	0.2602	2.379%	2.430%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.163%	0.163%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.266%	0.266%
Ethylpentane (3-)	VOC		100.202	0.2602	0.029%	0.030%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.222%	0.222%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.021%	0.024%
Heptane (n-)	VOC		100.202	0.2602	3.743%	3.822%
Methylcyclohexane	VOC		98.186	0.2549	3.302%	3.304%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.225%	0.257%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.095%	0.111%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	0.848%	0.849%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.143%	0.166%
Ethylcyclopentane	VOC		98.186	0.2549	0.464%	0.464%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.028%	0.033%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE E-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	4.445%	4.174%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.371%	0.424%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	3.506%	4.081%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	2.896%	3.372%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.416%	0.484%
Ethylhexane (3-)	VOC		114.229	0.2966	0.111%	0.129%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.028%	0.032%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.170%	0.194%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.170%	0.194%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	4.373%	5.090%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.190%	0.248%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.053%	0.061%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.053%	0.061%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.053%	0.061%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.348%	0.398%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.006%	0.008%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.158%	0.207%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.181%	0.207%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.510%	0.583%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.112%	0.146%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	1.365%	1.561%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.067%	0.088%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.067%	0.088%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.077%	0.099%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.038%	0.050%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.038%	0.050%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE E-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.261%	0.341%
Ethylbenzene	VOC	X	106.165	0.2757	0.406%	0.439%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.007%	0.009%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	2.462%	2.664%
Xylene (p-)	VOC	X	106.165	0.2757	2.462%	2.664%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.092%	0.120%
Methyloctane (2-)	VOC		128.255	0.3330	0.782%	1.022%
Methyloctane (4-)	VOC		128.255	0.3330	0.782%	1.022%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.231%	0.297%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.231%	0.297%
Xylene (o-)	VOC	X	106.165	0.2757	0.547%	0.592%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.200%	0.257%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	2.884%	3.770%
Unknowns	VOC		**283.704**	0.7366	10.755%	31.094%
Pressurized Liquid			98.125	0.2548	100.000%	100.000%
TOC (Total)			98.677	0.2562	99.000%	99.556%
VOC (Total)			124.943	0.3244	74.685%	95.096%
HAP (Total)			92.449	0.2400	7.356%	6.931%
Xylenes			106.165	0.2757	5.472%	5.920%

NOTES

1. Normalized mole percentages from TABLE E-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE E-1.

MW = 98.125 lb/lb-mol

TABLE E-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Nitrogen			28.013	0.0727	0.101%	0.105%
Carbon Dioxide	GHG		44.010	0.1143	3.163%	5.167%
Methane	GHG		16.042	0.0417	69.444%	41.356%
Ethane			30.069	0.0781	10.467%	11.683%
Propane	VOC		44.096	0.1145	5.339%	8.739%
Butane (i-)	VOC		58.122	0.1509	2.126%	4.587%
Butane (n-)	VOC		58.122	0.1509	2.495%	5.383%
Pentane (i-)	VOC		72.149	0.1873	1.895%	5.075%
Pentane (n-)	VOC		72.149	0.1873	1.056%	2.828%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.050%	0.161%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	0.352%	1.128%
Methylpentane (3-)	VOC		86.175	0.2238	0.264%	0.844%
Hexane (n-)	VOC	X	86.175	0.2238	0.561%	1.793%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.032%	0.119%
Methylcyclopentane	VOC		84.159	0.2185	0.116%	0.363%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.013%	0.049%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	0.175%	0.509%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.023%	0.084%
Cyclohexane	VOC		84.159	0.2185	0.113%	0.354%
Methylhexane (2-)	VOC		100.202	0.2602	0.235%	0.873%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.062%	0.225%
Methylhexane (3-)	VOC		100.202	0.2602	0.244%	0.907%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.017%	0.061%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.027%	0.099%
Ethylpentane (3-)	VOC		100.202	0.2602	0.003%	0.011%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.023%	0.083%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.002%	0.009%
Heptane (n-)	VOC		100.202	0.2602	0.383%	1.426%
Methylcyclohexane	VOC		98.186	0.2549	0.136%	0.495%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.009%	0.039%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.004%	0.017%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	0.035%	0.127%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.006%	0.025%
Ethylcyclopentane	VOC		98.186	0.2549	0.019%	0.070%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.001%	0.005%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE E-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	0.183%	0.625%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.015%	0.064%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.144%	0.611%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	0.119%	0.505%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.017%	0.073%
Ethylhexane (3-)	VOC		114.229	0.2966	0.005%	0.019%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.001%	0.005%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.007%	0.029%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.007%	0.029%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	0.180%	0.763%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.003%	0.016%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.001%	0.004%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.001%	0.004%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.001%	0.004%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.006%	0.025%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.003%	0.013%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.003%	0.013%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.009%	0.037%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.002%	0.009%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	0.023%	0.098%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.001%	0.005%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.001%	0.005%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.001%	0.006%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.001%	0.003%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.001%	0.003%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE E-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.004%	0.021%
Ethylbenzene	VOC	X	106.165	0.2757	0.007%	0.028%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.000%	0.001%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	0.042%	0.167%
Xylene (p-)	VOC	X	106.165	0.2757	0.042%	0.167%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.002%	0.008%
Methyloctane (2-)	VOC		128.255	0.3330	0.013%	0.064%
Methyloctane (4-)	VOC		128.255	0.3330	0.013%	0.064%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.004%	0.019%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.004%	0.019%
Xylene (o-)	VOC	X	106.165	0.2757	0.009%	0.037%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.003%	0.016%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	0.050%	0.236%
Unknowns	VOC		**473.700**	1.2300	0.079%	1.387%
Flash Gas			26.938	0.0699	100.000%	100.000%
TOC (Total)			26.379	0.0685	96.736%	94.728%
VOC (Total)			66.745	0.1733	16.825%	41.688%
HAP (Total)			88.115	0.2288	0.762%	2.492%
Xylenes			106.165	0.2757	0.094%	0.371%

NOTES

1. Normalized mole percentages from TABLE E-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE E-1, unless value negative.

MW = 26.938 lb/lb-mol

TABLE E-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Nitrogen			28.013	0.0727	0.000%	0.000%
Carbon Dioxide	GHG		44.010	0.1143	0.038%	0.013%
Methane	GHG		16.042	0.0417	0.303%	0.038%
Ethane			30.069	0.0781	0.383%	0.090%
Propane	VOC		44.096	0.1145	0.838%	0.288%
Butane (i-)	VOC		58.122	0.1509	0.849%	0.385%
Butane (n-)	VOC		58.122	0.1509	1.391%	0.630%
Pentane (i-)	VOC		72.149	0.1873	2.544%	1.430%
Pentane (n-)	VOC		72.149	0.1873	1.859%	1.045%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.227%	0.152%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	1.586%	1.065%
Methylpentane (3-)	VOC		86.175	0.2238	1.188%	0.797%
Hexane (n-)	VOC	X	86.175	0.2238	2.522%	1.693%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.430%	0.335%
Methylcyclopentane	VOC		84.159	0.2185	1.567%	1.027%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.177%	0.138%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	2.367%	1.440%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.305%	0.238%
Cyclohexane	VOC		84.159	0.2185	1.528%	1.002%
Methylhexane (2-)	VOC		100.202	0.2602	3.167%	2.472%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.833%	0.637%
Methylhexane (3-)	VOC		100.202	0.2602	3.287%	2.566%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.225%	0.172%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.368%	0.281%
Ethylpentane (3-)	VOC		100.202	0.2602	0.040%	0.031%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.307%	0.235%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.029%	0.026%
Heptane (n-)	VOC		100.202	0.2602	5.170%	4.036%
Methylcyclohexane	VOC		98.186	0.2549	4.647%	3.555%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.317%	0.277%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.134%	0.119%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	1.194%	0.913%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.201%	0.179%
Ethylcyclopentane	VOC		98.186	0.2549	0.653%	0.500%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.039%	0.035%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE E-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	6.256%	4.491%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.522%	0.457%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	4.934%	4.391%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	4.077%	3.628%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.586%	0.521%
Ethylhexane (3-)	VOC		114.229	0.2966	0.156%	0.139%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.039%	0.034%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.239%	0.209%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.239%	0.209%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	6.155%	5.477%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.269%	0.269%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.075%	0.066%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.075%	0.066%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.075%	0.066%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.493%	0.431%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.009%	0.009%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.224%	0.224%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.257%	0.224%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.723%	0.632%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.159%	0.159%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	1.935%	1.692%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.095%	0.095%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.095%	0.095%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.109%	0.107%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.054%	0.054%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.054%	0.054%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE E-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.370%	0.370%
Ethylbenzene	VOC	X	106.165	0.2757	0.576%	0.476%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.010%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	3.491%	2.887%
Xylene (p-)	VOC	X	106.165	0.2757	3.491%	2.887%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.130%	0.130%
Methyloctane (2-)	VOC		128.255	0.3330	1.109%	1.108%
Methyloctane (4-)	VOC		128.255	0.3330	1.109%	1.108%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.328%	0.322%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.328%	0.322%
Xylene (o-)	VOC	X	106.165	0.2757	0.776%	0.641%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.284%	0.279%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	4.089%	4.086%
Unknowns	VOC		**283.170**	0.7353	15.292%	33.734%
Residual Liquid			128.362	0.3333	100.000%	100.000%
TOC (Total)			128.394	0.3334	99.962%	99.987%
VOC (Total)			129.116	0.3353	99.276%	99.859%
HAP (Total)			92.587	0.2404	10.159%	7.327%
Xylenes			106.165	0.2757	7.757%	6.416%

NOTES

1. Normalized mole percentages from TABLE E-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE E-1.

MW = 128.362 lb/lb-mol

TABLE E-4a
Flash Analysis
Maximum Hourly and Annual Emission Estimates

Station ID	WADS-SV-V2				
Service	Pipeline Liquids				
Liquids Holding Capacity	317 gal			317 gal	
Liquids Input Rate	4,000 gal/yr			317 gal/hr	
Flash Gas Density	0.0769 lb/scf			0.0769 lb/scf	
Flash Factor	328.03 scf/bbl			328.03 scf/bbl	
Flash Gas Rate	31,241 scf/yr			2,473 scfh	
Flash Losses	2,404 lb/yr	Average	Maximum	190 lb/hr	Maximum
Flash Gas	100.00% by weight	0.2744 lb/hr	1.2018 tpy	100.00% by weight	190.2917 lb/hr
CO_{2-e}	1039.07% by weight	2.8511 lb/hr	12.4880 tpy	1039.07% by weight	1,977 lb/hr
CO_2	5.17% by weight	0.0142 lb/hr	0.0621 tpy	5.17% by weight	9.8332 lb/hr
TOC (Total)	94.73% by weight	0.2599 lb/hr	1.1385 tpy	94.73% by weight	180.2587 lb/hr
Methane	41.36% by weight	0.1135 lb/hr	0.4970 tpy	41.36% by weight	78.6974 lb/hr
Ethane	11.68% by weight	0.0321 lb/hr	0.1404 tpy	11.68% by weight	22.2326 lb/hr
VOC (Total)	41.69% by weight	0.1144 lb/hr	0.5010 tpy	41.69% by weight	79.3286 lb/hr
HAP (Total)	2.49% by weight	0.0068 lb/hr	0.0300 tpy	2.49% by weight	4.7425 lb/hr
Benzene	0.5089% by weight	0.0014 lb/hr	0.0061 tpy	0.5089% by weight	0.9683 lb/hr
Ethylbenzene	0.0275% by weight	0.0001 lb/hr	0.0003 tpy	0.0275% by weight	0.0523 lb/hr
Hexane (n-)	1.7932% by weight	0.0049 lb/hr	0.0216 tpy	1.7932% by weight	3.4123 lb/hr
Methanol					
Naphthalene					
Toluene	0.6253% by weight	0.0017 lb/hr	0.0075 tpy	0.6253% by weight	1.1899 lb/hr
Trimethylpentane (2,2,4-)	0.0091% by weight	0.0000 lb/hr	0.0001 tpy	0.0091% by weight	0.0174 lb/hr
Xylenes	0.3706% by weight	0.0010 lb/hr	0.0045 tpy	0.3706% by weight	0.7053 lb/hr

NOTES

1. Separator Characteristics: Flash is represented for separators that receive majority of liquids, but flash may be emitted from other separators.
   - Orientation: Vertical Fixed Roof Tank
   - Height/Length: 10.00 ft
   - Diameter: 4.00 ft
   - Capacity (physical): 940 gal
   - Capacity (liquid): 317 gal — 34% of physical capacity
2. Liquid input rates:
   - a. maximum hourly based on operator experience; 317 gal
   - b. maximum annual based on operating experience and safety factor; and 4,000 gal
   - c. average hourly is just the maximum annual divided by 8,760 hrs/yr.
3. Flash gas density is 110% of the value extracted from TABLE E-3b.
   Density (TABLE E-3b): 0.0699 lb/scf Safety Factor: 110%
4. Flash factor extracted from TABLE E-1.
5. Speciated emissions vapor weight percentages extracted from TABLE E-3b.

TABLE F-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum		mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ M_i	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	T (°F)	P_i (psia)	(mol_i/mol_L) f_{v-i}	(lb_i/lb_L) f_{m-i}	(mol_i/mol_V)	(lb_i/lb_V)
Nitrogen			28.013	3.7362	2.6465E+02	-6.7880E+00	0.0000E+00	0.0000E+00	-345.75	-232.60	68.00		0.000%	0.000%	0.000%	0.000%
Carbon Dioxide	GHG		44.010	35.0169	-1.5119E+03	-1.1334E+01	9.3368E-03	1.7136E-09	-68.80	87.80	68.00	833.1743	0.038%	0.013%	1.087%	2.183%
Methane	GHG		16.042	14.6667	-5.7097E+02	-3.3373E+00	-2.1999E-09	1.3096E-05	-295.60	-115.60	68.00	7,889.8148	0.303%	0.038%	82.053%	60.088%
Ethane			30.069	20.6973	-1.1341E+03	-5.2514E+00	-9.8774E-11	6.7329E-06	-297.40	89.60	68.00	546.5426	0.383%	0.090%	7.185%	9.862%
Propane	VOC		44.096	21.4469	-1.4627E+03	-5.2610E+00	3.2820E-11	3.7349E-06	-306.40	206.60	68.00	121.5870	0.838%	0.288%	3.497%	7.039%
Butane (i-)	VOC		58.122	31.2541	-1.9532E+03	-8.8060E+00	8.9246E-11	5.7501E-06	-254.20	275.00	68.00	44.2751	0.849%	0.385%	1.290%	3.423%
Butane (n-)	VOC		58.122	27.0441	-1.9049E+03	-7.1805E+00	-6.6845E-11	4.2190E-06	-216.40	305.60	68.00	30.1688	1.391%	0.630%	1.440%	3.821%
Pentane (i-)	VOC		72.149	29.2963	-2.1762E+03	-7.8830E+00	-4.6512E-11	3.8997E-06	-256.00	368.60	68.00	11.1082	2.544%	1.430%	0.970%	3.193%
Pentane (n-)	VOC		72.149	33.3239	-2.4227E+03	-9.2354E+00	9.0199E-11	4.1050E-06	-202.00	386.60	68.00	8.1938	1.859%	1.045%	0.523%	1.722%
Dimethylbutane (2,2-)	VOC		86.175	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.227%	0.152%	0.039%	0.155%
Dimethylbutane (2,3-)	VOC		86.175	33.6319	-2.5524E+03	-9.3142E+00	1.4759E-10	3.9140E-06	-223.60	500.00	68.00	3.6998	0.000%	0.000%	0.000%	0.000%
Cyclopentane	VOC		70.133	29.1547	-2.3512E+03	-7.6965E+00	-1.6212E-10	3.1250E-06	-137.20	462.20	68.00	5.0181	0.000%	0.000%	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	30.7477	-2.4888E+03	-8.2295E+00	-2.3723E-11	3.2402E-06	-243.40	437.00	68.00	3.3041	1.586%	1.065%	0.180%	0.707%
Methylpentane (3-)	VOC		86.175	35.2848	-2.6773E+03	-9.8546E+00	2.2352E-11	4.0277E-06	-261.40	447.80	68.00	2.9617	1.188%	0.797%	0.121%	0.475%
Hexane (n-)	VOC	X	86.175	69.7378	-3.6278E+03	-2.3927E+01	1.2810E-02	-1.6844E-16	-139.00	453.20	68.00	2.3626	2.522%	1.693%	0.204%	0.804%
Dimethylpentane (2,2-)	VOC		100.202	6.2875	-2.1682E+03	2.6936E+00	-1.5525E-02	1.0917E-05	-191.20	478.40	68.00	1.6191	0.430%	0.335%	0.024%	0.109%
Methylcyclopentane	VOC		84.159	32.4766	-2.6434E+03	-8.7933E+00	2.0749E-11	3.2158E-06	-223.60	500.00	68.00	2.1257	1.567%	1.027%	0.114%	0.439%
Dimethylpentane (2,4-)	VOC		100.202	35.9436	-2.8460E+03	-9.9938E+00	8.0693E-11	3.6419E-06	-182.20	476.60	68.00	1.5074	0.177%	0.138%	0.009%	0.042%
Trimethylbutane (2,2,3-)	VOC		100.202	32.3633	-2.6614E+03	-8.7743E+00	-7.6870E-10	3.2006E-06	-11.20	496.40	68.00	1.5789	0.000%	0.000%	0.000%	0.000%
Benzene	VOC	X	78.112	31.7718	-2.7254E+03	-8.4443E+00	-5.3534E-09	2.7187E-06	42.80	552.20	68.00	1.4495	2.367%	1.440%	0.118%	0.420%
Dimethylpentane (3,3-)	VOC		100.202	30.2570	-2.6313E+03	-7.9839E+00	4.6848E-13	2.7170E-06	-209.20	505.40	68.00	1.2681	0.305%	0.238%	0.013%	0.061%
Cyclohexane	VOC		84.159	48.5529	-3.0874E+03	-1.5521E+01	7.3830E-03	6.3563E-12	44.60	537.80	68.00	1.5112	1.528%	1.002%	0.079%	0.304%
Methylhexane (2-)	VOC		100.202	54.1075	-3.3785E+03	-1.7547E+01	8.2594E-03	-3.4967E-14	-180.40	494.60	68.00	0.9987	3.167%	2.472%	0.109%	0.496%
Dimethylpentane (2,3-)	VOC		100.202	39.7737	-2.9050E+03	-1.2012E+01	5.1334E-03	-2.3807E-14	-171.40	507.20	68.00	1.0467	0.000%	0.000%	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	58.1943	-3.4151E+03	-1.9294E+01	9.6704E-03	-2.4361E-15	-94.00	525.20	68.00	1.1616	0.833%	0.637%	0.033%	0.149%
Methylhexane (3-)	VOC		100.202	35.2535	-2.9310E+03	-9.6667E+00	-5.2026E-11	3.2107E-06	-182.20	503.60	68.00	0.9291	3.287%	2.566%	0.105%	0.479%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	53.1912	-3.3121E+03	-1.7277E+01	8.3107E-03	5.0896E-14	-209.20	536.00	68.00	0.9791	0.225%	0.172%	0.008%	0.034%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	35.4255	-2.7286E+03	-1.0444E+01	4.6608E-03	1.7565E-14	-209.20	532.40	68.00	1.0075	0.368%	0.281%	0.013%	0.057%
Ethylpentane (3-)	VOC		100.202	8.5463	-2.2979E+03	1.5503E+00	-1.2233E-02	8.2670E-06	-180.40	514.40	68.00	0.8755	0.040%	0.031%	0.001%	0.006%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	36.8109	-2.9536E+03	-1.0275E+01	-4.6212E-12	3.6730E-06	-178.60	536.00	68.00	0.9713	0.307%	0.235%	0.010%	0.046%
Trimethylpentane (2,2,4-)	VOC	X	114.229	50.3422	-3.2789E+03	-1.6111E+01	7.4260E-03	-9.1804E-14	-160.60	519.80	68.00	0.7453	0.029%	0.026%	0.001%	0.004%
Heptane (n-)	VOC		100.202	65.0257	-3.8188E+03	-2.1684E+01	1.0387E-02	1.0206E-14	-130.00	512.60	68.00	0.6808	5.170%	4.036%	0.121%	0.552%
Methylcyclohexane	VOC		98.186	38.0955	-3.0738E+03	-1.0684E+01	-5.1766E-11	3.5282E-06	-194.80	570.20	68.00	0.6925	4.647%	3.555%	0.110%	0.495%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.317%	0.277%	0.000%	0.001%
Dimethylhexane (2,2-)	VOC		114.229	38.7670	-3.1841E+03	-1.0857E+01	1.9275E-12	3.4797E-06	-185.80	530.60	68.00	0.5066	0.134%	0.119%	0.002%	0.012%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	36.3623	-3.0025E+03	-1.0070E+01	-1.0435E-09	3.3726E-06	-65.20	557.60	68.00	0.7110	1.194%	0.913%	0.029%	0.131%
Dimethylhexane (2,5-)	VOC		114.229	40.0260	-3.2647E+03	-1.1282E+01	-6.5408E-10	3.6200E-06	-131.80	530.60	68.00	0.4490	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	56.2877	-3.6225E+03	-1.8225E+01	8.1864E-03	8.7232E-12	30.20	537.80	68.00	0.4499	0.201%	0.179%	0.003%	0.016%
Ethylcyclopentane	VOC		98.186	36.3631	-3.0448E+03	-1.0038E+01	3.5007E-11	3.2347E-06	-216.40	566.60	68.00	0.5963	0.653%	0.500%	0.013%	0.060%
Trimethylpentane (2,2,3-)	VOC		114.229	35.9540	-3.0569E+03	-9.8896E+00	-7.2916E-11	3.1060E-06	-169.60	555.80	68.00	0.4788	0.039%	0.035%	0.001%	0.003%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	38.0712	-3.1736E+03	-1.0617E+01	6.3090E-11	3.3817E-06	-194.80	552.20	68.00	0.4250	0.000%	0.000%	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%

TABLE F-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum		mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ M_i	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	T (°F)	P_i (psia)	(mol_i/mol_L) f_{v-i}	(lb_i/lb_L) f_{m-i}	(mol_i/mol_V)	(lb_i/lb_V)
Trimethylpentane (2,3,4-)	VOC		114.229	34.1565	-3.0232E+03	-9.2267E+00	2.7691E-11	2.7828E-06	-164.20	559.40	68.00	0.4029	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,3-)	VOC		114.229	57.3778	-3.7143E+03	-1.8599E+01	8.2907E-03	-2.8441E-12	30.20	554.00	68.00	0.3451	0.000%	0.000%	0.000%	0.000%
Toluene	VOC	X	92.138	34.0775	-3.0379E+03	-9.1635E+00	1.0289E-11	2.7035E-06	-139.00	606.20	68.00	0.4219	6.256%	4.491%	0.091%	0.381%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.522%	0.457%	0.000%	0.001%
Dimethylhexane (3,4-)	VOC		114.229	38.6119	-3.2685E+03	-1.0752E+01	3.6386E-09	3.2771E-06	30.20	564.80	68.00	0.3186	4.934%	4.391%	0.054%	0.281%
Methylheptane (2-)	VOC		114.229	37.6930	-3.2611E+03	-1.0391E+01	-1.0524E-12	3.0560E-06	-164.20	548.60	68.00	0.3028	0.000%	0.000%	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	40.2080	-3.3661E+03	-1.1279E+01	-8.7855E-11	3.4055E-06	-185.80	552.20	68.00	0.3001	4.077%	3.628%	0.042%	0.219%
Dimethylhexane (3,4-)	VOC		114.229	38.6119	-3.2685E+03	-1.0752E+01	3.6386E-09	3.2771E-06	30.20	564.80	68.00	0.3186	0.000%	0.000%	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	52.8828	-3.6231E+03	-1.6804E+01	7.1828E-03	7.4077E-14	-184.00	555.80	68.00	0.2869	0.586%	0.521%	0.006%	0.030%
Ethylhexane (3-)	VOC		114.229	40.2079	-3.3651E+03	-1.1285E+01	-5.4180E-09	3.4199E-06	30.20	557.60	68.00	0.2931	0.156%	0.139%	0.002%	0.008%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.039%	0.034%	0.000%	0.000%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	32.4775	-3.0067E+03	-8.5896E+00	7.0258E-11	2.1739E-06	-103.00	604.40	68.00	0.3176	0.239%	0.209%	0.003%	0.013%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.239%	0.209%	0.000%	0.001%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	32.5731	-2.9872E+03	-8.6494E+00	-2.1355E-09	2.2946E-06	-34.60	602.60	68.00	0.3364	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	7.8816	-2.6422E+03	2.3902E+00	-1.5376E-02	9.7931E-06	-158.80	563.00	68.00	0.2426	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	33.1329	-3.0084E+03	-8.8498E+00	-4.3621E-10	2.3704E-06	-27.40	604.40	68.00	0.3361	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Cycloheptane	VOC		98.186	54.0858	-3.6109E+03	-1.7331E+01	7.5272E-03	1.7553E-12	17.60	627.80	68.00	0.3185	0.000%	0.000%	0.000%	0.000%
Octane (n-)	VOC		114.229	29.0948	-3.0114E+03	-7.2653E+00	-2.2696E-11	1.4680E-06	-70.60	564.80	68.00	0.2040	6.155%	5.477%	0.043%	0.225%
Trimethylhexane (2,4,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.269%	0.269%	0.047%	0.275%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	-3.8184	-2.2442E+03	7.0671E+00	-1.9644E-02	1.1435E-05	-86.80	568.40	68.00	0.2957	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	32.4384	-3.0550E+03	-8.5372E+00	2.2892E-10	2.0099E-06	-130.00	617.00	68.00	0.2590	0.075%	0.066%	0.001%	0.003%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	31.9151	-3.0253E+03	-8.3613E+00	5.7055E-12	1.9673E-06	-124.60	617.00	68.00	0.2640	0.075%	0.066%	0.001%	0.003%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.075%	0.066%	0.000%	0.000%
Propylcyclopentane (i-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.493%	0.431%	0.000%	0.001%
Trimethylhexane (2,3,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.009%	0.009%	0.001%	0.009%
Dimethylheptane (2,2-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.224%	0.224%	0.039%	0.228%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.257%	0.224%	0.000%	0.001%
Trimethylhexane (2,2,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	32.1635	-3.0728E+03	-8.4344E+00	6.8943E-10	1.9558E-06	-58.00	631.40	68.00	0.2121	0.723%	0.632%	0.005%	0.027%
Dimethylheptane (2,6-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.159%	0.159%	0.028%	0.162%
Propylcyclopentane (n-)	VOC		112.213	33.9220	-3.2097E+03	-8.9914E+00	-3.2992E-11	2.0684E-06	-178.60	626.00	68.00	0.1793	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	32.7090	-3.1283E+03	-8.6023E+00	-3.9268E-11	1.9935E-06	-167.80	636.80	68.00	0.1870	1.935%	1.692%	0.012%	0.064%
Dimethylheptane (2,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.095%	0.095%	0.017%	0.097%
Dimethylheptane (3,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.095%	0.095%	0.017%	0.097%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.109%	0.107%	0.000%	0.000%
Trimethylhexane (2,3,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.054%	0.054%	0.009%	0.055%

TABLE F-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum		mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ $\mathbf{M_i}$	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	**T** (°F)	P_i (psia)	(mol_i/mol_L) $\mathbf{f_{v\text{-}i}}$	(lb_i/lb_L) $\mathbf{f_{m\text{-}i}}$	(mol_i/mol_V)	(lb_i/lb_V)
Dimethylheptane (3,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.054%	0.054%	0.009%	0.055%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Tetramethylpentane (2,2,3,3-)	VOC		128.255	35.4216	-3.2760E+03	-9.5678E+00	9.0298E-10	2.4355E-06	14.00	640.40	68.00	0.1369	0.370%	0.370%	0.002%	0.010%
Ethylbenzene	VOC	X	106.165	36.1998	-3.3402E+03	-9.7970E+00	-1.1467E-11	2.5758E-06	-139.00	651.20	68.00	0.1388	0.576%	0.476%	0.003%	0.013%
Trimethylhexane (2,3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.010%	0.010%	0.002%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	34.6803	-3.2981E+03	-9.2570E+00	-4.3563E-10	-2.4103E-06	-54.40	649.40	68.00	0.0468	3.491%	2.887%	0.006%	0.027%
Xylene (p-)	VOC	X	106.165	60.0531	-4.0159E+03	-1.9441E+01	8.2881E-03	-2.3647E-12	55.40	649.40	68.00	0.1277	3.491%	2.887%	0.015%	0.074%
Dimethylheptane (3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.130%	0.130%	0.023%	0.133%
Methyloctane (2-)	VOC		128.255	6.0191	-2.8579E+03	3.4068E+00	-1.6572E-02	9.8047E-06	-112.00	597.20	68.00	0.0881	1.109%	1.108%	0.003%	0.020%
Methyloctane (4-)	VOC		128.255	11.2012	-2.9467E+03	1.2133E+00	-1.4423E-02	9.1770E-06	-171.40	599.00	68.00	0.0974	1.109%	1.108%	0.004%	0.022%
Dimethylheptane (3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	9.8147	-2.9609E+03	1.9061E+00	-1.5675E-02	9.7961E-06	-160.60	602.60	68.00	0.0889	0.000%	0.000%	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.328%	0.322%	0.000%	0.001%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.328%	0.322%	0.000%	0.001%
Xylene (o-)	VOC	X	106.165	37.2413	-3.4573E+03	-1.0126E+01	9.0676E-11	2.6123E-06	-13.00	674.60	68.00	0.0946	0.776%	0.641%	0.003%	0.012%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.284%	0.279%	0.000%	0.001%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Nonane (n-)	VOC		128.255	8.8817	-2.8042E+03	1.5262E+00	-1.0464E-02	5.7972E-06	-63.40	613.40	68.00	0.0627	4.089%	4.086%	0.009%	0.051%
Unknowns	VOC		283.170	116.5157	-8.0140E+03	-3.8799E+01	1.3398E-02	-4.4444E-13	50.00	813.20	68.00	0.0000	15.292%	33.734%	0.000%	0.000%
Residual Liquid	Liquid	128.362 lb/lb-mol	Vapor	68.00 °F		29.1420 psia			21.907 lb/lb-mol				100.000%	100.000%	100.000%	100.000%
TOC (Total)		128.394 lb/lb-mol		68.00 °F		28.8362 psia			21.664 lb/lb-mol				99.962%	99.987%	98.913%	97.817%
VOC (Total)		129.116 lb/lb-mol		68.00 °F		2.8403 psia			63.095 lb/lb-mol				99.276%	99.859%	9.676%	27.868%
HAP (Total)		95.690 lb/lb-mol		68.00 °F		0.6569 psia			86.481 lb/lb-mol				19.507%	14.542%	0.440%	1.736%
Xylenes		106.165 lb/lb-mol		68.00 °F		0.0880 psia			106.165 lb/lb-mol				7.757%	6.416%	0.023%	0.114%

NOTES

1. Liquid composition of residual liquid based on SPL flash analysis (see TABLE E-3c).
2. Vapor pressure data for unknowns based on: Pentadecane (n-)

TABLE F-2
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		WADS-SV-V1S				
Service		Pipeline Liquids				
Capacity		530 gal			530 gal	
Temperature of Stored Liquid		57.69 °F			84.03 °F	
Vapor Pressure		5.0312 psia			8.0963 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		0.13 turnover/yr				
		71 gal/yr			530 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					42.8424 lbs/month	
		277.6576 lb/yr			0.0576 lb/hr	
Working Losses		**7.91E-03** lb/gal			**1.01E-02** lb/gal	
		0.5575 lb/yr	Average	Maximum	5.3587 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.1137 lb/hr	0.4982 tpy	358.84% by weight	0.2066 lb/hr
	Work		0.0002 lb/hr	0.0010 tpy		19.2290 lb/hr
	Total		0.1140 lb/hr	0.4992 tpy		19.4357 lb/hr
CO_{2-e}		5398.27% by weight	1.7145 lb/hr	7.5094 tpy	5398.27% by weight	292 lb/hr
CO_2		7.83% by weight	0.0025 lb/hr	0.0109 tpy	7.83% by weight	0.4243 lb/hr
TOC (Total)		351.00% by weight	0.1115 lb/hr	0.4883 tpy	351.00% by weight	19.0114 lb/hr
Methane		215.62% by weight	0.0685 lb/hr	0.2999 tpy	215.62% by weight	11.6784 lb/hr
Ethane		35.39% by weight	0.0112 lb/hr	0.0492 tpy	35.39% by weight	1.9167 lb/hr
VOC (Total)		100.00% by weight	0.0318 lb/hr	0.1391 tpy	100.00% by weight	5.4163 lb/hr
HAP (Total)		6.23% by weight	0.0020 lb/hr	0.0087 tpy	6.23% by weight	0.3374 lb/hr
Benzene		1.5063% by weight	4.78E-04 lb/hr	2.10E-03 tpy	1.5063% by weight	8.16E-02 lb/hr
Ethylbenzene		0.0477% by weight	1.51E-05 lb/hr	6.63E-05 tpy	0.0477% by weight	2.58E-03 lb/hr
Hexane (n-)		2.8866% by weight	9.17E-04 lb/hr	4.02E-03 tpy	2.8866% by weight	1.56E-01 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	4.34E-04 lb/hr	1.90E-03 tpy	1.3668% by weight	7.40E-02 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	4.41E-06 lb/hr	1.93E-05 tpy	0.0139% by weight	7.52E-04 lb/hr
Xylenes		0.4073% by weight	1.29E-04 lb/hr	5.67E-04 tpy	0.4073% by weight	2.21E-02 lb/hr

NOTES

1. Tank Characteristics:

		TANKS 4.09d			
Orientation	Vertical Fixed Roof Tank		Above Ground?	Yes	
Height/Length	10.83 ft	10.83 ft	Shell/Roof Color	Gray/Medium	or less solar
Diameter	5.00 ft		Shell Condition	Good	absorptance
Capacity (estimated)	1,591 gal		Vacuum Setting	-0.03 psig	
Capacity (nominal)	1,590 gal		Pressure Setting	0.03 psig	

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Mansfield, Ohio
Material	Gasoline (RVP 10)	Selection based on VOC vapor pressure (see TABLE F-1).	
Liquid Molecular Weight	92.00 lb/lb-mol	Vapor Molecular Weight	66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.6969	4.1239	43.12	48.45	8.6042	9.2370	1,590
February	28	3.8865	4.4469	45.54	52.19	10.3592	9.7108	1,590
March	31	4.4119	5.2041	51.80	60.18	16.8946	11.0235	1,590
April	30	5.0398	6.1684	58.53	69.10	24.4690	12.5924	1,590
May	31	5.6806	7.1194	64.74	76.87	34.1459	14.1935	1,590
June	30	6.2284	7.8879	69.62	82.57	40.3377	15.5621	1,590
July	31	6.4341	8.0963	71.37	84.03	42.8424	16.0761	1,590
August	31	6.1978	7.6536	69.36	80.88	36.7229	15.4856	1,590
September	30	5.6756	6.8276	64.70	74.58	26.7589	14.1809	1,590
October	31	4.9614	5.7848	57.73	65.70	18.5266	12.3965	1,590
November	30	4.3235	4.8197	50.79	56.25	10.2279	10.8025	1,590
December	31	3.8374	4.2190	44.92	49.57	7.7683	9.5881	1,590
ALL	365	5.0312	8.0963	57.69	84.03	277.6576	150.8490	19,080

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01

4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-3
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		WADS-SV-V1D				
Service		Pipeline Liquids				
Capacity		530 gal			530 gal	
Temperature of Stored Liquid		57.69 °F			84.03 °F	
Vapor Pressure		5.0312 psia			8.0963 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		0.13 turnover/yr				
		71 gal/yr			530 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					42.8424 lbs/month	
		277.6576 lb/yr			0.0576 lb/hr	
Working Losses		**7.91E-03** lb/gal			**1.01E-02** lb/gal	
		0.5575 lb/yr	Average	Maximum	5.3587 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.1137 lb/hr	0.4982 tpy	358.84% by weight	0.2066 lb/hr
	Work		0.0002 lb/hr	0.0010 tpy		19.2290 lb/hr
	Total		0.1140 lb/hr	0.4992 tpy		19.4357 lb/hr
CO_{2-e}		5398.27% by weight	1.7145 lb/hr	7.5094 tpy	5398.27% by weight	292 lb/hr
CO_2		7.83% by weight	0.0025 lb/hr	0.0109 tpy	7.83% by weight	0.4243 lb/hr
TOC (Total)		351.00% by weight	0.1115 lb/hr	0.4883 tpy	351.00% by weight	19.0114 lb/hr
Methane		215.62% by weight	0.0685 lb/hr	0.2999 tpy	215.62% by weight	11.6784 lb/hr
Ethane		35.39% by weight	0.0112 lb/hr	0.0492 tpy	35.39% by weight	1.9167 lb/hr
VOC (Total)		100.00% by weight	0.0318 lb/hr	0.1391 tpy	100.00% by weight	5.4163 lb/hr
HAP (Total)		6.23% by weight	0.0020 lb/hr	0.0087 tpy	6.23% by weight	0.3374 lb/hr
Benzene		1.5063% by weight	4.78E-04 lb/hr	2.10E-03 tpy	1.5063% by weight	8.16E-02 lb/hr
Ethylbenzene		0.0477% by weight	1.51E-05 lb/hr	6.63E-05 tpy	0.0477% by weight	2.58E-03 lb/hr
Hexane (n-)		2.8866% by weight	9.17E-04 lb/hr	4.02E-03 tpy	2.8866% by weight	1.56E-01 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	4.34E-04 lb/hr	1.90E-03 tpy	1.3668% by weight	7.40E-02 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	4.41E-06 lb/hr	1.93E-05 tpy	0.0139% by weight	7.52E-04 lb/hr
Xylenes		0.4073% by weight	1.29E-04 lb/hr	5.67E-04 tpy	0.4073% by weight	2.21E-02 lb/hr

NOTES

1. Tank Characteristics:

		TANKS 4.09d			
Orientation	Vertical Fixed Roof Tank		Above Ground?	Yes	
Height/Length	10.83 ft	10.83 ft	Shell/Roof Color	Gray/Medium	or less solar
Diameter	5.00 ft		Shell Condition	Good	absorptance
Capacity (estimated)	1,591 gal		Vacuum Setting	-0.03 psig	
Capacity (nominal)	1,590 gal		Pressure Setting	0.03 psig	

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Mansfield, Ohio
Material	Gasoline (RVP 10)	Selection based on VOC vapor pressure (see TABLE F-1).	
Liquid Molecular Weight	92.00 lb/lb-mol	Vapor Molecular Weight	66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.6969	4.1239	43.12	48.45	8.6042	9.2370	1,590
February	28	3.8865	4.4469	45.54	52.19	10.3592	9.7108	1,590
March	31	4.4119	5.2041	51.80	60.18	16.8946	11.0235	1,590
April	30	5.0398	6.1684	58.53	69.10	24.4690	12.5924	1,590
May	31	5.6806	7.1194	64.74	76.87	34.1459	14.1935	1,590
June	30	6.2284	7.8879	69.62	82.57	40.3377	15.5621	1,590
July	31	6.4341	8.0963	71.37	84.03	42.8424	16.0761	1,590
August	31	6.1978	7.6536	69.36	80.88	36.7229	15.4856	1,590
September	30	5.6756	6.8276	64.70	74.58	26.7589	14.1809	1,590
October	31	4.9614	5.7848	57.73	65.70	18.5266	12.3965	1,590
November	30	4.3235	4.8197	50.79	56.25	10.2279	10.8025	1,590
December	31	3.8374	4.2190	44.92	49.57	7.7683	9.5881	1,590
ALL	365	5.0312	8.0963	57.69	84.03	277.6576	150.8490	19,080

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01

4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-4
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		WADS-SV-V1C1				
Service		Pipeline Liquids				
Capacity		400 gal			400 gal	
Temperature of Stored Liquid		57.69 °F			84.03 °F	
Vapor Pressure		5.0312 psia			8.0963 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		0.13 turnover/yr				
		53 gal/yr			400 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					33.7289 lbs/month	
		217.9022 lb/yr			0.0453 lb/hr	
Working Losses		**7.91E-03** lb/gal			**1.01E-02** lb/gal	
		0.4207 lb/yr	Average	Maximum	4.0443 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.0893 lb/hr	0.3910 tpy	358.84% by weight	0.1627 lb/hr
	Work		0.0002 lb/hr	0.0008 tpy		14.5125 lb/hr
	Total		0.0894 lb/hr	0.3917 tpy		14.6751 lb/hr
CO_{2-e}		5398.27% by weight	1.3454 lb/hr	5.8928 tpy	5398.27% by weight	221 lb/hr
CO_2		7.83% by weight	0.0020 lb/hr	0.0086 tpy	7.83% by weight	0.3204 lb/hr
TOC (Total)		351.00% by weight	0.0875 lb/hr	0.3832 tpy	351.00% by weight	14.3548 lb/hr
Methane		215.62% by weight	0.0537 lb/hr	0.2354 tpy	215.62% by weight	8.8179 lb/hr
Ethane		35.39% by weight	0.0088 lb/hr	0.0386 tpy	35.39% by weight	1.4472 lb/hr
VOC (Total)		100.00% by weight	0.0249 lb/hr	0.1092 tpy	100.00% by weight	4.0896 lb/hr
HAP (Total)		6.23% by weight	0.0016 lb/hr	0.0068 tpy	6.23% by weight	0.2547 lb/hr
Benzene		1.5063% by weight	3.75E-04 lb/hr	1.64E-03 tpy	1.5063% by weight	6.16E-02 lb/hr
Ethylbenzene		0.0477% by weight	1.19E-05 lb/hr	5.20E-05 tpy	0.0477% by weight	1.95E-03 lb/hr
Hexane (n-)		2.8866% by weight	7.19E-04 lb/hr	3.15E-03 tpy	2.8866% by weight	1.18E-01 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	3.41E-04 lb/hr	1.49E-03 tpy	1.3668% by weight	5.59E-02 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	3.46E-06 lb/hr	1.52E-05 tpy	0.0139% by weight	5.68E-04 lb/hr
Xylenes		0.4073% by weight	1.02E-04 lb/hr	4.45E-04 tpy	0.4073% by weight	1.67E-02 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	10.00 ft	Shell/Roof Color	Gray/Medium or less solar
Diameter	4.50 ft	Shell Condition	Good absorptance
Capacity (estimated)	1,190 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	1,200 gal	Pressure Setting	0.03 psig

2. Stored Liquid Characteristics:

Basis: USEPA TANKS 4.09d — MET Station: Mansfield, Ohio
Material: Gasoline (RVP 10) — Selection based on VOC vapor pressure (see TABLE F-1).
Liquid Molecular Weight: 92.00 lb/lb-mol — Vapor Molecular Weight: 66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.6969	4.1239	43.12	48.45	6.7001	6.9713	1,200
February	28	3.8865	4.4469	45.54	52.19	8.0750	7.3289	1,200
March	31	4.4119	5.2041	51.80	60.18	13.2033	8.3196	1,200
April	30	5.0398	6.1684	58.53	69.10	19.1738	9.5037	1,200
May	31	5.6806	7.1194	64.74	76.87	26.8191	10.7121	1,200
June	30	6.2284	7.8879	69.62	82.57	31.7378	11.7450	1,200
July	31	6.4341	8.0963	71.37	84.03	33.7289	12.1329	1,200
August	31	6.1978	7.6536	69.36	80.88	28.8910	11.6873	1,200
September	30	5.6756	6.8276	64.70	74.58	21.0167	10.7026	1,200
October	31	4.9614	5.7848	57.73	65.70	14.5128	9.3559	1,200
November	30	4.3235	4.8197	50.79	56.25	7.9899	8.1528	1,200
December	31	3.8374	4.2190	44.92	49.57	6.0538	7.2363	1,200
ALL	365	5.0312	8.0963	57.69	84.03	217.9022	113.8483	14,400

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-5
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		WADS-SV-V2				
Service		Pipeline Liquids				
Capacity		317 gal			317 gal	
Temperature of Stored Liquid		57.69 °F			84.03 °F	
Vapor Pressure		5.0312 psia			8.0963 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		12.63 turnover/yr				
		4,000 gal/yr			317 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					26.5885 lbs/month	
		171.7288 lb/yr			0.0357 lb/hr	
Working Losses		**7.91E-03** lb/gal			**1.01E-02** lb/gal	
		31.6245 lb/yr	Average	Maximum	3.2017 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.0703 lb/hr	0.3081 tpy	358.84% by weight	0.1282 lb/hr
	Work		0.0130 lb/hr	0.0567 tpy		11.4890 lb/hr
	Total		0.0833 lb/hr	0.3649 tpy		11.6173 lb/hr
CO_{2-e}		5398.27% by weight	1.2531 lb/hr	5.4888 tpy	5398.27% by weight	175 lb/hr
CO_2		7.83% by weight	0.0018 lb/hr	0.0080 tpy	7.83% by weight	0.2536 lb/hr
TOC (Total)		351.00% by weight	0.0815 lb/hr	0.3569 tpy	351.00% by weight	11.3637 lb/hr
Methane		215.62% by weight	0.0501 lb/hr	0.2192 tpy	215.62% by weight	6.9805 lb/hr
Ethane		35.39% by weight	0.0082 lb/hr	0.0360 tpy	35.39% by weight	1.1456 lb/hr
VOC (Total)		100.00% by weight	0.0232 lb/hr	0.1017 tpy	100.00% by weight	3.2375 lb/hr
HAP (Total)		6.23% by weight	0.0014 lb/hr	0.0063 tpy	6.23% by weight	0.2016 lb/hr
Benzene		1.5063% by weight	3.50E-04 lb/hr	1.53E-03 tpy	1.5063% by weight	4.88E-02 lb/hr
Ethylbenzene		0.0477% by weight	1.11E-05 lb/hr	4.85E-05 tpy	0.0477% by weight	1.54E-03 lb/hr
Hexane (n-)		2.8866% by weight	6.70E-04 lb/hr	2.94E-03 tpy	2.8866% by weight	9.35E-02 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	3.17E-04 lb/hr	1.39E-03 tpy	1.3668% by weight	4.43E-02 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	3.22E-06 lb/hr	1.41E-05 tpy	0.0139% by weight	4.50E-04 lb/hr
Xylenes		0.4073% by weight	9.46E-05 lb/hr	4.14E-04 tpy	0.4073% by weight	1.32E-02 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	10.00 ft	Shell/Roof Color	Gray/Medium
Diameter	4.00 ft	Shell Condition	Good
Capacity (estimated)	940 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	950 gal	Pressure Setting	0.03 psig

or less solar absorptance

2. Stored Liquid Characteristics:

Basis: USEPA TANKS 4.09d — MET Station: Mansfield, Ohio
Material: Gasoline (RVP 10) — Selection based on VOC vapor pressure (see TABLE F-1).
Liquid Molecular Weight: 92.00 lb/lb-mol — Vapor Molecular Weight: 66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.6969	4.1239	43.12	48.45	5.2771	5.5190	950
February	28	3.8865	4.4469	45.54	52.19	6.3605	5.8020	950
March	31	4.4119	5.2041	51.80	60.18	10.4021	6.5864	950
April	30	5.0398	6.1684	58.53	69.10	15.1090	7.5238	950
May	31	5.6806	7.1194	64.74	76.87	21.1375	8.4804	950
June	30	6.2284	7.8879	69.62	82.57	25.0176	9.2981	950
July	31	6.4341	8.0963	71.37	84.03	26.5885	9.6052	950
August	31	6.1978	7.6536	69.36	80.88	22.7735	9.2524	950
September	30	5.6756	6.8276	64.70	74.58	16.5643	8.4729	950
October	31	4.9614	5.7848	57.73	65.70	11.4359	7.4067	950
November	30	4.3235	4.8197	50.79	56.25	6.2945	6.4543	950
December	31	3.8374	4.2190	44.92	49.57	4.7683	5.7287	950
ALL	365	5.0312	8.0963	57.69	84.03	171.7288	90.1299	11,400

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-6
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		WADS-SV-V4SD				
Service		Pipeline Liquids				
Capacity		43 gal			43 gal	
Temperature of Stored Liquid		57.69 °F			84.03 °F	
Vapor Pressure		5.0312 psia			8.0963 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		0.13 turnover/yr				
		6 gal/yr			43 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					4.2103 lbs/month	
		26.9278 lb/yr			0.0057 lb/hr	
Working Losses		**7.91E-03** lb/gal			**1.01E-02** lb/gal	
		0.0456 lb/yr	Average	Maximum	0.4381 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.0110 lb/hr	0.0483 tpy	358.84% by weight	0.0203 lb/hr
	Work		0.0000 lb/hr	0.0001 tpy		1.5722 lb/hr
	Total		0.0110 lb/hr	0.0484 tpy		1.5925 lb/hr
CO_{2-e}		5398.27% by weight	0.1662 lb/hr	0.7280 tpy	5398.27% by weight	24 lb/hr
CO_2		7.83% by weight	0.0002 lb/hr	0.0011 tpy	7.83% by weight	0.0348 lb/hr
TOC (Total)		351.00% by weight	0.0108 lb/hr	0.0473 tpy	351.00% by weight	1.5577 lb/hr
Methane		215.62% by weight	0.0066 lb/hr	0.0291 tpy	215.62% by weight	0.9569 lb/hr
Ethane		35.39% by weight	0.0011 lb/hr	0.0048 tpy	35.39% by weight	0.1570 lb/hr
VOC (Total)		100.00% by weight	0.0031 lb/hr	0.0135 tpy	100.00% by weight	0.4438 lb/hr
HAP (Total)		6.23% by weight	0.0002 lb/hr	0.0008 tpy	6.23% by weight	0.0276 lb/hr
Benzene		1.5063% by weight	4.64E-05 lb/hr	2.03E-04 tpy	1.5063% by weight	6.68E-03 lb/hr
Ethylbenzene		0.0477% by weight	1.47E-06 lb/hr	6.43E-06 tpy	0.0477% by weight	2.12E-04 lb/hr
Hexane (n-)		2.8866% by weight	8.89E-05 lb/hr	3.89E-04 tpy	2.8866% by weight	1.28E-02 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	4.21E-05 lb/hr	1.84E-04 tpy	1.3668% by weight	6.07E-03 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	4.28E-07 lb/hr	1.87E-06 tpy	0.0139% by weight	6.16E-05 lb/hr
Xylenes		0.4073% by weight	1.25E-05 lb/hr	5.49E-05 tpy	0.4073% by weight	1.81E-03 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank		Above Ground?	Yes	
Height/Length	8.00 ft		Shell/Roof Color	Gray/Medium	or less solar
Diameter	1.67 ft	1.67 ft	Shell Condition	Good	absorptance
Capacity (estimated)	131 gal		Vacuum Setting	-0.03 psig	
Capacity (nominal)	130 gal		Pressure Setting	0.03 psig	

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Mansfield, Ohio
Material	Gasoline (RVP 10)	Selection based on VOC vapor pressure (see TABLE F-1).	
Liquid Molecular Weight	92.00 lb/lb-mol	Vapor Molecular Weight	66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.6969	4.1239	43.12	48.45	0.8078	0.7552	130
February	28	3.8865	4.4469	45.54	52.19	0.9767	0.7940	130
March	31	4.4119	5.2041	51.80	60.18	1.6099	0.9013	130
April	30	5.0398	6.1684	58.53	69.10	2.3576	1.0296	130
May	31	5.6806	7.1194	64.74	76.87	3.3224	1.1605	130
June	30	6.2284	7.8879	69.62	82.57	3.9540	1.2724	130
July	31	6.4341	8.0963	71.37	84.03	4.2103	1.3144	130
August	31	6.1978	7.6536	69.36	80.88	3.5983	1.2661	130
September	30	5.6756	6.8276	64.70	74.58	2.6035	1.1594	130
October	31	4.9614	5.7848	57.73	65.70	1.7828	1.0136	130
November	30	4.3235	4.8197	50.79	56.25	0.9730	0.8832	130
December	31	3.8374	4.2190	44.92	49.57	0.7316	0.7839	130
ALL	365	5.0312	8.0963	57.69	84.03	26.9278	12.3336	1,560

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01

4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-7
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		WADS-TK-V5				
Service		Pipeline Liquids				
Capacity		2,000 gal			2,000 gal	
Temperature of Stored Liquid		57.69 °F			84.03 °F	
Vapor Pressure		5.0312 psia			8.0963 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		2.00 turnover/yr				
		4,000 gal/yr			2,000 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					84.3518 lbs/month	
		533.0681 lb/yr			0.1134 lb/hr	
Working Losses		**7.91E-03** lb/gal			**1.01E-02** lb/gal	
		31.6245 lb/yr	Average	Maximum	20.2215 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.2184 lb/hr	0.9564 tpy	358.84% by weight	0.4068 lb/hr
	Work		0.0130 lb/hr	0.0567 tpy		72.5623 lb/hr
	Total		0.2313 lb/hr	1.0132 tpy		72.9692 lb/hr
CO_{2-e}		5398.27% by weight	3.4799 lb/hr	15.2418 tpy	5398.27% by weight	1,098 lb/hr
CO_2		7.83% by weight	0.0050 lb/hr	0.0221 tpy	7.83% by weight	1.5930 lb/hr
TOC (Total)		351.00% by weight	0.2263 lb/hr	0.9910 tpy	351.00% by weight	71.3762 lb/hr
Methane		215.62% by weight	0.1390 lb/hr	0.6088 tpy	215.62% by weight	43.8454 lb/hr
Ethane		35.39% by weight	0.0228 lb/hr	0.0999 tpy	35.39% by weight	7.1959 lb/hr
VOC (Total)		100.00% by weight	0.0645 lb/hr	0.2823 tpy	100.00% by weight	20.3348 lb/hr
HAP (Total)		6.23% by weight	0.0040 lb/hr	0.0176 tpy	6.23% by weight	1.2666 lb/hr
Benzene		1.5063% by weight	9.71E-04 lb/hr	4.25E-03 tpy	1.5063% by weight	3.06E-01 lb/hr
Ethylbenzene		0.0477% by weight	3.07E-05 lb/hr	1.35E-04 tpy	0.0477% by weight	9.69E-03 lb/hr
Hexane (n-)		2.8866% by weight	1.86E-03 lb/hr	8.15E-03 tpy	2.8866% by weight	5.87E-01 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	8.81E-04 lb/hr	3.86E-03 tpy	1.3668% by weight	2.78E-01 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	8.95E-06 lb/hr	3.92E-05 tpy	0.0139% by weight	2.82E-03 lb/hr
Xylenes		0.4073% by weight	2.63E-04 lb/hr	1.15E-03 tpy	0.4073% by weight	8.28E-02 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	5.00 ft	Shell/Roof Color	Gray/Medium
Diameter	8.00 ft	Shell Condition	Good
Capacity (estimated)	1,880 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	2,000 gal	Pressure Setting	0.03 psig

or less solar absorptance

2. Stored Liquid Characteristics:

Basis: USEPA TANKS 4.09d — MET Station: Mansfield, Ohio
Material: Gasoline (RVP 10) — Selection based on VOC vapor pressure (see TABLE F-1).
Liquid Molecular Weight: 92.00 lb/lb-mol — Vapor Molecular Weight: 66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure avg	Vapor Pressure max	Liquid Surface Temperature avg	Liquid Surface Temperature max	TANKS Output standing	TANKS Output working	TANKS Flow
January	31	3.6969	4.1239	43.12	48.45	15.5324	11.6189	2,000
February	28	3.8865	4.4469	45.54	52.19	18.8478	12.2148	2,000
March	31	4.4119	5.2041	51.80	60.18	31.3585	13.8660	2,000
April	30	5.0398	6.1684	58.53	69.10	46.3808	15.8395	2,000
May	31	5.6806	7.1194	64.74	76.87	65.9482	17.8535	2,000
June	30	6.2284	7.8879	69.62	82.57	79.0255	19.5750	2,000
July	31	6.4341	8.0963	71.37	84.03	84.3518	20.2215	2,000
August	31	6.1978	7.6536	69.36	80.88	71.8892	19.4788	2,000
September	30	5.6756	6.8276	64.70	74.58	51.6741	17.8377	2,000
October	31	4.9614	5.7848	57.73	65.70	35.0305	15.5931	2,000
November	30	4.3235	4.8197	50.79	56.25	18.9236	13.5881	2,000
December	31	3.8374	4.2190	44.92	49.57	14.1056	12.0605	2,000
ALL	365	5.0312	8.0963	57.69	84.03	533.0681	189.7471	24,000

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-8
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		WADS-TK-OIL1				
Service		Oil				
Capacity		570 gal			570 gal	
Temperature of Stored Liquid		57.69 °F			84.03 °F	
Vapor Pressure		0.0063 psia			0.0136 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		365.00 turnover/yr				
		208,050 gal/yr			570 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					0.0251 lbs/month	
		0.1576 lb/yr			0.00003 lb/hr	
Working Losses		**1.95E-05** lb/gal			**2.91E-05** lb/gal	
		4.0509 lb/yr	Average	Maximum	0.0166 lb/hr	Maximum
Liquid	Stand	100.00% by weight	0.0000 lb/hr	0.0001 tpy	100.00% by weight	0.0000 lb/hr
	Work		0.0005 lb/hr	0.0020 tpy		0.0166 lb/hr
	Total		0.0005 lb/hr	0.0021 tpy		0.0166 lb/hr
TOC (Total)		100.00% by weight	0.0005 lb/hr	0.0021 tpy	100.00% by weight	0.0166 lb/hr
Methane						
Ethane						
VOC (Total)		100.00% by weight	0.0005 lb/hr	0.0021 tpy	100.00% by weight	0.0166 lb/hr
HAP (Total)						
Benzene						
Ethylbenzene						
Hexane (n-)						
Methanol						
Naphthalene						
Toluene						
Trimethylpentane (2,2,4-)						
Xylenes						

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	6.00 ft	Shell/Roof Color	Gray/Medium
Diameter	4.00 ft	Shell Condition	Good
Capacity (estimated)	564 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	570 gal	Pressure Setting	0.03 psig

or less solar absorptance

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Mansfield, Ohio
Material	Distillate fuel oil no. 2	Selected purely for a worst-case scenario.	
Liquid Molecular Weight	188.00 lb/lb-mol	Vapor Molecular Weight	130.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	0.0035	0.0043	43.12	48.45	0.0042	0.0062	570
February	28	0.0039	0.0049	45.54	52.19	0.0052	0.0068	570
March	31	0.0049	0.0065	51.80	60.18	0.0090	0.0086	570
April	30	0.0062	0.0088	58.53	69.10	0.0139	0.0110	570
May	31	0.0077	0.0111	64.74	76.87	0.0201	0.0136	570
June	30	0.0089	0.0130	69.62	82.57	0.0236	0.0157	570
July	31	0.0094	0.0136	71.37	84.03	0.0251	0.0166	570
August	31	0.0088	0.0124	69.36	80.88	0.0215	0.0156	570
September	30	0.0077	0.0104	64.70	74.58	0.0156	0.0135	570
October	31	0.0060	0.0079	57.73	65.70	0.0104	0.0107	570
November	30	0.0047	0.0058	50.79	56.25	0.0053	0.0082	570
December	31	0.0038	0.0044	44.92	49.57	0.0038	0.0067	570
ALL	365	0.0063	0.0136	57.69	84.03	0.1576	0.1332	6,840

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. There is no basis for speciation of emissions.

TABLE F-9
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		WADS-TK-OW1				
Service		Oily Water				
Capacity		3,000 gal			3,000 gal	
Temperature of Stored Liquid		57.69 °F			84.03 °F	
Vapor Pressure		0.0063 psia			0.0136 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		12.00 turnover/yr				
		36,000 gal/yr			3,000 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					0.1588 lbs/month	
		0.9982 lb/yr			0.00021 lb/hr	
Working Losses		**1.95E-05** lb/gal			**2.91E-05** lb/gal	
		0.7009 lb/yr	Average	Maximum	0.0874 lb/hr	Maximum
Liquid	Stand	100.00% by weight	0.0001 lb/hr	0.0005 tpy	100.00% by weight	0.0002 lb/hr
	Work		0.0001 lb/hr	0.0004 tpy		0.0874 lb/hr
	Total		0.0002 lb/hr	0.0008 tpy		0.0876 lb/hr
TOC (Total)		100.00% by weight	0.0002 lb/hr	0.0008 tpy	100.00% by weight	0.0876 lb/hr
Methane						
Ethane						
VOC (Total)		100.00% by weight	0.0002 lb/hr	0.0008 tpy	100.00% by weight	0.0876 lb/hr
HAP (Total)						
Benzene						
Ethylbenzene						
Hexane (n-)						
Methanol						
Naphthalene						
Toluene						
Trimethylpentane (2,2,4-)						
Xylenes						

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Horizontal Tank		Above Ground?	Yes	
Height/Length	18.00 ft		Shell/Roof Color	Gray/Medium	or less solar
Diameter	5.38 ft	5.38 ft	Shell Condition	Good	absorptance
Capacity (estimated)	3,055 gal		Vacuum Setting	-0.03 psig	
Capacity (nominal)	3,000 gal		Pressure Setting	0.03 psig	

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Mansfield, Ohio
Material	Distillate fuel oil no. 2	Selected purely for a worst-case scenario.	
Liquid Molecular Weight	188.00 lb/lb-mol	Vapor Molecular Weight	130.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	0.0035	0.0043	43.12	48.45	0.0263	0.0328	3,000
February	28	0.0039	0.0049	45.54	52.19	0.0329	0.0360	3,000
March	31	0.0049	0.0065	51.80	60.18	0.0572	0.0451	3,000
April	30	0.0062	0.0088	58.53	69.10	0.0880	0.0576	3,000
May	31	0.0077	0.0111	64.74	76.87	0.1271	0.0714	3,000
June	30	0.0089	0.0130	69.62	82.57	0.1497	0.0827	3,000
July	31	0.0094	0.0136	71.37	84.03	0.1588	0.0874	3,000
August	31	0.0088	0.0124	69.36	80.88	0.1360	0.0821	3,000
September	30	0.0077	0.0104	64.70	74.58	0.0990	0.0713	3,000
October	31	0.0060	0.0079	57.73	65.70	0.0658	0.0561	3,000
November	30	0.0047	0.0058	50.79	56.25	0.0334	0.0433	3,000
December	31	0.0038	0.0044	44.92	49.57	0.0240	0.0352	3,000
ALL	365	0.0063	0.0136	57.69	84.03	0.9982	0.7009	36,000

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. There is no basis for speciation of emissions.

TABLE F-10
Volatile Organic Liquids Loading (Tanker Trucks)
Hourly and Annual Emission Estimates

Source	WADS-TL-PL				
Supply Vessel	WADS-TK-V5				
	Pipeline Liquids				
	2,000 gal			2,000 gal	
Tanker Truck Service	Dedicated Normal			Dedicated Normal	
Loading Method	Submerged			Submerged	
Saturation Factor	0.60 n.d.			0.60 n.d.	
Vapor Molecular Weight	66.00 lb/lb-mol			66.00 lb/lb-mol	
Bulk Liquid Temperature	57.69 °F			84.03 °F	
	517.69 R			544.03 R	
Vapor Pressure	5.0312 psia			8.0963 psia	
Loading Loss Factor	4.7953 lb/kgal			7.3430 lb/kgal	
Pumping Rate				150 gpm	
Throughput	2.00 turnover/yr				
	4,000 gal/yr			2,000 gal/hr	
Loading Losses	19.1813 lb/yr	Average	Maximum	14.6861 lb/hr	Maximum
Residual Liquid	358.84% by weight	0.0079 lb/hr	0.0344 tpy	358.84% by weight	52.6992 lb/hr
CO_{2-e}	5398.27% by weight	0.1182 lb/hr	0.5177 tpy	5398.27% by weight	792.7930 lb/hr
CO_2	7.83% by weight	0.0002 lb/hr	0.0008 tpy	7.83% by weight	1.1505 lb/hr
TOC (Total)	351.00% by weight	0.0077 lb/hr	0.0337 tpy	351.00% by weight	51.5487 lb/hr
Methane	215.62% by weight	0.0047 lb/hr	0.0207 tpy	215.62% by weight	31.6657 lb/hr
Ethane	35.39% by weight	0.0008 lb/hr	0.0034 tpy	35.39% by weight	5.1970 lb/hr
VOC (Total)	100.00% by weight	0.0022 lb/hr	0.0096 tpy	100.00% by weight	14.6861 lb/hr
HAP (Total)	6.23% by weight	0.0001 lb/hr	0.0006 tpy	6.23% by weight	0.9147 lb/hr
Benzene	1.5063% by weight	3.30E-05 lb/hr	1.44E-04 tpy	1.5063% by weight	2.21E-01 lb/hr
Ethylbenzene	0.0477% by weight	1.04E-06 lb/hr	4.57E-06 tpy	0.0477% by weight	7.00E-03 lb/hr
Hexane (n-)	2.8866% by weight	6.32E-05 lb/hr	2.77E-04 tpy	2.8866% by weight	4.24E-01 lb/hr
Methanol					
Naphthalene					
Toluene	1.3668% by weight	2.99E-05 lb/hr	1.31E-04 tpy	1.3668% by weight	2.01E-01 lb/hr
Trimethylpentane (2,2,4-)	0.0139% by weight	3.04E-07 lb/hr	1.33E-06 tpy	0.0139% by weight	2.04E-03 lb/hr
Xylenes	0.4073% by weight	8.92E-06 lb/hr	3.91E-05 tpy	0.4073% by weight	5.98E-02 lb/hr

NOTES

1. Emissions calculated using methods provided in USEPA, AP-42 Section 5.2 dated 1/95. $L_L = 12.46[(S)M_VP/T]$
2. Physical property, throughput and speciation data based data from supply vessel emission calculation spreadsheet.

TABLE F-11
Volatile Organic Liquids Loading (Tanker Trucks)
Hourly and Annual Emission Estimates

Source	WADS-TL-OIL				
Supply Vessel	WADS-TK-OIL1				
	Oil				
	570 gal			570 gal	
Tanker Truck Service	Dedicated Normal			Dedicated Normal	
Loading Method	Splash			Splash	
Saturation Factor	1.45 n.d.			1.45 n.d.	
Vapor Molecular Weight	130.00 lb/lb-mol			130.00 lb/lb-mol	
Bulk Liquid Temperature	57.69 °F			84.03 °F	
	517.69 R			544.03 R	
Vapor Pressure	0.0063 psia			0.0136 psia	
Loading Loss Factor	0.0285 lb/kgal			0.0588 lb/kgal	
Pumping Rate				150 gpm	
Throughput	12.00 turnover/yr				
	6,840 gal/yr			570 gal/hr	
Loading Losses	0.1952 lb/yr	Average	Maximum	0.0335 lb/hr	Maximum
Residual Liquid	100.00% by weight	0.00002 lb/hr	0.0001 tpy	100.00% by weight	0.0335 lb/hr
TOC (Total)	100.00% by weight	0.00002 lb/hr	0.0001 tpy	100.00% by weight	0.0335 lb/hr
Methane					
Ethane					
VOC (Total)	100.00% by weight	0.00002 lb/hr	0.0001 tpy	100.00% by weight	0.0335 lb/hr
HAP (Total)					
Benzene					
Ethylbenzene					
Hexane (n-)					
Methanol					
Naphthalene					
Toluene					
Trimethylpentane (2,2,4-)					
Xylenes					

NOTES

1. Emissions calculated using methods provided in USEPA, AP-42 Section 5.2 dated 1/95. $L_L = 12.46[(S)M_VP/T]$
2. Physical property, throughput and speciation data based data from supply vessel emission calculation spreadsheet.

TABLE F-12
Volatile Organic Liquids Loading (Tanker Trucks)
Hourly and Annual Emission Estimates

Source	WADS-TL-OW				
Supply Vessel	WADS-TK-OW1				
	Oily Water				
	3,000 gal			3,000 gal	
Tanker Truck Service	Dedicated Normal			Dedicated Normal	
Loading Method	Splash			Splash	
Saturation Factor	1.45 n.d.			1.45 n.d.	
Vapor Molecular Weight	130.00 lb/lb-mol			130.00 lb/lb-mol	
Bulk Liquid Temperature	57.69 °F			84.03 °F	
	517.69 R			544.03 R	
Vapor Pressure	0.0063 psia			0.0136 psia	
Loading Loss Factor	0.0285 lb/kgal			0.0588 lb/kgal	
Pumping Rate				150 gpm	
Throughput	12.00 turnover/yr				
	36,000 gal/yr			3,000 gal/hr	
Loading Losses	1.0274 lb/yr	Average	Maximum	0.1763 lb/hr	Maximum
Residual Liquid	100.00% by weight	0.00012 lb/hr	0.0005 tpy	100.00% by weight	0.1763 lb/hr
TOC (Total)	100.00% by weight	0.00012 lb/hr	0.0005 tpy	100.00% by weight	0.1763 lb/hr
Methane					
Ethane					
VOC (Total)	100.00% by weight	0.00012 lb/hr	0.0005 tpy	100.00% by weight	0.1763 lb/hr
HAP (Total)					
Benzene					
Ethylbenzene					
Hexane (n-)					
Methanol					
Naphthalene					
Toluene					
Trimethylpentane (2,2,4-)					
Xylenes					

NOTES

1. Emissions calculated using methods provided in USEPA, AP-42 Section 5.2 dated 1/95. $L_L = 12.46[(S)M_VP/T]$
2. Physical property, throughput and speciation data based data from supply vessel emission calculation spreadsheet.

TABLE G-1a
Gas Releases
Hourly and Annual Emission Estimates

Category	Station Operations					
Source	WADS-GR-ST			WADS-GR-PL		
	Avg. Hourly	Max. Annual	Max. Hourly	Avg. Hourly	Max. Annual	Max. Hourly
Gas Release	1,747 scfh	15,300,000 scf/yr	975,000 scfh	1,615 scfh	14,150,000 scf/yr	5,660,000 scfh
	81 lb/hr	709,230 lb/yr	46,369 lb/hr	75 lb/hr	655,922 lb/yr	269,181 lb/hr
NO_X						
CO						
SO_2						
$PM_{10/2.5}$						
CO_{2-e}	1,827 lb/hr	8,001 tpy	1,031,296 lb/hr	1,689 lb/hr	7,400 tpy	5,986,804 lb/hr
CO_2	1.0787 lb/hr	4.7248 tpy	617.8143 lb/hr	0.9976 lb/hr	4.3697 tpy	3,586.4912 lb/hr
N_2O						
TOC (Total)	79 lb/hr	346 tpy	45,268 lb/hr	73 lb/hr	320 tpy	262,784 lb/hr
Methane	73 lb/hr	320 tpy	41,227 lb/hr	68 lb/hr	296 tpy	239,329 lb/hr
Ethane	4 lb/hr	16 tpy	2,067 lb/hr	3 lb/hr	15 tpy	11,998 lb/hr
VOC (Total)	2.3509 lb/hr	10.2969 tpy	1,973.6004 lb/hr	2.1742 lb/hr	9.5229 tpy	11,457.0035 lb/hr
VOC (non-HAP)	2.1566 lb/hr	9.4457 tpy	1,810.4612 lb/hr	1.9945 lb/hr	8.7357 tpy	10,509.9594 lb/hr
HAP (Total)	0.1943 lb/hr	0.8511 tpy	163.1392 lb/hr	0.1797 lb/hr	0.7872 tpy	947.0441 lb/hr
Acetaldehyde						
Acrolein						
Benzene	0.0686 lb/hr	0.3003 tpy	57.5644 lb/hr	0.0634 lb/hr	0.2778 tpy	334.1689 lb/hr
Biphenyl						
Butadiene (1,3-)						
Carbon Tetrachloride						
Chlorobenzene						
Chloroform						
Dichloropropene (1,3-)						
Ethylbenzene	0.0017 lb/hr	0.0074 tpy	1.4148 lb/hr	0.0016 lb/hr	0.0068 tpy	8.2131 lb/hr
Ethylene Dibromide						
Formaldehyde						
Hexane (n-)	0.0684 lb/hr	0.2996 tpy	57.4203 lb/hr	0.0633 lb/hr	0.2771 tpy	333.3321 lb/hr
Methanol						
Methylene Chloride						
Methylnaphthalene (2-)						
Naphthalene						
PAH						
Phenol						
Propylene Oxide						
Styrene						
Tetrachloroethane (1,1,2,2-)						
Toluene	0.0439 lb/hr	0.1922 tpy	36.8361 lb/hr	0.0406 lb/hr	0.1777 tpy	213.8386 lb/hr
Trichloroethane (1,1,2-)						
Trimethylpentane (2,2,4-)						
Vinyl Chloride						
Xylenes	0.0118 lb/hr	0.0517 tpy	9.9036 lb/hr	0.0109 lb/hr	0.0478 tpy	57.4915 lb/hr

NOTES

1. Gas release estimates based on data for a similar compressor station.
2. Gas density is the value extracted from physical property estimation spreadsheets.

					Density:
Density (Lab):	0.0441 lb/scf				
Density (GC - Avg+):	0.0464 lb/scf	Safety Factor (GC):	103%	Average Plus:	0.0464 lb/scf
Density (GC - Max):	0.0476 lb/scf			Maximum:	0.0476 lb/scf

3. As it will be assumed that Gas Chromatograph (GC) is more representative, the following is used to scaled the extended analysis (Lab).

				Average Plus	Maximum	VOC Specie Scaling:	
VOC (Lab):	0.00128 lb/scf	VOC:	GC	0.00128 lb/scf	0.00188 lb/scf	Average Plus:	100%
	2.91% wt%		Use	2.90% wt%	4.26% wt%	Maximum:	146%
Methane (Lab):	90.19% wt%	Methane (Use):		90.20% wt%	88.91% wt%		
Ethane (Lab):	4.52% wt%	Ethane (Use):		4.52% wt%	4.46% wt%		

TABLE G-2
Natural Gas
Physical Property Estimations

Component				Molecular	Vapor	Stream		
Name (i)	Formula	Type	HAP	Weight M_i $(lb/lb\text{-}mol)_i$	Density ρ_i $(lb/scf)_i$	Mole Fraction $f_{n\text{-}i}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $f_{m\text{-}i}$ $(f_{n\text{-}i}M_i)/\Sigma(f_{n\text{-}i}M_i)$ (lb_i/lb_T)	Volume Fraction $f_{v\text{-}i}$ $f_{m\text{-}i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Nitrogen	N2			28.013	0.0727	0.632%	1.044%	0.633%
Carbon Dioxide	CO2	GHG		44.010	0.1143	0.514%	1.332%	0.514%
Methane	C01H04	GHG		16.042	0.0417	95.390%	90.193%	95.447%
Ethane	C02H06			30.069	0.0781	2.551%	4.522%	2.553%
Propane	C03H08	VOC		44.096	0.1145	0.449%	1.167%	0.449%
Butane (i-)	C04H10	VOC		58.122	0.1509	0.097%	0.333%	0.097%
Butane (n-)	C04H10	VOC		58.122	0.1509	0.114%	0.391%	0.114%
Cyclopentane	C05H10	VOC		70.133	0.1821	0.002%	0.007%	0.002%
Pentane (i-)	C05H12	VOC		72.149	0.1873			
Pentane (i-)	C05H12	VOC		72.149	0.1873			
Pentane (n-)	C05H12	VOC		72.149	0.1873	0.041%	0.176%	0.041%
Benzene	C06H06	VOC	X	78.112	0.2028	0.018%	0.085%	0.018%
Cyclohexane	C06H12	VOC		84.159	0.2185	0.007%	0.035%	0.007%
Methylcyclopentane	C06H12	VOC		84.159	0.2185	0.005%	0.026%	0.005%
Dimethylbutane (2,2-)	C06H14	VOC		86.175	0.2238	0.004%	0.019%	0.004%
Dimethylbutane (2,3-)	C06H14	VOC		86.175	0.2238	0.003%	0.014%	0.003%
Hexane (n-)	C06H14	VOC	X	86.175	0.2238	0.017%	0.085%	0.017%
Methylpentane (2-)	C06H14	VOC		86.175	0.2238	0.014%	0.073%	0.014%
Methylpentane (3-)	C06H14	VOC		86.175	0.2238	0.009%	0.044%	0.009%
Toluene	C07H08	VOC	X	92.138	0.2392	0.010%	0.054%	0.010%
Cycloheptane	C07H14	VOC		98.186	0.2549			
Dimethylcyclopentane (1,1-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Dimethylcyclopentane (1,c-2-)	C07H14	VOC		98.186	0.2549			
Dimethylcyclopentane (1,c-3-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Dimethylcyclopentane (1,t-2-)	C07H14	VOC		98.186	0.2549	0.001%	0.006%	0.001%
Dimethylcyclopentane (1,t-3-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Ethylcyclopentane	C07H14	VOC		98.186	0.2549	0.000%	0.002%	0.000%
Methylcyclohexane	C07H14	VOC		98.186	0.2549	0.007%	0.042%	0.007%
Dimethylpentane (2,2-)	C07H16	VOC		100.202	0.2602	0.001%	0.006%	0.001%
Dimethylpentane (2,3-)	C07H16	VOC		100.202	0.2602	0.002%	0.010%	0.002%
Dimethylpentane (2,4-)	C07H16	VOC		100.202	0.2602	0.001%	0.006%	0.001%
Dimethylpentane (3,3-)	C07H16	VOC		100.202	0.2602	0.001%	0.004%	0.001%
Ethylpentane (3-)	C07H16	VOC		100.202	0.2602	0.000%	0.002%	0.000%
Heptane (n-)	C07H16	VOC		100.202	0.2602	0.009%	0.055%	0.009%
Methylhexane (2-)	C07H16	VOC		100.202	0.2602	0.005%	0.031%	0.005%
Methylhexane (3-)	C07H16	VOC		100.202	0.2602	0.005%	0.030%	0.005%
Trimethylbutane (2,2,3-)	C07H16	VOC		100.202	0.2602	0.001%	0.004%	0.001%
Ethylbenzene	C08H10	VOC	X	106.165	0.2757	0.000%	0.002%	0.000%
Xylene (m-)	C08H10	VOC	X	106.165	0.2757	0.001%	0.006%	0.001%
Xylene (o-)	C08H10	VOC	X	106.165	0.2757	0.000%	0.002%	0.000%
Xylene (p-)	C08H10	VOC	X	106.165	0.2757	0.001%	0.006%	0.001%
Cyclooctane	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,1-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,c-2-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Dimethylcyclohexane (1,c-3-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Dimethylcyclohexane (1,c-4-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,t-2-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Dimethylcyclohexane (1,t-3-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,t-4-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Ethylcyclohexane	C08H16	VOC		112.213	0.2914			

TABLE G-2
Natural Gas
Physical Property Estimations

Component				Molecular	Vapor	Stream		
Name (i)	Formula	Type	HAP	Weight M_i $(lb/lb\text{-}mol)_i$	Density ρ_i $(lb/scf)_i$	Mole Fraction $f_{n\text{-}i}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $f_{m\text{-}i}$ $(f_{n\text{-}i}M_i)/\Sigma(f_{n\text{-}i}M_i)$ (lb_i/lb_T)	Volume Fraction $f_{v\text{-}i}$ $f_{m\text{-}i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Ethylcyclopentane (1-methyl-1-)	C08H16	VOC		112.213	0.2914			
Ethylcyclopentane (1-methyl-c-2-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	C08H16	VOC		112.213	0.2914			
Ethylcyclopentane (1-methyl-t-2-)	C08H16	VOC		112.213	0.2914			
Propylcyclopentane (i-)	C08H16	VOC		112.213	0.2914			
Propylcyclopentane (n-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,1,2-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,1,3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,c-3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,t-3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,t-4-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,t-2,c-3-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Trimethylcyclopentane (1,t-2,c-4-)	C08H16	VOC		112.213	0.2914			
Dimethylhexane (2,2-)	C08H18	VOC		114.229	0.2966			
Dimethylhexane (2,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (2,4-)	C08H18	VOC		114.229	0.2966			
Dimethylhexane (2,5-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (3,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (3,4-)	C08H18	VOC		114.229	0.2966	0.001%	0.004%	0.001%
Ethylhexane (3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Methylheptane (2-)	C08H18	VOC		114.229	0.2966	0.002%	0.013%	0.002%
Methylheptane (3-)	C08H18	VOC		114.229	0.2966	0.003%	0.018%	0.003%
Methylheptane (4-)	C08H18	VOC		114.229	0.2966			
Octane (n-)	C08H18	VOC		114.229	0.2966	0.005%	0.034%	0.005%
Trimethylpentane (1,1,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Trimethylpentane (2,2,3-)	C08H18	VOC		114.229	0.2966			
Trimethylpentane (2,2,4-)	C08H18	VOC	X	114.229	0.2966			
Trimethylpentane (2,3,4-)	C08H18	VOC		114.229	0.2966			
Ethyltoluene (m-)	C09H12	VOC		120.192	0.3121			
Ethyltoluene (o-)	C09H12	VOC		120.192	0.3121			
Ethyltoluene (p-)	C09H12	VOC		120.192	0.3121			
Propylbenzene (i-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Propylbenzene (n-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Trimethylbenzene (1,2,4-)	C09H12	VOC		120.192	0.3121			
Trimethylbenzene (1,3,5-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Butylcyclopentane (n-)	C09H18	VOC		126.239	0.3278			
Methylcyclooctane	C09H18	VOC		126.239	0.3278			
Propylcyclohexane (i-)	C09H18	VOC		126.239	0.3278			
Propylcyclohexane (n-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,2-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,c-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,c-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,t-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,c-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,c-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,t-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-3,c-5-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-3,t-5-)	C09H18	VOC		126.239	0.3278			

TABLE G-2
Natural Gas
Physical Property Estimations

Component				Molecular Weight	Vapor Density	Stream		
Name (i)	Formula	Type	HAP	$\mathbf{M_i}$ $(lb/lb\text{-}mol)_i$	$\boldsymbol{\rho_i}$ $(lb/scf)_i$	Mole Fraction $\mathbf{f_{n\text{-}i}}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $\mathbf{f_{m\text{-}i}}$ $(f_{n\text{-}i}M_i)/\Sigma(f_{n\text{-}i}M_i)$ (lb_i/lb_T)	Volume Fraction $\mathbf{f_{v\text{-}i}}$ $f_{m\text{-}i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Dimethylheptane (2,2-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,3-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,5-)	C09H20	VOC		128.255	0.3330			
Dimethylheptane (2,6-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (3,3-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (3,4-)	C09H20	VOC		128.255	0.3330			
Dimethylheptane (3,5-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Methyloctane (2-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Methyloctane (3-)	C09H20	VOC		128.255	0.3330	0.001%	0.005%	0.001%
Methyloctane (4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Nonane (n-)	C09H20	VOC		128.255	0.3330	0.002%	0.018%	0.002%
Trimethylhexane (2,2,3-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,2,4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Trimethylhexane (2,2,5-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Trimethylhexane (2,3,3-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,3,4-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,3,5-)	C09H20	VOC		128.255	0.3330			
Butylbenzene (t-)	C10H14	VOC		134.218	0.3485			
Butylcyclohexane (i-)	C10H20	VOC		140.266	0.3642			
Butylcyclohexane (t-)	C10H20	VOC		140.266	0.3642			
Decane (n-)	C10H22	VOC		142.282	0.3694	0.001%	0.008%	0.001%
Dimethyloctane (2,2-)	C10H22	VOC		142.282	0.3694			
Dimethyloctane (2,3-)	C10H22	VOC		142.282	0.3694			
Dimethyloctane (3,3-)	C10H22	VOC		142.282	0.3694	0.000%	0.003%	0.000%
Ethyloctane (3-)	C10H22	VOC		142.282	0.3694			
Methylnonane (2-)	C10H22	VOC		142.282	0.3694	0.000%	0.003%	0.000%
Methylnonane (3-)	C10H22	VOC		142.282	0.3694			
Methylnonane (4-)	C10H22	VOC		142.282	0.3694			
Methylnonane (5-)	C10H22	VOC		142.282	0.3694			
Trimethylheptane (2,3,4-)	C10H22	VOC		142.282	0.3694			
Trimethylheptane (2,5,5-)	C10H22	VOC		142.282	0.3694			
Undecane (n-)	C11H24	VOC		156.308	0.4059	0.000%	0.003%	0.000%
Dodecane (n-)	C12H26	VOC		170.335	0.4423	0.000%	0.003%	0.000%
Tridecane (n-)	C13H28	VOC		184.361	0.4787			
Tetradecane (n-)	C14H30	VOC		198.388	0.5151			
Natural Gas				16.977	0.0441	99.940%	100.000%	100.000%
TOC (Total)				16.766	0.0435	98.794%	97.624%	98.853%
VOC (Total)				57.866	0.1503	0.853%	2.910%	0.854%
HAP (Total)				85.428	0.2218	0.048%	0.241%	0.048%
Xylenes				106.165	0.2757	0.002%	0.015%	0.002%

NOTES

1. Vapor density is estimated using the ideal gas law (PV = nRT = (m/M)RT OR ρ = RPT/M), where R = 10.73164 (psia ft^3)/(lb-mol °R).
2. Standard conditions 68 °F
   14.696 psia
3. Mole percentages from analysis on Various of sample collected at Meter Station Avg. Results (3 Most Representative Samples).
   The sample is assumed to be representative of the actual gas composition at Wadsworth Compressor Station.

TABLE H-1a
Piping Components
Hourly and Annual Emission Estimates

Source			WADS-PC-NG			
Service			Gas			
			Natural Gas			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	724 components			
		Emission Factor	4.50E-03 kg/hr/component			
	Connectors	Count	2,631 components			
		Emission Factor	2.00E-04 kg/hr/component			
	Flanges	Count	501 components			
		Emission Factor	3.90E-04 kg/hr/component			
	Open-Ended Lines	Count	9 components			
		Emission Factor	2.00E-03 kg/hr/component			
	Pump Seals	Count	0 components			
		Emission Factor	2.40E-03 kg/hr/component			
	Other	Count	66 components	**Emissions**		
		Emission Factor	8.80E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}		2256.29% by weight	227.7371 lb/hr	997.4885 tpy	273.2845 lb/hr
	CO_2		1.33% by weight	0.1345 lb/hr	0.5890 tpy	0.1614 lb/hr
	TOC (Total)		97.62% by weight	9.8536 lb/hr	43.1587 tpy	11.8243 lb/hr
	Methane		90.198% by weight	9.1041 lb/hr	39.8760 tpy	10.9249 lb/hr
	Ethane		4.522% by weight	0.4564 lb/hr	1.9991 tpy	0.5477 lb/hr
	VOC (Total)		2.904% by weight	0.2931 lb/hr	1.2837 tpy	0.3517 lb/hr
	HAP (Total)		0.240% by weight	0.0242 lb/hr	0.1061 tpy	0.0291 lb/hr
	Benzene		0.085% by weight	8.55E-03 lb/hr	3.74E-02 tpy	1.03E-02 lb/hr
	Ethylbenzene		0.002% by weight	2.10E-04 lb/hr	9.20E-04 tpy	2.52E-04 lb/hr
	Hexane (n-)		0.084% by weight	8.53E-03 lb/hr	3.73E-02 tpy	1.02E-02 lb/hr
	Methanol					
	Naphthalene					
	Toluene		0.054% by weight	5.47E-03 lb/hr	2.40E-02 tpy	6.56E-03 lb/hr
	Trimethylpentane (2,2,4-)					
	Xylenes		0.015% by weight	1.47E-03 lb/hr	6.44E-03 tpy	1.76E-03 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017).
The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings for a similar compressor station.
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on gas analysis used to estimate gas release annual emissions (TABLE G-1a).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.

TABLE H-2a
Piping Components
Hourly and Annual Emission Estimates

Source			WADS-PC-PL			
Service			Light Oil			
			Pipeline Liquids			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	100 components			
		Emission Factor	2.50E-03 kg/hr/component			
	Connectors	Count	666 components			
		Emission Factor	2.10E-04 kg/hr/component			
	Flanges	Count	161 components			
		Emission Factor	1.10E-04 kg/hr/component			
	Open-Ended Lines	Count	11 components			
		Emission Factor	1.40E-03 kg/hr/component			
	Pump Seals	Count	2 components			
		Emission Factor	1.30E-02 kg/hr/component			
	Other	Count	2 components	**Emissions**		
		Emission Factor	7.50E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}		0.96% by weight	0.0098 lb/hr	0.0430 tpy	0.0118 lb/hr
	CO_2		0.01% by weight	0.0001 lb/hr	0.0006 tpy	0.0002 lb/hr
	TOC (Total)		99.99% by weight	1.0227 lb/hr	4.4795 tpy	1.2273 lb/hr
	Methane		0.04% by weight	0.0004 lb/hr	0.0017 tpy	0.0005 lb/hr
	Ethane		0.09% by weight	0.0009 lb/hr	0.0040 tpy	0.0011 lb/hr
	VOC (Total)		99.86% by weight	1.0214 lb/hr	4.4738 tpy	1.2257 lb/hr
	HAP (Total)		14.54% by weight	0.1487 lb/hr	0.6515 tpy	0.1785 lb/hr
	Benzene		1.44% by weight	1.47E-02 lb/hr	6.45E-02 tpy	1.77E-02 lb/hr
	Ethylbenzene		0.48% by weight	4.87E-03 lb/hr	2.13E-02 tpy	5.84E-03 lb/hr
	Hexane (n-)		1.69% by weight	1.73E-02 lb/hr	7.59E-02 tpy	2.08E-02 lb/hr
	Methanol					
	Naphthalene					
	Toluene		4.49% by weight	4.59E-02 lb/hr	2.01E-01 tpy	5.51E-02 lb/hr
	Trimethylpentane (2,2,4-)		0.03% by weight	2.64E-04 lb/hr	1.16E-03 tpy	3.17E-04 lb/hr
	Xylenes		6.42% by weight	6.56E-02 lb/hr	2.87E-01 tpy	7.88E-02 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017). The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings for a similar compressor station.
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on composition estimate (TABLE F-1).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.

TABLE H-3a
Piping Components
Hourly and Annual Emission Estimates

Source			WADS-PC-OIL			
Service			Heavy Oil			
			Oil			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	59 components			
		Emission Factor	8.40E-06 kg/hr/component			
	Connectors	Count	278 components			
		Emission Factor	7.50E-06 kg/hr/component			
	Flanges	Count	94 components			
		Emission Factor	3.90E-07 kg/hr/component			
	Open-Ended Lines	Count	0 components			
		Emission Factor	1.40E-04 kg/hr/component			
	Pump Seals	Count	6 components			
		Emission Factor	8.62E-03 kg/hr/component			
	Other	Count	2 components	**Emissions**		
		Emission Factor	3.20E-05 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}					
	CO_2					
	TOC (Total)		100.00% by weight	0.1199 lb/hr	0.5252 tpy	0.1439 lb/hr
	Methane					
	Ethane					
	VOC (Total)		100.00% by weight	0.1199 lb/hr	0.5252 tpy	0.1439 lb/hr
	HAP (Total)					
	Benzene					
	Ethylbenzene					
	Hexane (n-)					
	Methanol					
	Naphthalene					
	Toluene					
	Trimethylpentane (2,2,4-)					
	Xylenes					

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017). The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings for a similar compressor station.
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based listed on MSDS.
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.

TABLE I-1
Parts Washer
Hourly and Annual Emission Estimates

Solvent			Eversol 143			
Solvent Density			6.84 lb/gal			
Potential	Hourly	Maximum	0.3288 gal/hr			
Make-up Solvent		Average	0.0137 gal/hr	**Emissions**		
Requirement	Annual		120.00 gal/yr	**Avg. Hourly**	**Max. Hourly**	**Max. Annual**
Speciation	TOC (Total)		100.00% by weight	0.0937 lb/hr	2.2484 lb/hr	0.4103 tpy
	Methane					
	Ethane					
	VOC (Total)		100.00% by weight	0.0937 lb/hr	2.2484 lb/hr	0.4103 tpy
	VOC (non-HAP)		100.00% by weight	0.0937 lb/hr	2.2484 lb/hr	0.4103 tpy
	HAP (Total)					
	Benzene					
	Ethylbenzene					
	Hexane (n-)					
	Naphthalene					
	Toluene					
	Trimethylpentane (2,2,4-)					
	Xylenes					

NOTES

1. Although emissions are estimated based on the physical properties and chemical speciation of Eversol 143, other solvents may be used as long as the represented solvent density and chemical species weight percents are not exceeded. MSDS indicate that the vapor pressure at 100°F is less than 5 mmHg (0.097 psia).
2. Potential maximum annual solvent make-up is based on past experience and a safety factor.
3. Potential maximum hourly solvent make-up is the potential maximum annual solvent make-up divided by 365 day/yr.
4. Potential average hourly solvent make-up is the potential maximum annual solvent make-up divided by 8,760 hrs/yr.

APPENDIX C

Traditional BAT Request Letter

July 1, 2015

Ms. Kelly Kanoza
Akron Regional Air Quality Management District
Summit County Public Health
Fairway Center
1867 W. Market St.
Akron, Ohio 44313

RE: NEXUS Gas Transmission – Medina, OH
Request for Application of Historic BAT Format

Dear Ms. Kanoza:

NEXUS Gas Transmission (NGT) plans to construct a natural gas compressor station in Medina County, Ohio (Wadsworth Compressor Station). As part of the Wadsworth Compressor Station, NGT plans to install one (1) new natural gas-fired Solar Titan 250 combustion turbine sized to a nominal, NEMA-rated capacity of 26,000 horsepower (hp) and equipped with an oxidation catalyst.

Pursuant to the provisions added to Ohio Revised Code (ORC) 3704 as a result of Senate Bill 265, sources modified or constructed after August 3, 2009, are to have rule-based BAT limits established by Ohio EPA for specific source categories. However, Ohio EPA has yet to promulgate the rule based BAT limits. To address this regulatory gap, the Ohio EPA's Division of Air Pollution Control (DAPC) released a memo (February 2014 Memo) indicating that permits filed on or after August 3, 2009, must go through an interim case-by-case BAT procedure.[42]

As clarified in the February 2014 Memo,[43] Ohio EPA requires any entity establishing a synthetic minor restriction to do so in accordance with U.S. EPA's "Limiting Potential to Emit" guidance. The memo states Ohio EPA's belief that BAT established in the format of a source design/design efficiency can be used to limit potential to emit (PTE) for New Source Review (NSR) actions. The February 2014 Memo also asserts that PTE must still be calculated before controls for the purposes of assessing Title V applicability and establishes Ohio EPA's stance that limits established in accordance with the memo are legally and practically enforceable. U.S. EPA since sent a letter[44] to Ohio EPA stating concerns regarding the practical enforceability of the source design BAT format, noting that the format does not establish an expectation of ongoing compliance for the source.

---

[42] Ohio EPA Memo from Mike Hopkins, Assistant Chief, Permitting, DAPC, to Permit Writers and Reviewers "BAT Requirements for Permits Issued On or After February 7, 2014" dated February 7, 2014, which supersedes the BAT guidance issued on August 30, 2013. Ohio's BAT policy will be in place only until such time when the Ohio EPA develops and promulgates rules that define BAT in accordance with ORC 3704.03(T) requirements.

[43] Refer to Questions 26, 27, and 28 in the February 2014 Memo.

[44] Letter send from John Mooney (U.S. EPA, Region V, Air Programs Branch) to Mike Hopkins (Ohio EPA) on September 2, 2014.

Ohio EPA has recently issued guidance[45] clarifying that operators may request that BAT be administered in the traditional BAT format (i.e., the format in which BAT would have been administered prior to the implementation of Senate Bill 265). Specifically, the application of the traditional BAT format would result in a short-term (e.g., pound per hour [lb/hr]) limit, annual (e.g., ton per year [tpy]) limit, and associated parametric monitoring for the control device (as necessary). As U.S. EPA has historically approved such limits as an adequate means to limit PTE, no synthetic minor limit is required when BAT has been established in this format. NGT has proposed BAT for the combustion turbine in the application narrative in accordance with this request.

***

NGT respectfully requests that Ohio EPA establish BAT for the combustion turbine in accordance with this letter and the application narrative. Please contact Reagan Mayces at (713) 627-4790 with any questions regarding this request.

Sincerely,

NEXUS GAS TRANSMISSION

Thomas V. Wooden Jr.
Vice President – US Field Operations

[45] Per discussion between Amanda Adams (Trinity Consultants) and Mike Hopkins (Ohio EPA) on November 6, 2014.

APPENDIX D

PTIO APPLICATION FORMS

Application for Permit to Install (PTI) and Permit to Install/Operate (PTIO)

Ohio Environmental Protection Agency
Lazarus Government Center
50 West Town Street, Suite 700
P.O. Box 1049
Columbus, Ohio 43216-1049

For EPA Use Only

Application Number_____

Date Received _____

Facility Information

Note: Application is incomplete if all **bolded** questions throughout the application are not completed.

Legal Facility Name	Wadsworth Compressor Station			
Alternate Name (if any)				
Facility Physical Address	Guilford Road			
City, ZIP code	Wadsworth			
County	Medina			
Facility ID				
Facility Description	Natural Gas Compressor Station			
NAICS Code	486210			
Facility Latitude	41	degrees 02	minutes 05.48	seconds
Facility Longitude	81	degrees 49	minutes 42.61	seconds
Core Place ID (if known)				
SCSC ID (if known)				

Portable? ☐ Yes ☒ No

Portable Type ☐ Asphalt Plant ☐ Concrete Plant ☐ Generator ☐ Aggregate Processing ☐ Concrete Crusher ☐ Grinder ☐ Other

Initial Location County If "Other", describe:

Contact Information

☐ No change to information on file.

❶ ☑ Billing ☐ Owner ☑ Primary ☐ Operator ☐ On-Site ☐ Responsible Official					
First Name: Reagan	Last Name: Mayces	Phone: 713-627-4790	Fax:	E-mail: rmmayces@spectraenergy. com	
Address 1: P.O. Box 1642	Address 2:	City or Township: Houston	State: TX	Zip Code: 77251-1642	

❷ ☐ Billing ☐ Owner ☐ Primary ☐ Operator ☐ On-Site ☑ Responsible Official					
First Name: Thomas	Last Name: Wooden Jr.	Phone: 713-627-5400	Fax:	E-mail: tvwooden@spectraenergy.com	
Address 1: P.O. Box 1642	Address 2:	City or Township: Houston	State: TX	Zip Code: 77251-1642	

❸ ☐ Billing ☐ Owner ☐ Primary ☐ Operator ☐ On-Site ☐ Responsible Official					
First Name:	Last Name:	Phone:	Fax:	E-mail:	
Address 1:	Address 2:	City or Township:	State:	Zip Code:	

❹ ☐ Billing ☐ Owner ☐ Primary ☐ Operator ☐ On-Site ☐ Responsible Official					
First Name:	Last Name:	Phone:	Fax:	E-mail:	
Address 1:	Address 2:	City or Township:	State:	Zip Code:	

❺ ☐ Billing ☐ Owner ☐ Primary ☐ Operator ☐ On-Site ☐ Responsible Official					
First Name:	Last Name:	Phone:	Fax:	E-mail:	
Address 1:	Address 2:	City or Township:	State:	Zip Code:	

❻ ☐ Billing ☐ Owner ☐ Primary ☐ Operator ☐ On-Site ☐ Responsible Official					
First Name:	Last Name:	Phone:	Fax:	E-mail:	
Address 1:	Address 2:	City or Township:	State:	Zip Code:	

Division of Air Pollution Control
Application for Permit-to-Install or Permit-to-Install and Operate

Section I – General Application Information

This section should be filled out for each permit to install (PTI) or Permit to Install and Operate (PTIO) application. A PTI is required for all air contaminant sources (emissions units) installed or modified after January 1, 1974 that are subject to OAC Chapter 3745-77. A PTIO is required for all air contaminant sources (emissions units) that are not subject to OAC Chapter 3745-77 (Title V). See the application instructions for additional information.

For OEPA use only:	☐ Installation	☐ Request Federally enforceable restrictions
	☐ Modification	☐ General Permit
	☐ Renewal	☐ Other

1. Is the purpose of this application to transition from OAC Chapter 3745-77 (Title V) to OAC Chapter 3745-31 (PTIO)?

   ☐ yes ■ no

2. **Establish PER Due Date** - Select an annual Permit Evaluation Report (PER) due date for this facility (does not apply to facilities subject to Title V, OAC Chapter 3745-77). If the PER has previously been established and a change is now desired, a PER Change Request form must be filed instead of selecting a date here.

Due Date:	For Time Period:
■ February 15	January 1 through December 31
☐ May 15	April 1 through March 31
☐ August 15	July 1 through June 30
☐ November 15	October 1 through September 30

   ☐ PER not applicable (Title V) or due date already established
   ☐ PER Request Permit Change form attached

3. **Federal Rules Applicability** - Please check all of the appropriate boxes below.

New Source Performance Standards (NSPS)
New Source Performance Standards are listed under 40 CFR 60 - Standards of Performance for New Stationary Sources.
☐ not affected ■ subject to Subpart: JJJJ, KKKK
☐ unknown ☐ exempt - explain below

National Emission Standards for Hazardous Air Pollutants (NESHAP)
National Emissions Standards for Hazardous Air Pollutants are listed under 40 CFR 61. (These include asbestos, benzene, beryllium, mercury, and vinyl chloride).
■ not affected ☐ subject to Subpart: _____
☐ unknown ☐ subject, but exempt - explain below

Maximum Achievable Control Technology (MACT)
The Maximum Achievable Control Technology standards are listed under 40 CFR 63 and OAC rule 3745-31-28.
☐ not affected ■ subject to Subpart: ZZZZ
☐ unknown ☐ subject, but exempt - explain below

Prevention of Significant Deterioration (PSD)
These rules are found under OAC rule 3745-31-10 through OAC rule 3745-31-20.
■ not affected ☐ subject to regulation
☐ unknown

Non-Attainment New Source Review
These rules are found under OAC rule 3745-31-21 through OAC rule 3745-31-27.
■ not affected ☐ subject to regulation
☐ unknown

112 (r) - Risk Management Plan
These rules are found under 40 CFR 68.
■ not affected ☐ subject to regulation
☐ unknown

Title IV (Acid Rain Requirements)
These rules are found under 40 CFR 72 and 40 CFR 73.
■ not affected ☐ subject to regulation
☐ unknown

Please explain why you checked "exempt" in this question for one or more federal rules. Identify each exemption and whether the entire facility and/or the specific air contaminant sources included in this permit application is exempted. Attach an additional page if necessary.

_____

_____

4. Express PTI/PTIO - Do you qualify for express PTI or PTIO processing?

☐ yes ■ no

If yes, are you requesting express processing per OAC rule 3745-31-05?

☐ yes ■ no

5. **Air Contaminant Sources in this Application** - Identify the air contaminant source(s) for which you are applying below. Attach additional pages if necessary. Section II of this application and an EAC form should be completed for each air contaminant source.

Emissions Unit ID*	**Company Equipment ID** (company's name for air contaminant source)	**Equipment Description** (List all equipment that are a part of this air contaminant source)
	See Attached	See Attached

* This ID would have been created when a previous air permit was issued. If no previous permits have been issued for this air contaminant source, leave this field blank. If this air contaminant source was previously identified in STARShip applications as a "Z" source (e.g., Z001), please provide that identification and a new ID will be assigned when the PTI/PTIO is issued.

6. Trade Secret Information - Is any information included in this application being claimed as a trade secret per Ohio Revised Code (ORC) 3704.08?

☐ yes (A "non-confidential" version must also be submitted in order for this application to be deemed complete.)
■ no

7. Permit Application Contact - Person to contact for questions about this application:

Reagan Mayces — EHS Manager, US Operations

Name — Title

P.O. Box 1642, Houston, TX, 77251-1642

Address (Street, City/Township, State and Zip Code)

713-627-4790 — rmmayces@spectraenergy.com

Phone — Fax — E-mail

8. **Authorized Signature** – OAC rule 3745-31-04 states that applications for permits to install or permits to install and operate shall be signed:
   (1) In the case of a corporation, by a principal executive officer of at least the level of vice president, or his duly authorized representative, if such representative is responsible for the overall operation of the facility.
   (2) In the case of a partnership by a general partner.
   (3) In the case of sole proprietorship, by the proprietor, and
   (4) In the case of a municipal, state, federal or other governmental facility, by the principal executive officer, the ranking elected official, or other duly authorized employee.

   Under OAC rule 3745-31-04, this signature shall constitute personal affirmation that all statements or assertions of fact made in the application are true and complete, comply fully with applicable state requirements, and shall subject the signatory to liability under applicable state laws forbidding false or misleading statements.

Authorized Signature (for facility)	Date
Thomas V. Wooden Jr.	Vice President - US Field Operations
Print Name	Title

5. **Air Contaminant Sources in this Application** - Identify the air contaminant source(s) for which you are applying below. Attach additional pages if necessary. Section II of this application and an EAC form should be completed for each air contaminant source.

Emissions Unit ID*	**Company Equipment ID** (company's name for air contaminant source)	**Equipment Description** (List all equipment that are a part of this air contaminant source)
	Combustion Turbine	New natural gas-fired combustion turbine sized 26,000 hp, equipped with an oxidation catalyst
	Gas Release	Periodic Maintenance, routine operations, and pigging activities will occasionally necessitate the evacuation of equipment directly to atmosphere
	Equipment Leaks	Various equipment components will be located throughout the compressor station that may result in fugitive emissions due to equipment leaks
	Separator Vessel #1	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 530 gallons handling condensate liquids collected from the pipeline
	Separator Vessel #2	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 530 gallons handling condensate liquids collected from the pipeline
	Separator Vessel #3	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 400 gallons handling condensate liquids collected from the pipeline
	Separator Vessel #4	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 317 gallons handling condensate liquids collected from the pipeline
	Separator Vessel #5	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 43 gallons handling condensate liquids collected from the pipeline
	Loading Operation	NGT will periodically transfer the condensate liquids and the used lubricating oil collected on-site to tanker trucks for shipment off-site

* This ID would have been created when a previous air permit was issued. If no previous permits have been issued for this air contaminant source, leave this field blank. If this air contaminant source was previously identified in STARShip applications as a "Z" source (e.g., Z001), please provide that identification and a new ID will be assigned when the PTI/PTIO is issued.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: J001
Company Equipment ID: Loading Operation

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-001-50 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.01
Volatile organic compounds (VOC)					0.01
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					6.00E-04
Highest single HAP: Hexane					2.77E-04
Toxic Air Contaminants (see instructions):					6.00E-04

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: J001
Company Equipment ID: Loading Operation

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
J001	■ Area ☐ Volume	2,155 x 1,326	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Loading Operation			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude			Egress Point Longitude		
J001	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3107 - Loading Rack for Liquid Materials

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
LOADING RACK FOR LIQUID MATERIALS

This form is to be completed for each loading rack for liquid materials. State/Federal regulations which may apply to loading racks for liquid materials are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ☐ Renewal or Modification of Air Permit Number(s) (e.g. J001) J001 _____

2. Maximum Operating Schedule: 24 _____ hours per day; 365 _____ days per year

If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. Complete the following table for each bay:

Bay Identification	Number of Loading Arms	Type of Vehicle Loaded (check one or more)	Loading Method (check one or more)
J001	N/A	☑ Tank Truck ❒ Barge ❒ RR Car ❒ Ship ❒ Other (describe):	❒ Top Load, Splash Fill ❒ Bottom Load ☑ Top Load, fully Submerged ❒ Top Load, Partial Submerged
		❒ Tank Truck ❒ Barge ❒ RR Car ❒ Ship ❒ Other (describe):	❒ Top Load, Splash Fill ❒ Bottom Load ❒ Top Load, fully Submerged ❒ Top Load, Partial Submerged
		❒ Tank Truck ❒ Barge ❒ RR Car ❒ Ship ❒ Other (describe):	❒ Top Load, Splash Fill ❒ Bottom Load ❒ Top Load, fully Submerged ❒ Top Load, Partial Submerged

4. Complete this section for each material loaded.

Liquid Material Loaded	Bay ID	Average Material Vapor Pressure at Loading Temperature (millimeters mercury)	Is liquid a photo-chemically reactive material?*	Maximum Daily Throughput (gallons)	Proposed Maximum Annual Throughput (gallons)
Pipeline Liquids	J001	260.19	❒Yes ☐ No	2,000	4,000
Lubricating Oil	J001	0.33	❒Yes ☐ No	570	6,840
Oily Water	J001	0.33	❒Yes ☐ No	3,000	36,000
			❒Yes ❒ No		

* Photochemically reactive material is defined in OAC rule 3745-21-01(C)(5).

5. Complete this section for each vapor control system.

Type of Vapor Control System (check one):	Minimum Control Efficiency (% by weight):	Maximum Controlled Mass Emissions Rate (pounds/1,000 gallons):	Basis for Mass Emissions Rate Data (check one):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ☑ None ❒ Other (describe):	N/A	N/A	❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ❒ None ❒ Other (describe):			❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ❒ None ❒ Other (describe):			❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ❒ None ❒ Other (describe):			❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P001
Company Equipment ID: Combustion Turbine

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P001
Company Equipment ID: Combustion Turbine

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

2-02-002-01 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)				1.58	6.23
PM • •10 microns in diameter (PE/PM_{10})				1.58	6.23
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)				1.58	6.23
Sulfur dioxide (SO_2)				0.81	3.21
Nitrogen oxides (NO_x)				7.78	30.99
Carbon monoxide (CO)				13.15	7.79
Organic compounds (OC)				1.65	3.30
Volatile organic compounds (VOC)				1.65	3.30
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					0.59
Highest single HAP: Toluene					0.21
Toxic Air Contaminants (see instructions):					0.59

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☒ Yes - fill out the applicable information below.
☐ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P001
Company Equipment ID: Combustion Turbine

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

■ Catalytic Converter
Manufacturer: Solar Year installed: Not Installed **Your ID for control equipment** P001
Describe this control equipment: Oxidation Catalyst
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ■ VOC ☐ SO_2 ☐ NO_x ■ CO ☐ Pb ■ Other HAPs
Estimated capture efficiency (%): _____ Basis for efficiency: Refer to Table B-1Aj for estimated efficiencies
Design control efficiency (%): _____ Basis for efficiency: Refer to Table B-1Aj for estimated efficiencies
Operating control efficiency (%): _____ Basis for efficiency: Refer to Table B-1Aj for estimated efficiencies
■ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: P001

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
P001	A	7.5 ft	50	897		
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
P001 Stack	Round	44.18	1,197	60	90	120

❷ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ **Company ID or Name for the Egress Point**	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
N/A	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)
N/A			

❷ **Company ID or Name for the Egress Point**	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ **Company ID or Name for the Egress Point**	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P001	41 deg 2 min 9.57 sec	81 deg 49 min 33.71 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3862 - Stationary Internal Combustion Engine

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STATIONARY INTERNAL COMBUSTION ENGINE

This form is to be completed for each stationary reciprocating or gas turbine engine. State/Federal regulations which may apply to stationary internal combustion engines are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

   ☑ New Permit ☐ Renewal or Modification of Air Permit Number (e.g. P001) P001

2. Maximum Operating Schedule: 24 hours per day; 365 days per year

   If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. Engine type: ☑ Gas turbine ☐ Reciprocating

4. Purpose of engine: ☑ Driving pump or compressor ☐ Driving electrical generator

5. Normal use of engine: ☐ Emergency only ☑ Non-emergency

6. Engine Manufacturer: Solar Model No: 250-30002S4

7. Engine exhaust configuration: (for turbines only)
   ☑ simple cycle *(no heat recovery)*
   ❒ regenerative cycle *(heat recovery to preheat combustion air)*
   ❒ cogeneration cycle *(heat recovered to produce steam)*
   ❒ combined cycle *(heat recovered to produce steam which drives generator)*

8. Input capacities (million BTU/hr): Rated: 196.51 Maximum: 196.51
   Normal: 196.51

   Supplemental burner (duct burner) input capacity, if equipped (million BTU/hr):

   Rated:_____ Maximum:_____ Normal:_____

9. Output capacities (Horsepower): Rated: 29,517 Maximum: 29,517 Normal: 29,517

   (Kilowatts): Rated:_____ Maximum:_____ Normal:_____

   (lbs steam/hr)*: Rated:_____ Maximum:_____ Normal:_____

   **required for cogeneration or combined cycle units only*

10. Type of ignition: ☐ non-spark (diesel) ☑ spark

11. Type of fuel fired (check all that apply):

☑ single fuel
❒ dual fuel

❒ No. 2 oil, low-sulfur
❒ No. 2 oil, high-sulfur
❒ gasoline
❒ other, explain_____

☑ natural gas
❒ diesel
❒ propane

❒ landfill gas
❒ digester gas

12. Complete the following table for all fuels identified in question 11 that are used for the engine and any supplemental (duct) burners, if equipped:

Fuel	HeatContent (BTU/unit)	wt.% Ash	wt.% Sulfur	Fuel Usage		
				Estimated Maximum Per Year	Normal Per Hour	Max. Per Hour
Nat. gas	939.2 BTU/cu ft		gr/scf	1,832,863,560 cu ft	209,231 cu ft	209,231 cu ft
No. 2 oil	BTU/gal			gal	gal	gal
Gasoline	BTU/gal			gal	gal	gal
Diesel	BTU/gal			gal	gal	gal
Landfill/digester gas	BTU/cu ft		ppm	cu ft	cu ft	cu ft
Other (show units)						
List supplemental (duct) burner fuel and information below (show units):						

13. Type of combustion cycle (check all that apply):

❒ 2-stroke
❒ rich-burn
❒ carbureted
❒ other, explain_____

☐ 4-stroke
☐ lean-burn
❒ fuel injected

14. Emissions control techniques (check all that apply):

❒ prestratified charge
☑ catalytic oxidation (CO)
❒ air/fuel ratio
❒ 2-stage rich/lean combustion
❒ water/steam injection
☐ other, explain_____

❒ nonselective catalytic reduction (NSCR)
❒ selective catalytic reduction (SCR)
❒ injection timing retard (ITR)
❒ 2-stage lean/lean combustion
❒ preignition chamber combustion (PCC)

For each emissions control technique checked above, explain what pollutants are controlled by each technique: CO, VOC, and HAPs

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P003
Company Equipment ID: Gas Releases

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P003
Company Equipment ID: Gas Releases

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

3-06-004-02 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					19.82
Volatile organic compounds (VOC)					19.82
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					1.64
Highest single HAP: Hexane					0.58
Toxic Air Contaminants (see instructions):					1.64

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P003
Company Equipment ID: Gas Releases

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (^oF) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P003	■ Area ☐ Volume	2,155 x 1,326	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Gas Releases			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P003	41 deg 2 min 12.19 sec	81 deg 49 min 39.23 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3100 - General Process Operation

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
GENERAL PROCESS OPERATION

This form is to be completed for each process operation when there is no specific emissions activity category (EAC) form applicable. If there is more than one end product for this process, copy and complete this form for each additional product (see instructions). Several State/Federal regulations which may apply to process operations are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. P001) P003

2. Maximum Operating Schedule: 24 hours per day; 365 days per year

If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. End product of this process: N/A - Natural Gas released during maintenance blowdown events

4. Hourly production rates (indicate appropriate units). Please see the instructions for clarification of "Maximum" and "Average" for new versus existing operations:

Hourly	Rate	Units (e.g., widgets)
Average production	N/A	N/A
Maximum production	N/A	N/A

5. Annual production rates (indicate appropriate units) Please see the instructions for clarification of "Maximum" and "Actual" for new versus existing operations:

Annual	Rate	Units (e.g., widgets)
Actual production	N/A	N/A
Maximum production	N/A	N/A

6. Type of operation (please check one):

❒ Continuous
❒ Batch (please complete items below)

Minimum cycle* time (minutes): _____
Minimum time between cycles (minutes): _____
Maximum number of cycles per daily 24 hour period: _____
(Note: include cycle time and set up/clean up time.)

*"Cycle" refers to the time the equipment is in operation.

7. Materials used in process at maximum hourly production rate (add rows/pages as needed):

Material	Physical State at Standard Conditions	Principle Use	Amount**
Pipeline Gas	Gas	Venting during planned gas release events	1,365,152 lb/yr

** Please indicate the amount **and** rate (e.g., lbs/hr, gallons/hr, lbs/cycle, etc.).

8. Please provide a narrative description of the process below (e.g., coating of metal parts using high VOC content coatings for the manufacture of widgets; emissions controlled by thermal oxidizer...):

Gas releases associated with routine operation and periodic pipeline maintenance activities.

8. Please provide a narrative description of the process in sufficient detail for someone unfamiliar with the process to be able to understand the nature and purpose of the process and how it is integrated into any other processes at the facility, if applicable.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P004
Company Equipment ID: Separator Vessel #1

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.14
Volatile organic compounds (VOC)					0.14
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					8.70E-03
Highest single HAP: Hexane					4.02E-03
Toxic Air Contaminants (see instructions):					8.70E-03

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P004
Company Equipment ID: Separator Vessel #1

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P004-P008	■ Area ☐ Volume	2,155 x 1,326	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	41 deg 2 min 7.72 sec	81 deg 49 min 44.35 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P004-P005

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 1,590 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 530 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 10.83 ft.
Tank shell diameter or width: 5 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 57.69 °F and Maximum 84.03 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 5.0312 psia at average storage temperature
8.0963 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ ^{o}F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 530 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 71 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.67 ft

24. The average height of the liquid material stored within the tank during the year: 5.41 ft.

25. The maximum height of the liquid material stored within the tank during the year: 10.83 ft.

26. The average liquid surface temperature: 57.69 ^{o}F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area	❒ Gasketed	❒ Ungasketed	❒ Sock
_____ Adjustable, center area	❒ Gasketed	❒ Ungasketed	❒ Sock

_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)
_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)
_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P005
Company Equipment ID: Separator Vessel #2

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P005
Company Equipment ID: Separator Vessel #2

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.14
Volatile organic compounds (VOC)					0.14
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					8.70E-03
Highest single HAP: Hexane					4.02E-03
Toxic Air Contaminants (see instructions):					8.70E-03

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P005
Company Equipment ID: Separator Vessel #2

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (^oF) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
N/A						
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
N/A						

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P004-P008	■ Area ☐ Volume	2,155 x 1,326	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	41 deg 2 min 7.72 sec	81 deg 49 min 44.35 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P004-P005

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 1,590 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 530 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 10.83 ft.
Tank shell diameter or width: 5 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 57.69 °F and Maximum 84.03 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 5.0312 psia at average storage temperature
8.0963 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ ^{o}F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 530 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 71 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.67 ft

24. The average height of the liquid material stored within the tank during the year: 5.41 ft.

25. The maximum height of the liquid material stored within the tank during the year: 10.83 ft.

26. The average liquid surface temperature: 57.69 ^{o}F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area	❒ Gasketed	❒ Ungasketed	❒ Sock
_____ Adjustable, center area	❒ Gasketed	❒ Ungasketed	❒ Sock

_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)
_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)
_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P006
Company Equipment ID: Separator Vessel #3

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/17 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P006
Company Equipment ID: Separator Vessel #3

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.11
Volatile organic compounds (VOC)					0.11
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					6.80E-03
Highest single HAP: Hexane					3.15E-03
Toxic Air Contaminants (see instructions):					6.80E-03

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P006
Company Equipment ID: Separator Vessel #3

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P004-P008	■ Area ☐ Volume	2,155 x 1,326	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	41 deg 2 min 7.72 sec	81 deg 49 min 44.35 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P006

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 1,200 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 400 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 10 ft.
Tank shell diameter or width: 4.5 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 57.69 °F and Maximum 84.03 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 5.0312 psia at average storage temperature
8.0963 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ ^{o}F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 400 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 53 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.60 ft

24. The average height of the liquid material stored within the tank during the year: 5 ft.

25. The maximum height of the liquid material stored within the tank during the year: 10 ft.

26. The average liquid surface temperature: 57.69 ^{o}F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area	❒ Gasketed	❒ Ungasketed	❒ Sock
_____ Adjustable, center area	❒ Gasketed	❒ Ungasketed	❒ Sock

_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)
_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)
_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P007
Company Equipment ID: Separator Vessel #4

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/17 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P007
Company Equipment ID: Separator Vessel #4

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.60
Volatile organic compounds (VOC)					0.60
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					0.04
Highest single HAP: Hexane					0.02
Toxic Air Contaminants (see instructions):					0.04

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P007
Company Equipment ID: Separator Vessel #4

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (^oF) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P004-P008	■ Area ☐ Volume	2,155 x 1,326	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	41 deg 2 min 7.72 sec	81 deg 49 min 44.35 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P007

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 950 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 317 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 10 ft.
Tank shell diameter or width: 4 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 57.69 °F and Maximum 84.03 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 5.0312 psia at average storage temperature
8.0963 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ ^{o}F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 317 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 4,000 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.54 ft

24. The average height of the liquid material stored within the tank during the year: 5 ft.

25. The maximum height of the liquid material stored within the tank during the year: 10 ft.

26. The average liquid surface temperature: 57.69 ^{o}F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area	❒ Gasketed	❒ Ungasketed	❒ Sock
_____ Adjustable, center area	❒ Gasketed	❒ Ungasketed	❒ Sock

_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)
_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)
_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P008
Company Equipment ID: Separator Vessel #5

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/17 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P008
Company Equipment ID: Separator Vessel #5

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.01
Volatile organic compounds (VOC)					0.01
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					8.00E-04
Highest single HAP: Hexane					3.89E-04
Toxic Air Contaminants (see instructions):					8.00E-04

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P008
Company Equipment ID: Separator Vessel #5

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (^oF) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
N/A						
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
N/A						

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P004-P008	■ Area ☐ Volume	2,155 x 1,326	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	41 deg 2 min 7.72 sec	81 deg 49 min 44.35 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P008

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 130 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 43 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 8 ft.
Tank shell diameter or width: 1.67 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 57.69 °F and Maximum 84.03 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 5.0312 psia at average storage temperature
8.0963 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ ^{o}F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 43 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 6 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.22 ft

24. The average height of the liquid material stored within the tank during the year: 4 ft.

25. The maximum height of the liquid material stored within the tank during the year: 8 ft.

26. The average liquid surface temperature: 57.69 ^{o}F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area	❒ Gasketed	❒ Ungasketed	❒ Sock
_____ Adjustable, center area	❒ Gasketed	❒ Ungasketed	❒ Sock

_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)
_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)
_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P801
Company Equipment ID: Equipment Leaks

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P801
Company Equipment ID: Equipment Leaks

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

3-10-002-20 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					6.28
Volatile organic compounds (VOC)					6.28
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					0.76
Highest single HAP: Hexane					0.11
Toxic Air Contaminants (see instructions):					0.76

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (^oF) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P801	☒ Area ☐ Volume	2,155 x 1,326	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Equipment Leaks			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P801	41 deg 2 min 7.72 sec	81 deg 49 min 44.35 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3100 - General Process Operation

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
GENERAL PROCESS OPERATION

This form is to be completed for each process operation when there is no specific emissions activity category (EAC) form applicable. If there is more than one end product for this process, copy and complete this form for each additional product (see instructions). Several State/Federal regulations which may apply to process operations are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. P001) P801

2. Maximum Operating Schedule: 24 hours per day; 365 days per year

If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. End product of this process: N/A - Fugitive Emissions from Equipment Leaks

4. Hourly production rates (indicate appropriate units). Please see the instructions for clarification of "Maximum" and "Average" for new versus existing operations:

Hourly	Rate	Units (e.g., widgets)
Average production	N/A	N/A
Maximum production	N/A	N/A

5. Annual production rates (indicate appropriate units) Please see the instructions for clarification of "Maximum" and "Actual" for new versus existing operations:

Annual	Rate	Units (e.g., widgets)
Actual production	N/A	N/A
Maximum production	N/A	N/A

6. Type of operation (please check one):

❒ Continuous
❒ Batch (please complete items below)

Minimum cycle* time (minutes): _____
Minimum time between cycles (minutes): _____
Maximum number of cycles per daily 24 hour period: _____
(Note: include cycle time and set up/clean up time.)

*"Cycle" refers to the time the equipment is in operation.

7. Materials used in process at maximum hourly production rate (add rows/pages as needed):

Material	Physical State at Standard Conditions	Principle Use	Amount**
N/A			

** Please indicate the amount **and** rate (e.g., lbs/hr, gallons/hr, lbs/cycle, etc.).

8. Please provide a narrative description of the process below (e.g., coating of metal parts using high VOC content coatings for the manufacture of widgets; emissions controlled by thermal oxidizer...):

Fugitive emissions from various equipment components, including valves, connectors, pump seals, and flanges.

PERMIT TO INSTALL AND OPERATE APPLICATION

NEXUS Gas Transmission > Sandusky, OH

Clyde Compressor Station

Prepared By:

TRINITY CONSULTANTS
8425 Pulsar Place
Suite 280
Columbus, Ohio 43240
(614) 443-0733

July 2015

Project 143601.0141

Environmental solutions delivered uncommonly well

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APPENDIX A – PROCESS FLOW DIAGRAM

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APPENDIX D – PTIO APPLICATION FORMS

NEXUS Gas Transmission (NGT) plans to construct a new natural gas pipeline to facilitate the delivery of natural gas from Appalachian supplies to supply markets in Ohio, Michigan, Chicago, and Ontario. NGT proposes to construct and operate a natural gas compressor station (Clyde Compressor Station) in Sandusky County, Ohio to support the transmission of gas through the new pipeline. The purpose of the compressor station is to maintain line pressure and ensure natural gas continues to move at sufficient volumes for reliable service at delivery points. With this Permit to Install and Operate (PTIO) application, NGT is requesting approval for the construction and operation of this natural gas compressor station.

The primary Standard Industrial Classification (SIC) code of the proposed Clyde Compressor Station is 4922 (Natural Gas Transmission).

1.1. FACILITY LOCATION

The Clyde Compressor Station will be located in Sandusky County, near Clyde, Ohio. Figure 1-1 is an area map that shows the site location relative to predominant geographical features such as highways and railroads.

Fig. 1-1. NEXUS Gas Transmission
Clyde Compressor Station
Area Map

Coordinate System: NAD83 UTM Zone 17N

Scale

0 1,000 2,000 3,000 4,000

Feet

0 500 1,000 1,500

Meters

Trinity Consultants

1.2. PROJECT DESCRIPTION

The Clyde Compressor Station will facilitate the delivery of natural gas along the NEXUS Gas Transmission (NGT) pipeline. NGT plans to install the following emission units during the construction of the Clyde Compressor Station. Each of the following emission units is listed with the proposed Ohio Environmental Protection Agency (Ohio EPA) Emission Unit Identification Number (EUID). Refer to Figure 1-2 for a process flow diagram describing the organization of these emission units.

- Combustion Turbine (P001) – One (1) new natural gas-fired Solar Titan 250 combustion turbine sized to a nominal, NEMA-rated capacity of 26,000 horsepower (hp) and equipped with an oxidation catalyst.
- Emergency Generator (P002) – One (1) new natural gas-fired internal combustion engine rated at a maximum capacity of 880 hp intended to drive a generator to supply power to the facility during emergency situations. Because this engine qualifies for coverage under a Permit by Rule (PBR) in accordance with Ohio Administrative Code (OAC) 3745-31-03(A)(4)(b), the application described herein will not contain any application forms for this unit; rather, NGT will submit under separate cover a notification of intent to operate a new emergency engine under Ohio EPA's PBR program.
- Gas Releases (P003) – Periodic maintenance, routine operations, and pigging activities will occasionally necessitate the evacuation of equipment (e.g., turbine, piping components) directly to atmosphere.
- Equipment Leaks (P801) – Various equipment components, including valves, flanges, and connectors will be located throughout the compressor station that may result in fugitive emissions due to equipment leaks.
- Separator Vessel #1 (P004) – One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 530 gallons handling condensate liquids collected from the pipeline.
- Separator Vessel #2 (P005) - One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 530 gallons handling condensate liquids collected from the pipeline.
- Separator Vessel #3 (P006) - One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 400 gallons handling condensate liquids collected from the pipeline.
- Separator Vessel #4 (P007) - One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 317 gallons handling condensate liquids collected from the pipeline.
- Separator Vessel #5 (P008) - One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 43 gallons handling condensate liquids collected from the pipeline.
- Loading Operation (J001) – NGT will periodically transfer the condensate liquids collected in T001, the used lubricating oil collected in T002, and the oily water collected in T003 to tanker trucks for shipment off-site.

The Clyde Compression Station will also include the following additional *de minimis* sources under Ohio Administrative Code (OAC) 3745-15-05.

- Process Heater (B001) – One (1) new natural gas-fired catalytic heater rated at a heat input capacity of 1.125 MMBtu/hr intended to provide heat to various streams at the facility.
- Parts Washer (L001) – One parts washer expected to require 120 gallons of makeup organic solvent per year.

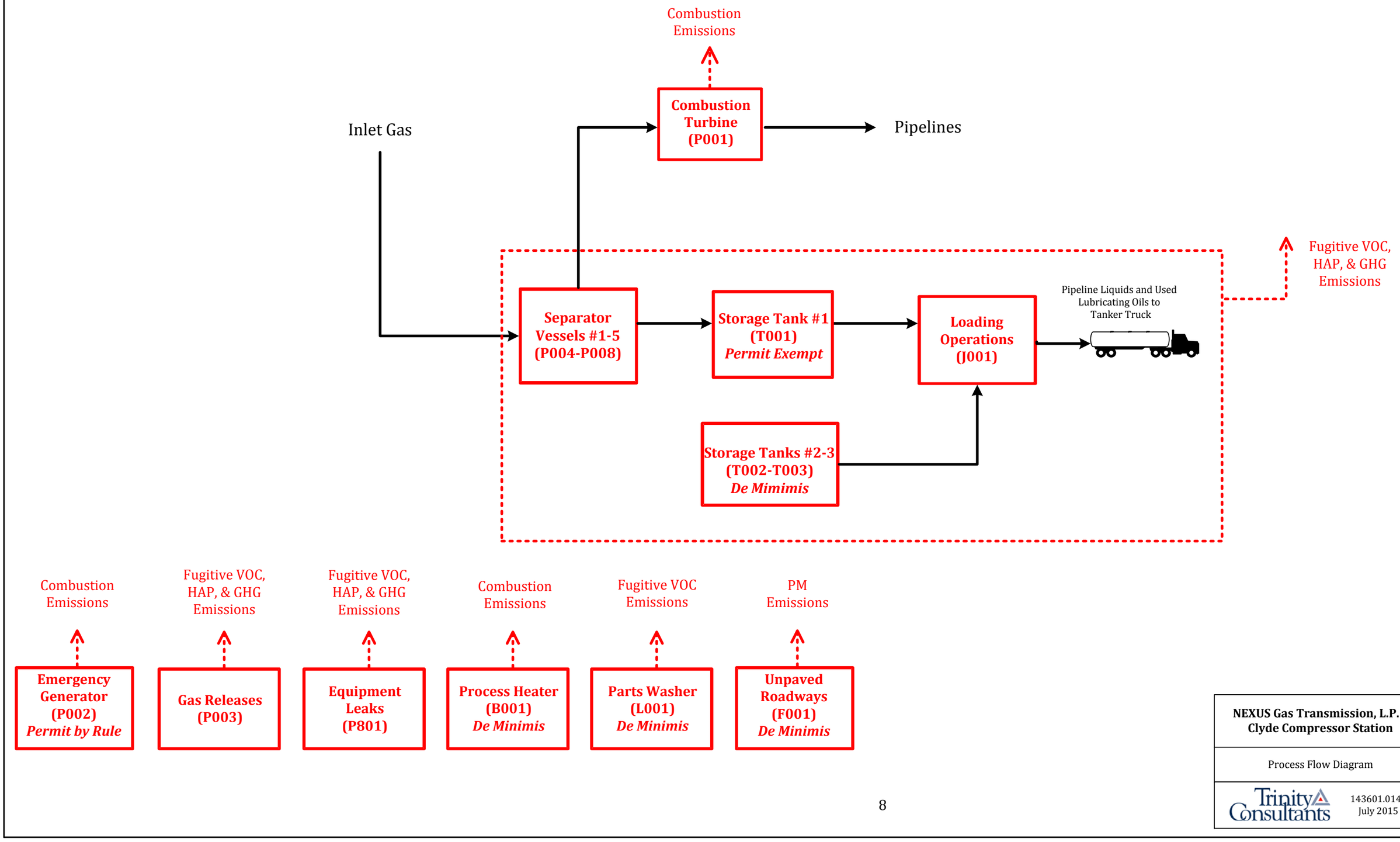
- Storage Tank #2 (T002) – One vertical fixed roof tank sized to a capacity of 570 gallons used to store lubricating oils for the turbine.
- Storage Tank #3 (T003) – One vertical fixed roof tank sized to a capacity of 3,000 gallons used to store oily water.
- Roadways (F001) – Vehicle traffic on facility roadways will result in fugitive emissions of particulate matter.

Additionally, the Clyde Compressor Station will include the following emissions sources considered exempt from permitting under OAC 3745-31-03(A)(1).

- Storage Tank #1 (T001) – One vertical fixed roof tank sized to a capacity of 2,000 gallons used to store condensate liquids collected from the pipeline and from station equipment. T001 will be equipped with submerged filling mechanisms and will be eligible for the permanent permitting exemption provided in OAC 3745-31-03(A)(1)(l)(iv).

NGT requests that the PTIO be issued for all non-exempt, non-*de minimis* emission units to be installed at the Clyde Compressor Station.

FIGURE 1-2. PROCESS FLOW DIAGRAM FOR THE CLYDE COMPRESSOR STATION



NEXUS Gas Transmission, L.P. – Clyde Compressor Station	
Process Flow Diagram	
Trinity Consultants	143601.0141 July 2015

1.3. PROJECT EMISSIONS

This section provides a summary of the calculation methodology used to estimate potential emissions for the turbine, emergency generator, heater, parts washer, piping components, gas releases, storage tanks and truck loading operations to be installed as part of the NEXUS project at the Clyde Compressor Station. Appendix B provides the detailed emission calculations for the project.

Table 1-1 provides a summary of the facility-wide potential annual emissions attributable to the installation of the Clyde Compressor Station, including particulate matter, particulate matter with an aerodynamic diameter of less than 10 microns, and particulate matter with an aerodynamic diameter of less than 2.5 microns ($PM/PM_{10}/PM_{2.5}$); nitrogen oxides (NO_X); sulfur dioxide (SO_2); carbon monoxide (CO); volatile organic compounds (VOC); greenhouse gases (i.e., carbon dioxide [CO_2], methane [CH_4], and nitrous oxide [N_2O]) expressed as carbon dioxide equivalents (CO_2e); total hazardous air pollutants (HAP); and hexane.

Table 1-1. Potential Emissions for the Clyde Compressor Station

EU ID	Emission Unit Description	Annual Emissions (tpy)							
		NO_X	CO	VOC	SO_2	$PM/PM_{10}/PM_{2.5}$	CO_2e [a]	Hexane	Total HAP
P001	Combustion Turbine	31.13	7.81	3.32	3.22	6.25	112,238	-	0.60
P002	Emergency Generator [b]	0.97	1.94	0.87	1.02E-03	0.02	432	0.01	0.53
P003	Gas Releases	-	-	19.82	-	-	15,401	0.58	1.64
P801	Equipment Leaks	-	-	6.28	-	-	997	0.11	0.76
P004	Separator Vessel #1	-	-	0.14	-	-	8	4.08E-03	8.80E-03
P005	Separator Vessel #2	-	-	0.14	-	-	8	4.08E-03	8.80E-03
P006	Separator Vessel #3	-	-	0.11	-	-	6	3.20E-03	6.90E-03
P007	Separator Vessel #4	-	-	0.60	-	-	18	0.02	0.04
P008	Separator Vessel #5	-	-	0.01	-	-	1	3.95E-04	9.00E-04
T001	Storage Tank #1[d]	-	-	0.29	-	-	15	8.26E-03	0.02
T002	Storage Tank #2[c]	-	-	2.10E-03	-	-	-	-	-
T003	Storage Tank #3[c]			9.00E-04	-	-	-	-	-
B001	Process Heater [c]	0.71	0.43	0.17	2.80E-03	0.04	554	3.66E-02	0.04
L001	Parts Washer[c]	-	-	0.41	-	-	-	-	-
J001	Loading Operation	-	-	0.01	-	-	1	2.73E-04	6.00E-04
Totals		32.81	10.18	32.17	3.22	6.30	129,678	0.78	3.64

a. Carbon dioxide equivalent (CO_2e) emissions. Represents the sum of carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4) emissions adjusted by each pollutant's global warming potential as identified in Table A-1 to 40 CFR 98, Subpart A.

b. This unit qualifies for coverage under a Permit by Rule pursuant to OAC 3745-31-03(A)(4)(b).

c. These units are classified as *de minimis* sources under OAC 3745-15-05.

d. This unit qualifies for permanent permit exemption pursuant to OAC 3745-31-03(A)(1)(l)(iv).

1.3.1. Turbine Emissions

Emissions are estimated for operation during normal steady-state operating conditions, and operation during startup and shutdown events as described in the following sections.[1]

1.3.1.1. Turbine Normal Steady-State Operation Hourly Emissions

One new Solar turbine is proposed as part of this project. The turbine will utilize an oxidation catalyst to reduce potential emissions of CO and organic emissions and will utilize SoLoNO$_X$™ technology to reduce emissions of NO$_X$. Table 1-2 provides a summary of the uncontrolled emission factors used for each pollutant during normal steady-state operation.

Table 1-2. Turbine Pre-Control Emission Factors – Normal Operations

Pollutant	Emission Factor [a]	Source
NO$_X$	9 ppmvd at 15% O$_2$ for Titan 250	Vendor guaranteed emission rate
CO	25 ppmvd at 15% O$_2$	Vendor guaranteed emission rate
VOC	25 ppmvd of TOC at 15% O$_2$	Based on vendor data for TOC, scaled to VOC based on ratio of TOC:VOC in Table 3.1-2a of AP-42 (April 2000)
CH$_4$	25 ppmvd of TOC at 15% O$_2$	Based on vendor data for TOC, scaled to CH$_4$ based on ratio of TOC:CH$_4$ in Table 3.1-2a of AP-42 (April 2000)
PM$_{10}$/PM$_{2.5}$	0.0066 lb/MMBtu (HHV)	Table 3.1-2a of AP-42 (April 2000)
SO$_2$	0.0034 lb/MMBtu (HHV)	Table 3.1-2a of AP-42 (April 2000)
CO$_2$	53.06 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-1 (effective January 2014)
N$_2$O	0.0001 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-2 (effective January 2014)
Total HAPs	Multiple HAP factors	Table 3.1-3 of AP-42 (April 2000). Organic HAPs were scaled using vendor data and AP-42 emission rates for TOC

a. The emission factors provided in this table represent uncontrolled emissions (excluding add-on controls not inherent to the equipment) at temperatures above 0 °F.

Although the general publically available manufacturer's guarantee information currently states that the NO$_X$ guarantee is 15 ppmvd, for this project Solar® has guaranteed NO$_X$ emissions for the new Titan 250 units at 9 ppmvd (15 percent O$_2$) during steady-state operation at 50-100 percent engine load for all ambient temperatures above 0°F.

[1] NGT also evaluated emissions during cold weather operation (temperatures below 0°F). Due to the location of the Clyde Compressor Station, NGT has assumed 28 hours of potential low temperature operation.

In order to calculate hourly emissions during normal operation, the emission factors provided in the table above are converted to factors in pounds per million standard cubic feet (lb/MMscf) as described in subsequent sections.

1.3.1.2. Turbine Emission Factors – NO_X, CO, and TOC

NO_X, CO, and Total Organic Carbon (TOC)[2] emitted by the combustion turbines during normal operation are calculated based on the vendor-supplied emission rates provided in Table 1-2. Although TOC is not a criteria pollutant, it is used to derive the emission factors for VOC, methane (CH_4 – a greenhouse gas), and organic HAPs. Vendor data for several ambient temperatures and vendor literature for emissions were compiled to develop the data listed below:

- Fuel: Lower Heating Value (939.2 BTU/scf);
- Turbine Performance: Net Output Power (30,381 hp at 48.49 °F), Heat Input at LHV (194.50 MMBtu/hr), Heat Rate at LHV (6,402 BTU/hp-hr);
- Exhaust Parameters: Exhaust Temperature (864 °F), Water Fraction (6.40 %), O_2 Content (15.36 %, dry), Molecular Weight (28.53 lb/lb-mol), Flowrate (548,329 lb/hr and 309,589 acfm); and
- Vendor Supplied Emission Rates for NO_X, CO and UHC (9 ppmvd, 25 ppmvd, and 25 ppmvd @ 15% O_2).

Operating and emissions data at other ambient temperatures are estimated by fitting the vendor-provided data to a curve that best represents the data and interpolating/extrapolating to the desired temperatures. Since the effectiveness of the emissions control inherent in the turbine's combustor design (e.g., SoLoNO$_X$™) is only guaranteed at temperatures above 0 °F, the ppm values provided in Table 1-2 do not apply to sub-zero operating conditions. Further, the rated output power and the mass emission rates of NO_X, CO, and TOC at a given percent load decrease with increasing ambient temperature conditions (i.e., fuel consumption at 100 percent load is highest at lower ambient temperatures). As such, short-term, maximum hourly emission rates are estimated based on operating and emissions data at 0.01 °F to provide a conservative estimate. Annual emissions estimates are based on the annual average ambient conditions at the Clyde Compressor Station. As such, for annual emissions estimates, the operating data (turbine performance and exhaust gas parameters) are interpolated to estimate emissions at the average annual ambient temperature at the station (i.e., 48.49 °F).[3] The emission factor at a given ambient temperature is calculated as illustrated in Equation 1-1 through Equation 1-3:

[2] TOC would be the same as UHC (As defined in Section 1.1.1.1).

[3] A weighted daily average ambient temperature is used in estimating annual emissions for the Clyde Compressor Station and is based on meteorological information in USEPA's TANKS 4.09d database. To determine ambient temperatures, the three meteorological stations in closest proximity to the station are reviewed, and the station with the lowest ambient temperatures is conservatively selected. The weighted daily average ambient temperature is also adjusted to account for the proposed utilization limit. NEXUS interpolates the performance and exhaust parameters using operating data provided by the manufacturer at the following ambient temperatures: 0, 20, 40, 60, 80, and 100 °F.

Equation 1-1:

$$NO_x, CO, TOC\ EF\ (ppmw) = ppmvd, 15\%\ O_2 \times nonwater\% \times \frac{20.9 - (\ vol\%\ O_2, dry\ \times 100)}{20.9 - 15} = ppmw$$

Equation 1-2:

$$NO_x, CO, TOC\ hourly\ emissions\ \left(\frac{lb}{hr}\right) @\ T = \frac{ppmw}{1{,}000{,}000} \times \left[\frac{lb\ exhaust}{hr}\right]_T \times \frac{\frac{lb\ pollutant}{lbmol}}{\left[\frac{lb\ exhaust}{lbmol}\right]_T}$$

$$= \left[\frac{lb\ pollutant}{hr}\right]_T$$

Equation 1-3:

$$NO_x, CO, TOC\ EF\ @\ T = \left[\frac{lb}{hr}\right]_T \times \frac{1{,}000{,}000\ \frac{scf}{MMscf}}{\left[\frac{scf\ fuel}{hr}\right]_T} = \left[\frac{lb}{MMscf}\right]_T$$

Where: *EF = Emission factor*
T = ambient temperature
Maximum hourly emissions estimated at T = 0.01 °F
Annual average hourly emissions estimated at T = 48.49 °F

1.3.1.3. Turbine Emission Factors – VOC, CH_4, and HAPs

VOC, CH_4, and HAP emitted by the combustion turbines are calculated using the vendor-guaranteed TOC emission rate and AP-42 emission factors, as VOC, CH_4, and HAP are constituents of TOC. The TOC emission factor in terms of lb/MMscf at a given ambient temperature is calculated as outlined above in Section 1.3.1.2.

Standard emission factors for VOC, CH_4, HAP, and TOC from stationary gas turbines are provided in Chapter 3.1 of EPA's Compilation of Air Pollutant Emission Factors (AP-42). Table 3.1-2a of AP-42 (version dated April 2000) provides emission factors of 0.0021 lb VOC per MMBtu, 0.0086 lb CH_4 per MMBtu, and 0.011 lb TOC per MMBtu from natural gas-fired turbines. Table 3.1-3 of AP-42 (version dated April 2000) provides emission factors for HAPs emitted from natural gas fired turbines. These HAPs include:

- 1,3-butadiene;
- Acetaldehyde;
- Acrolein;
- Benzene;

- Ethylbenzene;
- Formaldehyde;
- Naphthalene;
- Polycyclic aromatic hydrocarbons (PAH);
- Propylene oxide;
- Toluene; and
- Xylenes.

A total HAP emission factor is calculated as the sum of all individual HAP emission factors.

Ratios of VOC, CH_4, and HAP to TOC from the AP-42 factors are applied to the TOC factor derived from vendor information to obtain emission factors for VOC, CH_4, and HAP. For normal operation, the uncontrolled VOC, CH_4, and HAP factors are derived as follows:

Equation 1-4:

$$VOC, CH_4, HAP\ EF = \frac{lb\ TOC_{(vendor\ guarantee)}}{MMscf} \times \frac{\left(\frac{lb\ pollutant_{(AP-42)}}{MMBtu} \times 1{,}020\ \frac{MMBtu}{MMscf}\right)}{\left(0.011 \frac{lb\ TOC_{(AP-42)}}{MMBtu} \times 1{,}020\ \frac{MMBtu}{MMscf}\right)} = \frac{lb}{MMscf}$$

The scaled emission factors were calculated as 0.0068 lb VOC/MMBtu and 0.0279 lb CH_4/MMBtu. Organic HAP emission factors are included in the emission calculations found in Appendix B.

1.3.1.4. Turbine Emission Factors – PM_{10}, $PM_{2.5}$, and SO_2

As indicated in Table 1-2, PM10, $PM_{2.5}$, and SO_2 emitted by the combustion turbine during normal operation are calculated based on the emission factors listed in Table 3.1-2a of AP-42 (version dated April 2000) for stationary gas turbines. The AP-42 emission factors are converted to lb/MMscf as follows:

Equation 1-5:

$$PM_{10}, PM_{2.5}, or\ SO_2\ EF = \frac{lb}{MMBtu} \times 1{,}020\ \frac{MMBtu}{MMscf} = \frac{lb}{MMscf}$$

It is conservatively assumed that PM = PM_{10} = $PM_{2.5}$.

1.3.1.5. Turbine Emission Factors – CO_2, N_2O, and CO_2e

Emission factors for CO_2 and nitrous oxides (N_2O) emitted by the combustion of natural gas are calculated based on the emission factors provided for pipeline natural gas combustion in 40 CFR 98, Subpart C, Tables C-1 and C-2 (effective January 2014), as follows:[4]

Equation 1-6:

$$CO_2\ EF = 53.06\frac{kg}{MMBtu} \times 2.2046\frac{lb}{kg} \times 1{,}026\frac{Btu}{scf} = 120{,}017.5\frac{lb\ CO_2}{MMscf}$$

A chemical reaction will occur as a result of the oxidation catalyst controlling CO emissions to produce CO_2. NGT quantified the additional CO_2 emissions using the following equation:

Equation 1-7:

$$CO_2\ Emissions\ \left(\frac{lb}{hr}\right) = CO_2\ EF\left(\frac{lb\ CO_2}{MMscf}\right) * Fuel\ Consumption\ \left(\frac{MMscf}{hr}\right) + [CO\ Emissions\left(\frac{lb\ CO}{hr}\right) * 95\%\ CO\ Control * \frac{Molecular\ Weight_{CO2}}{Molecular\ Weight_{CO}}]$$

Equation 1-8:

$$N_2O\ EF = 0.0001\frac{kg}{MMBtu} \times 2.2046\frac{lb}{kg} \times 1{,}026\frac{Btu}{scf} = 0.23\frac{lb\ N_2O}{MMscf}$$

Total GHG emissions in terms of CO_2 equivalents (CO_2e) are equal to the sum of all individual GHGs emitted by the turbine, accounting for the respective global warming potential of each GHG. The global warming potentials (GWPs) used to calculate CO_2e emissions for each pollutant emitted by the Project are contained in Table 1-3.

Table 1-3. Applicable Global Warming Potentials

Pollutant [a]	GWP [b]
CO_2	1
CH_4	25
N_2O	298

a. Only those GHGs for which quantifiable emissions increases are expected due to this project are listed.

[4] Note that emission factors utilized the corresponding natural gas heating value from the same subpart or reference (Part 98 for GHG, AP-42 for other factors). In this way, the factors and heating value are consistent with each other, although slightly different heating values were reference for different factors.

b. GWPs are based on a 100-year time horizon, as identified in Table A-1 to 40 CFR Part 98, Subpart A as amended on November 29, 2013, and effective January 1, 2014, to incorporate revised GWPs as published in the Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Report (AR4). See 78 Fed Reg 71903-71981.

As such, the CO_2e factor is derived as follows:

Equation 1-9:

$$CO_2e\ EF = \left(\frac{lb\ CO_2}{MMscf} \times 1\ GWP\right) + \left(\frac{lb\ CH_4}{MMscf} \times 25\ GWP\right) + \left(\frac{lb\ N_2O}{MMscf} \times 298\ GWP\right) = \frac{lb\ CO_2e}{MMscf}$$

1.3.2. Turbine Startup and Shutdown Operation Hourly Emissions

Emissions during startups and shutdowns are calculated based on vendor-specified transient operation profiles which are used to determine the maximum pound per startup or shutdown event as described in further detail in the following sections.

1.3.2.1. Turbine Startup Operation

The startup process for the turbine is estimated to take approximately nine minutes from the initiation of startup to normal operation (startup sequence ends at approximately 50 percent load for most Solar® turbines). This includes approximately three minutes of ignition-idle operation and six minutes of loading/thermal stabilization operation. [5]

Table 1-4 provides a summary of the emission factors used for each pollutant during the ignition-idle and loading/thermal stabilization phases of each startup event per turbine type. It is assumed that the oxidation catalyst will not yet have a measureable destruction or removal efficiency (DRE) during startup, as it is designed to meet control specifications only during normal operation. It is also assumed that the SoLoNO$_X$™ will not result in reduced NO$_X$ during startup.

[5] These are referred to as "Step 2" and "Step 3", respectively in the emissions calculations in Appendix B. Step 1 of turbine startup includes energizing the starter and observing the RPM until the ignition range is reached. During Step 1, ignition and combustion have not yet occurred in the turbine, and thus the turbine combustor is not yet a source of air emissions.

Table 1-4. Solar® Titan 250-30002S4 Pre-Control Emission Factors – Startup Operation

Pollutant	Ignition-Idle Phase Emission Factor from Source [a]	Loading/Thermal Stabilization Phase Emission Factor from Source [a]	Source
NO_X	50 ppmvd at 15% O_2	50 ppmvd at 15% O_2	Based on vendor data
CO	2,000 ppmvd at 15% O_2	1,013 ppmvd at 15% O_2	Based on vendor data
VOC	200 ppmvd TOC at 15% O_2 0.011 lb_{TOC}/MMBtu (HHV) : 0.0021 lb_{VOC}/MMBtu (HHV)	110 ppmvd TOC at 15% O_2 0.011 lb_{TOC}/MMBtu (HHV) : 0.0021 lb_{VOC}/MMBtu (HHV)	Based on vendor data for TOC, scaled to VOC based on ratio of TOC:VOC in Table 3.1-2a of AP-42 (April 2000)
CH_4	200 ppmvd TOC at 15% O_2 0.0086 lb/MMBtu (HHV) CH_4	110 ppmvd TOC at 15% O_2 0.0086 lb/MMBtu (HHV) CH_4	Based on vendor data for TOC, scaled to CH_4 based on ratio of TOC:CH_4 in Table 3.1-2a of AP-42 (April 2000)
$PM_{10}/PM_{2.5}$	Same as normal operation		
SO_2	Same as normal operation		
CO_2	Same as normal operation		
N_2O	Same as normal operation		
Total HAPs	200 ppmvd TOC at 15% O_2 Multiple HAP factors	110 ppmvd TOC at 15% O_2 Multiple HAP factors	Based on vendor data for TOC, scaled to HAP based on ratio of TOC:HAP in Table 3.1-2a of AP-42 (April 2000)

a. The emission factors provided in this table represent uncontrolled emissions. The Solar® Titan 250 turbine will be equipped with oxidation catalyst, however it is assumed that the catalyst does not have a DRE during startups.

All pollutants emitted by the combustion turbine during startup events are calculated based on the same methodology that is used to calculate emissions during normal operation (i.e., the techniques described in Section 1.3.1).[6] However, rather than calculate a lb/MMscf emission factor, pounds per startup event (lb/event) are calculated for each pollutant based on the fuel consumed during the 3-minute ignition-idle phase and during the 6-minute loading/thermal stabilization phase as follows:

[6] NEXUS will not operate any control device to reduce emissions of NO_X from the turbines; however, NO_X emission rates during startup events may nevertheless differ from the emission rates observed during normal operation given that the low-NO_X burners are designed to operate at optimal combustion temperatures which may not be achieved until the end of the startup sequence.

Equation 1-10:

$$EF\ during\ SU\ event = ppmvw_{S2-i} \times \frac{Exhaust\ Mass\ Flow}{10^6} \times \frac{MW_{pol}}{MW_{ex}} \times \frac{3\ min}{60\ min} + ppmvw_{S3-i} \times \frac{Exhaust\ Mass\ Flow}{10^6} \times \frac{MW_{pol}}{MW_{ex}} \times \frac{6\ min}{60\ min} = \frac{lb\ Pollutant\ i}{event}$$

Where: EF is the emission factor for pollutant "i"

For example:

$$CO\ EF\ during\ SU\ event = 1{,}137.25 \times \frac{273{,}420}{10^6} \times \frac{28.01}{28.66} \times \frac{3\ min}{60\ min} + 688.04 \times \frac{347{,}975}{10^6} \times \frac{28.01}{28.61} \times \frac{6\ min}{60\ min} = 38.63$$

1.3.2.2. Turbine Shutdown Operation

The shutdown process for each turbine is estimated to take approximately 8.5 minutes from normal operation to shutdown for a Solar® Titan 250. The shutdown event consists of loading/thermal stabilization operation. The calculation for shutdowns is similar to that for startups as shown in Table 1-4, utilizing the same emission rates identified during loading/thermal stabilization for startup.

1.3.3. Turbine Annual Potential Emissions

The emission factors described in the previous sections are multiplied by the following activity data to estimate annual potential emissions:

- **Normal, Steady State Operation:** Annual fuel consumption as estimated from vendor-provided turbine parameters at the annual average ambient temperature for the Clyde Compressor Station. Annual potential to emit (PTE) estimates assume 100% utilization (8,760 hours per year). CO, VOC, and HAP PTE estimates take the control efficiency of the proposed oxidation catalyst into account. Further, since an oxidation catalyst provides more complete conversion of CO to CO_2, the controlled portion of the CO emissions is added back to the CO_2 emissions rate. Note however, that this increase is a small fraction of the overall CO_2 emissions.

  NO_X PTE estimates are based on the project-specific emissions guarantee of the proposed SoLoNO$_X$™ combustion technology.
- **Startup/Shutdown Operation:** The number of startup and shutdown events is conservatively estimated at 260 startup events and 260 shutdown events per year for each turbine. No credit for control by the oxidation catalyst is accounted for in the estimation of startup emissions even though the oxidation catalyst inlet temperature should reach the effective temperature very quickly. However, it is assumed that the oxidation catalyst will be operational during shutdown since the oxidation catalyst

inlet temperature would not be expected to drop below the effective temperature until the feed of fuel is discontinued.

- **Low Temperature Operation:** Fuel consumption during low temperature operation as estimated by extrapolating vendor-provided turbine parameters to an ambient temperature of 0°F. NGT has estimated emissions by assuming that the temperature will drop below 0°F for 27 hours per year and that the temperature will drop below 20°F for an additional one (1) hour per year.

For some pollutants (e.g., particulate matter), emission rates from the combustion turbine are higher during normal steady-state operation than they are during startup and shutdown. However, for other pollutants (e.g., CO), emission rates may be higher during startup and shutdown than during normal operation. Although emission concentration may be higher, load is typically lower during startup and shutdown such that short-term mass emission rate may still be lower. This varies, however, per pollutant. Therefore, for the sake of conservatism, maximum annual emissions for the turbine are the maximum of potential combinations of normal, startup (SU), and shutdown (SD) operation as summarized in the equations below.

Equation 1-11:

$$Normal\ \frac{ton}{yr} = Average\ Normal\ \frac{lb}{hr} \times \frac{8{,}760\ hr \times \%\ utilization}{yr} \times \frac{ton}{2{,}000\ lb}$$

Equation 1-12:

$$Normal\ with\ Startup\ (SU)\ and\ Shutdown(SD)\ \frac{ton}{yr} = \max[normal\ \frac{ton}{yr},\ startup\ \frac{ton}{yr} + shutdown\ \frac{ton}{yr} + \left(normal\ \frac{ton}{yr} \times \left\{1 - \frac{startup\ hrs \mp shutdown\ hrs}{8{,}760\ \times\ \%\ utilization}\right\}\right)]$$

Equation 1-13:

$$Normal, SU, SD, and\ Low\ Temp(LT)\ \frac{ton}{yr} = startup\ \frac{ton}{yr} + shutdown\ \frac{ton}{yr} + low\ temp\ \frac{ton}{yr} + \left(normal\ \frac{ton}{yr} \times \left\{1 - \frac{startup\ hrs \mp shutdown\ hrs \mp low\ temp\ hrs}{8760\ \times\ \%\ utilization}\right\}\right)]$$

Equation 1-14:

$$Normal\ \ and\ Low\ Temp(LT)\ \frac{ton}{yr} = low\ \frac{ton}{yr} + normal\ \frac{ton}{yr}\ x\ \left[1 - \left\{\frac{low\ temp\ hrs}{8{,}760\ \times\ \%\ utilization}\right\}\right]$$

Equation 1-15:

$$Annual\ PTE\ \left(\frac{ton}{yr}\right)_{Pollutant\ i} = \text{MAX}\left[Normal\left(\frac{ton}{yr}\right), Normal\ with\ SU, SD\ \left(\frac{ton}{yr}\right), Normal\ with\ SU, SD, LT\ \left(\frac{ton}{yr}\right)\right]_i$$

1.3.4. Natural Gas Heater Emissions

NGT is proposing to install one (1) fuel gas heater rated at 0.750 MMBtu/hr. Table 1-5 provides information on the emission factors used to calculate emissions from the heaters.

Table 1-5. Cameron Heater Emission Factors

Pollutant	Emission Factor from Source	Source
NO_X	80 ppmvd at 3% O_2	Vendor specified emission rate
CO	200 ppmvd at 3% O_2	Vendor specified emission rate
TOC	140 ppmvd at 3% O_2	Vendor specified emission rate
VOC	0.035 lb/MMBtu	Table 1.4-3 of AP-42 (July 1998), scaled using the vendor guarantee and AP-42 emission rates for TOC
CH_4	0.00996 lb/MMBtu	Table 1.4-2 of AP-42 (July 1998), scaled using the vendor guarantee and AP-42 emission rates for TOC
$PM_{10}/PM_{2.5}$	7.60 lb/MMscf	Table 1.4-2 of AP-42 (July 1998)
SO_2	0.60 lb/MMscf	Table 1.4-2 of AP-42 (July 1998)
CO_2	53.06 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-1 (effective January 2014)
N_2O	0.0001 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-2 (effective January 2014)
Total HAPs	Multiple HAP factors	Table 1.4-3 of AP-42 (July 1998), scaled using the vendor guarantee and AP-42 emission rates for TOC

In order to calculate hourly emissions, the emission factors provided in Table 1-5 are converted to units of lb/MMscf. These converted factors are multiplied by each heater's hourly fuel consumption in scf/hr to obtain hourly emissions. Fuel consumption is calculated from the heat output of the heaters assuming a thermal efficiency of 70 percent and a natural gas heating value of 1,020 Btu/scf. Annual potential emissions are calculated based on average hourly fuel consumption. Maximum hourly potential emissions are calculated based on maximum hourly fuel consumption, assuming an overload capability of 105 percent. The following sections summarize the methods used to obtain lb/MMscf emission factors for each pollutant emitted from the new heaters.

1.3.4.1. Heater Emissions Factors – NO_X, CO, and TOC

NO_X, CO, and TOC emitted by the heaters are calculated based on vendor-specified emission rates and vendor-specified fuel consumption for the heaters. NO_X, CO, and TOC factors are derived as follows:

Equation 1-16:[7]

$$NO_x, CO, TOC\ EF = ppmvd, 3\%\ O_2 \times \frac{lb/MMBtu}{ppmvd,3\%\ O_2} \times 1{,}020\,\frac{MMBtu}{MMscf} = \frac{lb}{MMscf}$$

1.3.4.2. Heater Emissions Factors – VOC, CH_4, and HAPs

VOC, CH_4, and HAP emissions are calculated using the TOC emission rate and AP-42 emission factors. Standard emission factors for TOC, VOC, CH_4, and HAP from natural gas fired heaters are provided in Chapter 1.4 of AP-42. Table 1.4-2 (version dated July 1998) provides a CH_4 emission factor for natural gas-fired external combustion sources. Instead, the TOC and VOC factors used in the calculations differ slightly from the factors provided in AP-42 Table 1.4-2. TOC and VOC factors are calculated as the sum of the factors for all speciated organic compounds listed in AP-42 Table 1.4-3 which are TOCs and VOCs, respectively. Table 1.4-3 of AP-42 (version dated July 1998) provides emission factors for the HAPs emitted from natural gas fired external combustion units.

Using the same ratio method used to calculate CH_4 and HAP emitted from turbines (detailed in Section 1.3.1.3), ratios for CH_4, HAP, and VOC emitted from heaters are based on the vendor-specified TOC emission rate.

1.3.4.3. Heater Emissions Factors – PM_{10}, $PM_{2.5}$, and SO_2

PM_{10} and $PM_{2.5}$ emitted by the heaters are calculated based on the emission factors listed in Table 1.4-2 of AP-42 (version dated July 1998) for natural gas fired external combustion sources. The total PM emission factor of 7.6 lb/MMscf, which includes filterable and condensable particulate, is used. It is assumed that all particulate emitted from natural gas combustion is less than 2.5 microns in diameters, so that PM equals PM_{10} and $PM_{2.5}$. The SO_2 emission factor of 0.6 lb/MMscf from Table 3.2-2 of AP-42 is used directly.

1.3.4.4. Heater Emission Factors – CO_2, N_2O, and CO_2e

CO_2 and N_2O emitted by the heaters are calculated based on the emission factors listed in 40 CFR 98, Subpart C, Tables C-1 and C-2. Equation 1-6 and Equation 1-8 show how factors in lb/MMscf are derived for these pollutants. GHGs emitted from the heaters include CO_2, CH_4, and N_2O. CO_2e emissions are calculated using the GWPs provided in Table 1-3.

1.3.5. Emergency Generator Emissions

NGT is proposing to install one new Waukesha (880 bhp) four stroke lean burn natural gas fired emergency generator or equivalent. The emergency generator potential emissions are calculated using 500 hours per

[7] Conversion factors in units of lb/MMBtu over ppmvd, 3% O_2 are obtained from the North American Combustion Handbook.

year, which includes maintenance and testing, based on standard guidance from USEPA.[8] Table 1-6 provides information on the emission factors used to calculate emissions from the emergency generator.

Table 1-6: Waukesha Emergency Generator Emission Factors

Pollutant	Emission Factor from Source	Source
NO_X	2.0 g/bhp-hr	NSPS Subpart JJJJ
CO	4.0 g/bhp-hr	NSPS Subpart JJJJ
VOC	1.0 g/bhp-hr	VOC (without formaldehyde): NSPS Subpart JJJJ Table 3.2-2 of AP-42 (July 2000)
CH_4	1.0 g VOC/bhp-hr 1.25 lb/MMBtu (HHV)	VOC: NSPS Subpart JJJJ Table 3.2-2 of AP-42 (July 2000)
$PM_{10}/PM_{2.5}$	0.00999 lb/MMBtu (HHV)	Table 3.2-2 of AP-42 (July 2000)
SO_2	0.000588 lb/MMBtu (HHV)	Table 3.2-2 of AP-42 (July 2000)
CO_2	53.06 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-1 (effective January 2014)
N_2O	0.0001 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-2 (effective January 2014)
Total HAPs	1.0 g VOC/bhp-hr Multiple HAP factors	VOC: NSPS Subpart JJJJ Table 3.2-2 of AP-42 (July 2000)

In order to calculate hourly emissions, the emission factors provided in Table 1-6 are converted to factors in lb/MMscf. These converted factors are multiplied by the generator's hourly fuel consumption in scf/hr to obtain hourly emissions. The following sections summarize the methods used to obtain lb/MMscf emission factors for each pollutant emitted from the new emergency generator.

1.3.5.1. Emergency Generator Emission Factors – NO_X, CO, and VOC

NO_X, CO, and VOC emitted by the emergency generator are calculated based on the emission limits established under NSPS Subpart JJJJ in grams per brake horsepower-hour (g/bhp-hr) for emergency engines greater than 130 hp installed on and after January 1, 2009.[9]

The VOC emission limit of 1.0 g/bhp-hr in NSPS Subpart JJJJ excludes formaldehyde.[10] A VOC factor inclusive of formaldehyde is calculated using the relative emissions of formaldehyde and VOC provided in Table 3.2-2 of AP-42 (version dated July 2000). A VOC factor is calculated as the sum of the factors for all trace organic compounds listed in Table 3.2-2 which are VOCs. Formaldehyde emissions are proportional to VOC emissions, because formaldehyde is a constituent of VOC. The VOC factor is adjusted to account for formaldehyde as follows:

[8] NGT will limit the operation of the emergency engine for maintenance checks and readiness testing to no more than 100 hr/yr as per 40 CFR 60.4243(d)(2), to be defined as an emergency engine under NSPS Subpart JJJJ.

[9] Per Table 1 to Subpart JJJJ of Part 60.

[10] Per footnote "d" of Table 1 to Subpart JJJJ of Part 60.

Equation 1-17:

$$VOC\ EF = \frac{1.0\ g\ VOC\ (without\ formaldehyde)}{bhp-hr} \times \frac{\left(\frac{0.119\ lb\ VOC}{MMBtu}\right)}{\left(\frac{0.119\ lb\ VOC}{MMBtu} - \frac{0.0528\ lb\ formaldehyde}{MMBtu}\right)}$$
$$= 1.79\ \frac{g}{bhp-hr}$$

Vendor-specified power output and fuel consumption for the engine are used to convert the g/bhp-hr factors to a lb/MMBtu emission factor.

NO_X, CO, and VOC factors are derived as follows:

Equation 1-18:

$$NO_x, CO, VOC\ EF = \frac{g}{bhp-hr} \times \frac{lb}{453.6\ g} \times hp \times \frac{hr}{scf\ fuel} \times \frac{1{,}000{,}000\ scf}{MMscf} = \frac{lb}{MMscf}$$

1.3.5.2. Emergency Generator Emission Factors – CH_4 and HAP

CH_4 and HAP emissions are calculated using the VOC emission rate and AP-42 emission factors. Standard emission factors for VOC, CH_4, and HAP from natural gas fired engines are provided in Chapter 3.2 of AP-42. Table 3.2-2 (version dated July 2000) provides emission factors for VOC, CH_4, and HAPs from four stroke lean burn natural gas-fired engines.

Using the same ratio method used to calculate CH_4 and HAP emitted from turbines (detailed in 1.3.1.3), the ratio of CH_4 and HAP emitted from engines is based on the VOC emission rate from NSPS Subpart JJJJ.

1.3.5.3. Emergency Generator Emission Factors – PM_{10}, $PM_{2.5}$, and SO_2

PM_{10} and $PM_{2.5}$ emitted by the emergency generator are calculated based on the emission factors listed in Table 3.2-2 of AP-42 (version dated July 2000) for natural gas fired engines. PM_{10} and $PM_{2.5}$ emission factors are calculated as the sum of the filterable and condensable PM emission factors. The SO_2 emission factor utilized is also obtained from Table 3.2-2 of AP-42.

1.3.5.4. Emergency Generator Emission Factors – CO_2, N_2O, and CO_2e

CO_2 and N_2O emitted by the emergency generator are calculated based on the emission factors listed in 40 CFR 98, Subpart C, Tables C-1 and C-2 (effective January 1, 2014). GHGs emitted from the engine include CO_2, CH_4, and N_2O. CO_2e emissions are calculated using the GWPs provided in Table 1-3.

1.3.6. Miscellaneous Support Equipment

Fugitive emissions and gas releases at the Clyde Compressor Station will occur as a result of the proposed project. The methodologies used to calculate this potential increase are described in the following sections.

1.3.6.1. Emissions from Piping Components

Fugitive emissions from equipment leaks will occur during operation of the Clyde Compressor Station due to the installation of equipment and piping components. While the design is not yet final, component counts were estimated based on data from similar sized compressor stations. Components will include flanges, connectors, valves, open-ended lines, compressor seals, pump seals, etc.

Potential emissions are calculated from the piping components using emission factors from EPA's Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017), Table 2-4 (November 1995) which provides leak emission factors for oil and gas production operations. Gas service factors are used for components in natural gas service, light oil service factors are used for components in pipeline liquids service (e.g. condensate), and heavy oil service factors are used for components in oil service (e.g. oils on-site). Since an emission factor is not provided for leaks from pump seals in heavy oil service in Table 2-4, the average SOCMI without ethylene emission factor for pumps in heavy oil service from Table 2-1 is used to estimate emissions. Annual emissions are conservatively calculated assuming that the components are in continuous gas/liquid/oil service as follows:

Equation 1-19:

$$\text{Total Gas Emissions} = \#\ of\ components \times \frac{\frac{kg}{hr}}{component} \times \frac{8{,}760\ hrs}{yr} \times \frac{1{,}000\ g}{kg} \times \frac{lb}{453.6\ g} \times \frac{2{,}000\ ton}{lb}$$
$$= \frac{tons}{yr}$$

The equation above is used to calculate total fugitive gas emitted from the piping components at the Clyde Compressor Station. Emissions of individual VOCs, GHGs, and HAPs are calculated by multiplying the total fugitive gas emissions from piping components in gas, pipeline liquid, and oil service by the weight percent of each pollutant in gas, pipeline liquids, and oil. Gas, pipeline liquid, and oil compositions are engineering estimates based on available worst case data to be conservative.[11, 12]

1.3.6.2. Emissions from Gas Releases

Gas releases due to periodic blowdown of the new turbine-driven compressor units and other events occur with station operation. The majority of emissions from gas release events are associated with routine operations such as startup and shutdown, reduced pressure demand events, or maintenance activities. The potential volume of gas emitted was estimated in standard cubic feet per year based on the design data for other compressor stations. Emissions of individual VOCs, GHGs, and HAPs are calculated by multiplying the total gas emissions from gas releases by the weight percent of each pollutant in the natural gas compressed at the facility.[13]

[11] Oil is assumed to be 100 percent VOC and contain no GHGs or HAPs. Pipeline liquids composition is based on the composition of residual liquids following flashing, calculated based on a laboratory analysis of flashing from an operation in Atlanta, Texas in April 2009.

[12] Natural gas composition is conservatively estimated based on an extended gas analysis taken from a representative metering station.

[13] Ibid.

1.3.6.3. Emissions from Separator Vessels and Condensate Storage Tanks

Although stabilized condensate has no flashing losses, flashing losses do occur when the pressure of a liquid is decreased or the temperature is increased. At the Clyde Compressor Station, flashing losses occur at pipeline liquids storage tanks and include VOCs, GHGs, and HAPs. Total flashing losses are calculated based on a flash gas rate and a representative flash gas density. The flash gas rate is calculated based on a liquids input rate and a flash factor.[14] Emissions of individual VOCs, GHGs, and HAPs are calculated from total flashing losses using a representative pipeline liquids compositions.

Working and breathing losses occur at all tanks at the Clyde Compressor Station, including pipeline liquid tanks, lubricating oil tanks, and oil-water separators. Working and breathing losses include VOCs, GHGs, and HAPs and are calculated with EPA's TANKS 4.09d program using maximum potential throughputs for each tank.

1.3.6.4. Emissions from Truck Loading

Emissions occur during the loading of volatile organic liquids into tanker trucks and include VOCs, GHGs, and HAPs. Total loading losses are calculated based on calculation methods for submerged filling provided in AP-42 Section 5.2 (version dated January 1995). Emissions of individual VOCs, GHGs, and HAPs are calculated from total loading losses using representative pipeline liquids and lubricating oil compositions.

1.3.6.5. Parts Washer Emissions

NGT is proposing to install a new remote reservoir parts washer. Potential emissions from the parts washer are calculated based on the physical and chemical properties of a worst-case representative solvent used in the parts washer and the maximum throughput of the parts washer. In order to conservatively calculate potential emissions, it is assumed that all volatile organic compounds in the solvent are emitted to the atmosphere and that the VOC content is 100 percent. The maximum throughput of the parts washer will be 120 gallons of solvent per year, based on past experience and the addition of a safety factor. A worst-case specific gravity is assumed based on typical solvents used.

Potential VOC emissions from the parts washer are calculated as follows:

Equation 1-20:

$$VOC = 120\frac{gal\ solvent}{year} \times (0.82\ \times 8.34\frac{lb}{gal})\ \times 1\frac{lb\ VOC}{lb\ solvent} = 0.4103\frac{tons\ VOC}{yr}$$

[14] The liquids input rate is determined based on operator experience with the incorporation of a safety factor, and the flash factor in standard cubic foot per barrel (scf/bbl) was determined in a laboratory analysis of a gas sample taken from Atlanta, Texas.

This section of the permit application includes a discussion of potentially applicable federal and state air quality permitting and regulatory requirements.

2.1. FEDERAL REGULATORY APPLICABILITY

2.1.1. Prevention of Significant Deterioration Applicability

The applicability of the Prevention of Significant Deterioration (PSD) permitting program is evaluated for proposed construction, reconstruction, and modification projects that result in an emission increase of a regulated New Source Review (NSR) pollutant for which the area is in attainment with the National Ambient Air Quality Standards (NAAQS). Sandusky County has been designated as "attainment" or "unclassifiable" for all regulated NSR pollutants.[15] Natural gas compressor stations are not among the 28 listed source categories in OAC 3745-31-01(NNN)(2)(a); therefore the facility is subject to the PSD major source threshold of 250 tpy provided in OAC 3745-31-01(NNN)(2)(b). As shown in Table 1-1, the proposed Clyde Compressor Station will be a minor source of criteria pollutants with respect to the PSD permitting program.

2.1.2. GHG Tailoring Rule Applicability

Additionally, the final PSD and Title V Greenhouse Gas (GHG) Tailoring Rule was published in the Federal Register on June 3, 2010 (75 FR 31514) but was ultimately overturned on June 23, 2014 by the US Supreme Court.[16] Under the formerly effective rule, GHGs could, as of July 1, 2011, become "subject to regulation" under the PSD program for construction projects that would result in potential GHG emissions of 100,000 tpy carbon dioxide equivalents (CO_2e) or more. However, the June 23, 2014 Supreme Court Decision clarifies that construction projects cannot trigger major NSR for GHGs unless major NSR is otherwise triggered for criteria pollutants.[17] Furthermore, in accordance with OAC 3745-31-34(C)(2), Ohio EPA's permit to install permitting requirements for GHGs cease to be effective if a federal court issues a ruling limiting the administrator's authority to regulate GHGs under the Clean Air Act.

[15] Attainment designations for Ohio counties are established in 40 CFR 81.336.

[16] As defined in 40 CFR 98.6, regulated GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).

[17] On June 23, 2014, the U.S. Supreme Court issued its decision in *Utility Air Regulatory Group v. EPA* (No. 12-1146). The Court said that EPA may not treat greenhouse gases as an air pollutant for purposes of determining whether a source is a major source required to obtain a PSD or Title V permit. The Court also said that PSD permits that are otherwise required (based on emissions of other pollutants) may continue to require limitations on greenhouse gases emissions based on the application of Best Available Control Technology (BACT). EPA is currently evaluating the implications of the Court's decision and awaiting further action by the U.S. Courts. [adapted from 7/24/14 letter from Janet G. McCabe, U.S. EPA, Acting Administrator, to Regional Administrators, "Next Steps and Preliminary Views on the Application of Clean Air Act Permitting Programs to Greenhouse Gases Following the Supreme Court's Decision in *Utility Air Regulatory Group v. Environmental Protection Agency*].

2.1.2.1. Ohio EPA GHG Permitting Status

On June 23, 2014, the U.S. Supreme Court issued a decision addressing stationary source permitting requirements for greenhouse gases (GHGs).[18] Subsequently, on July 24, 2014, Janet McCabe, Acting Assistant Administrator, Office of Air and Radiation, U.S. EPA issued preliminary guidance concerning the impact of the decision on various aspects of the court decision.[19] The Supreme Court decision and subsequent U.S. EPA guidance changes how Ohio EPA permits GHG sources. Ohio EPA has issued Engineering Guide #85 that discusses the revised approach Ohio EPA will use to regulate GHGs through the air pollution permitting program.[20] Therefore, emission of GHGs do not trigger permitting for the proposed project.

2.1.3. Title V Operating Permit Program Applicability

The Title V operating permit program consolidates state and federal requirements applicable to major sources into a single comprehensive operating permit for the purposes of facilitating ongoing compliance. In accordance with OAC 3745-77, sources with a PTE of 100 tpy or more for criteria pollutants, 25 tpy or more for total HAP, or 10 tpy or more for individual HAP are considered major sources for which applicants must obtain a Title V operating permit.

As mentioned previously, the final PSD and Title V Greenhouse Gas (GHG) Tailoring Rule was published in the Federal Register on June 3, 2010 (75 FR 31514) but was ultimately overturned on June 23, 2014 by the U.S. Supreme Court. Under the formerly effective rule, GHGs could, as of July 1, 2011, become "subject to regulation" under the Title V program for facilities that have a GHG potential to emit of 100,000 tpy CO_2e or more.

U.S. EPA has since issued guidance following the U.S. Supreme Court ruling indicating that, "EPA will no longer apply or enforce federal regulatory provisions or provisions of the EPA-approved title V programs that require a stationary source to obtain a title V permit solely because the source emits or has the potential to emit greenhouse gases above the major source thresholds." EPA also clarifies in this guidance that, "The EPA also does not intend to continue applying regulations that would require title V programs submitted for approval by the EPA to require that such sources obtain title V permits."[21]

Furthermore, in accordance with OAC 3745-77-11(D)(2), Ohio EPA's Title V permitting requirements for greenhouse gases cease to be effective if a federal court issues a ruling limiting the administrator's authority to regulate greenhouse gases under the Clean Air Act. **As a result, the GHG PTE for Clyde Compressor Station cannot trigger major source applicability under the Title V permitting program.**

Finally, Table 1-1 shows that facility-wide emissions will not exceed Title V thresholds for criteria pollutants or HAP; therefore, NGT is not required to obtain a Title V operating permit for the Clyde Compressor Station.

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[18] http://www.supremecourt.gov/opinions/13pdf/12-1146_4g18.pdf

[19] http://www.epa.gov/nsr/documents/20140724memo.pdf

[20] A copy of this guidance can be found on the web at: http://epa.ohio.gov/dapc/engineer/eguides.aspx.

[21] U.S. EPA memorandum from Ms. Janet G. McCabe to U.S. EPA Regional Administrators dated July 24, 2014.

2.1.4. New Source Performance Standards

NSPS require new, modified, or reconstructed sources in specified source categories to control emissions to the level achievable by the best demonstrated technology as specified in the applicable provisions. Any source subject to an NSPS is also subject to the general provisions of NSPS Subpart A, except as noted.

2.1.4.1. 40 CFR 60, Subpart A - General Provisions – Applicable

All affected sources subject to source specific NSPS are subject to the general provisions of NSPS Subpart A unless specifically excluded by the source-specific NSPS. Subpart A requires initial notification, performance testing, recordkeeping and monitoring, provides reference methods, and mandates general control device requirements for all other subparts as applicable.

2.1.4.2. 40 CFR 60, Subpart D – Fossil-Fuel-Fired Steam Generators – Not Applicable

NSPS Subpart D applies to fossil fuel-fired steam generating units with a heat input capacity greater than or equal to 250 MMBtu/hr that have been constructed or modified since August 17, 1971. The rule defines a fossil fuel-fired steam generating unit as:[22]

> *A furnace or boiler used in the process of burning fossil fuel for the purpose of producing steam by heat transfer.*

The combustion turbine will not be subject to Subpart D, because:

1. The turbine has a heat input capacity less than 250 MMBtu/hr;
2. The turbine does not burn fossil fuel for the purpose of producing steam; and

Per 40 CFR 60.40(e), units that are subject to 40 CFR 60 Subpart KKKK, which includes the Clyde Compressor Station's combustion turbines, are not subject to 40 CFR 60 Subpart D.

2.1.4.3. 40 CFR 60, Subpart Da – Electrical Utility Steam Generating Units – Not Applicable

This regulation applies to electric utility steam generating units with a heat input capacity greater than 250 MMBtu/hr for which construction, reconstruction, or modification commenced after September 18, 1978. Since the NEXUS Gas Transmission combustion turbine will neither generate steam nor produce electricity for sale to the grid, and since each turbine will have a heat input capacity less than 250 MMBtu/hr, the unit is not subject to Subpart Da. Furthermore, per 40 CFR 60.40Da(e)(1) units that meet the applicability requirements of and are subject to 40 CFR 60 Subpart KKKK, which includes the Clyde Compressor Station combustion turbine, are not subject to 40 CFR 60 Subpart Da.

[22] 40 CFR 60.41

2.1.4.4. 40 CFR 60, Subpart Db - Industrial Commercial – Institutional Steam Generating Units – Not Applicable

NSPS Subpart Db provides standards for steam generating units with a heat input capacity greater than 100 MMBtu/hr that commenced construction, reconstruction, or modification after June 19, 1984. The term "steam generating unit" is defined under this regulation as:[23]

> *A device that combusts any fuel and produces steam or heats water or any other heat transfer medium.*

The combustion turbine will have a heat input capacity greater than 100 MMBtu/hr; however, as previously stated, the units are not steam generating units. Furthermore, per 40 CFR 60.40b(i) units that meet the applicability requirements of 40 CFR 60 Subpart KKKK, which includes the Clyde Compressor Station's combustion turbines, are not subject to 40 CFR 60 Subpart Db.

2.1.4.5. 40 CFR 60, Subpart Dc – Small Industrial-Commercial-Institutional Steam Generating Units – Not Applicable

NSPS Subpart Dc applies to steam generating units for which construction, modification, or reconstruction is commenced after June 9, 1989 and that have a maximum design heat input capacity of greater than or equal to 10 MMBtu/hr and less than or equal to 100 MMBtu/hr. The Process Heater (B001) is sized to a maximum heat input capacity less than 10 MMBtu/hr. As such, Subpart Dc is not applicable.

2.1.4.6. 40 CFR 60, Subpart Kb – Volatile Organic Liquid Storage Vessels Constructed, Reconstructed, or Modified after July 23, 1984 – Not Applicable

Affected sources under 40 CFR 60, Subpart Kb (NSPS Kb) include all storage vessels with capacities of at least 75 cubic meters (m^3) (19,813 gallons) storing volatile organic liquids (VOL) constructed, reconstructed, or modified after July 23, 1984.

The Separator Vessels #1-5 (P004-P008) and the Storage Vessels #1-3 (T001-T003) are each sized to a nominal storage capacity less than 19,813 gallons; therefore, Subpart Kb is not applicable.

2.1.4.7. 40 CFR 60, Subpart GG – Stationary Gas Turbines – Not Applicable

NSPS Subpart GG applies to combustion turbines constructed or modified after October 3, 1977 with heat input equal to or greater than 10 MMBtu/hr based on lower heating value. However, NSPS Subpart GG has been superseded by a newer subpart (KKKK) that exempts subject units from NSPS Subpart GG [40 CFR 60.4305(b)]. The proposed combustion turbine at the Clyde Compressor Station is subject to the requirements of NSPS KKKK (refer to the discussion in Section 2.1.4.11 below) and is, therefore, exempt from NSPS Subpart GG.

[23] 40 CFR 60.41b

2.1.4.8. 40 CFR 60, Subpart KKK – Equipment Leaks of VOC from Onshore Natural Gas Processing Plants – Not Applicable

NSPS Subpart KKK applies to equipment leaks from natural gas processing plants that were constructed after June 20, 1984 but before August 23, 2011. The facility is not a natural gas processing plant (as defined in 40 CFR 60.631). Therefore, this subpart does not apply.

2.1.4.9. 40 CFR 60, Subpart LLL – SO_2 Emissions from Onshore Natural Gas Processing Plants – Not Applicable

NSPS Subpart LLL applies to onshore natural gas processing facilities that contain sweetening units that commence construction or modification after January 20, 1984. The Clyde Compressor Station is not a natural gas processing plant and will not contain any sweetening units, as defined in 40 CFR 60.641, and therefore is not subject to this subpart.

2.1.4.10. 40 CFR 60, Subpart JJJJ – Spark Ignition Internal Combustion Engines – Applicable

NSPS Subpart JJJJ establishes requirements for owners or operators of spark ignition internal combustion engines that commence construction, modification, or reconstruction after June 12, 2006 (the date the engine is ordered constitutes construction). The spark ignition internal combustion engine (P002) used at this facility will be considered an emergency stationary internal combustion engine, as defined by 40 CFR 60.4248, and will be constructed and manufactured after the dates mentioned above; therefore, it is subject to the provisions of NSPS Subpart JJJJ.

Per 40 CFR 60.4233(e) the unit will meet the emission standards specified in Table 1 of Subpart JJJJ. NGT will ensure that the engine satisfies the monitoring requirements specified in 40 CFR 60.4237(a) by installing a non-resettable hour meter. NGT will also ensure that the Emergency Generator (P002) satisfies the compliance requirements for periodic testing and maintenance specified in 40 CFR 60.4243(b)(2), the operational restrictions for emergency engines in 40 CFR 60.4243(d), and the notification, reporting and recordkeeping requirements specified in 40 CFR 60.4245.

2.1.4.10.1. *Emission Limits*

The emergency generator will be subject to the following emissions standards from Table 1 of Subpart JJJJ (emergency engines greater than 130 hp):[24]

- NO_X: 2.0 g/hp-hr or 160 ppmvd @15% O_2
- CO: 4.0 g/hp-hr or 540 ppmvd @15% O_2
- VOC: 1.0 g/hp-hr or 86 ppmvd @15% O_2

2.1.4.10.2. *Testing*

NGT will comply with the requirements for a non-certified generator pursuant to 40 CFR 60.4243(a)(2)(iii), including conducting an initial performance test within one year of startup and subsequent tests every 8,760 hours or three (3) years, whichever comes first. 40 CFR 60.4245(d) requires the submittal of a copy of the performance test within 60 days of its completion.

[24] 40 CFR 60.4233(e) Emission standards for operators of stationary SI ICE with a maximum engine power greater than 100 HP

2.1.4.10.3. *Monitoring, Recordkeeping, and Reporting*

Since the engine will be used as an emergency generator, a non-resettable hour meter is required.[25] Per 40 CFR 60.4243(d), emergency engines are allowed to be operated according to the following time constraints:

There is no time limit on use in emergency situations.
The emergency ICE can operate for up to 100 hours per year total for the following reasons:

- Maintenance checks and readiness testing, provided that the tests are recommended by federal, state, or local government, the manufacturer, the vendor, the regional transmission organization or equivalent balancing authority and transmission operator, or the insurance company associated with the engine;
- Emergency demand response for periods specified in 40 CFR 60.4243(d)(2)(ii); and
- Periods where there is a deviation of voltage or frequency of 4 percent or greater below standard voltage or frequency.

The emergency ICE can operate for up to 50 hours per year in non-emergency situations. The 50 hours of operation in non-emergency situations are counted as part of the 100 hours per year for maintenance and testing and emergency demand response described in the previous bullet point.

NGT will track the engine's run time and the reason for use in order to demonstrate compliance with the run time requirements.[26]

Initial notification is required for this engine, which is a non-certified RICE greater than 500 hp[27]. Since performance testing is required, advanced notification and results reporting are required, in addition to semiannual compliance reports.

2.1.4.11. 40 CFR 60, Subpart KKKK – Stationary Combustion Turbines – Applicable

NSPS Subpart KKKK applies to combustion turbines constructed, modified, or reconstructed after February 18, 2005 with heat input equal to or greater than 10 MMBtu/hr based on the higher heating value of the fuel [40 CFR 60.4305(a)]. The proposed combustion turbine for the Clyde Compressor Station has a heat input greater than 10 MMBtu/hr. Therefore, the combustion turbine is subject to NSPS Subpart KKKK. As provided in 40 CFR 60.4305(b), the combustion turbine is exempt from NSPS Subpart GG. The applicable requirements for each pollutant are outlined in the following subsections.

2.1.4.11.1. *NO_X Emission Limits*

Units subject to the requirements of Subpart KKKK must meet the emissions standards listed in Table 1 of the subpart [40 CFR 60.4320(a)]. New turbines firing natural gas with a heat input capacity greater than 50 MMBtu/hr and less than 850 MMBtu/hr are required to limit NO_X emissions to less than 25 ppm at 15 percent (%) O_2 [Table 1 to Subpart KKKK of Part 60]. The proposed combustion turbine at the Clyde

[25] 40 CFR 60.4237(a)

[26] 40 CFR 60.4245(b)

[27] 40 CFR 60.4245(c)

Compressor Station is designed with maximum NO_X emissions of 9 ppm at 15% O_2, which is lower than the applicable NSPS emission limits.

- NO_X Emissions:[28,29]
  - 25 ppm at 15% O_2; OR
  - 150 ng/J (1.2 lb/MWh) of useful output

2.1.4.11.2. *SO_2 Emission Limits*

In accordance with 40 CFR 60.4330(a), each combustion turbine must comply with one of the following:

1. Limit emissions to less than 110 nanograms per Joule (ng/J) of SO_2 (0.90 lb/MWh) gross output; or
2. Burn fuel which contains total potential sulfur emissions equal to or less than 26 ng/J of SO_2 (0.060 lb/MMBtu HHV) heat input.

The SO_2 limits will be met by firing only pipeline quality natural gas in the combustion turbine, which will satisfy the requirements of 40 CFR 60.4330(a)(2).

2.1.4.11.3. *Monitoring and Testing Requirements*

Pursuant to 40 CFR 60.4333(a), the new turbine, the air pollution control equipment, and the monitoring equipment will be maintained in a manner that is consistent with good air pollution control practices for minimizing emissions. This requirement applies at all times including during startup, shutdown, and malfunction.

Since the turbines will not be equipped with water or steam injection, NGT will perform the required initial and annual performance testing to demonstrate compliance with the NO_X emission limit.[30] If the results of a NO_X performance test are under 75% of the NO_X emissions limits, then the Clyde Compressor Station will only be required to perform the performance tests for that turbine every two years (no more than 26 calendar months following the previous performance test), provided that subsequent performance test results are less than 75% of the emission limit. If the results of subsequent performance tests indicate NO_X emissions greater than 75% of the limit, then annual performance testing for NO_X will resume.[31] The Clyde Compressor Station may also choose to install, calibrate, and maintain continuous emissions monitoring systems (CEMS) for NO_X on the turbines and operate them in accordance with NSPS Subpart A and Subpart KKKK, in which case NO_X performance testing will not be required.[32] However, at this time the Clyde Compressor Station elects not to install CEMS and plans to verify compliance using stack tests.

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[28] 40 CFR 60.4320(a) and Table 1 to Subpart KKKK

[29] Subpart KKKK, Table 1 also includes a NO_X limit of 150 ppmvd at 15% O_2 or 8.7 lb/MWh for turbine operation at temperatures less than 0°F and turbine operation at loads less than 75% of peak load which the new turbine will meet.

[30] Per 40 CFR 60.8(a), the initial NO_X performance tests for the new/modified turbines are required to be conducted within 60 days after achieving the maximum production rate (i.e. the turbine's maximum rated heat output), but no later than 180 days after initial startup.

[31] 40 CFR 60.4340(a)

[32] 40 CFR 60.4340(b)(1)

For compliance with the SO_2 emission limit, facilities are required to perform regular determinations of the total sulfur content of the combustion fuel and to conduct initial and annual compliance demonstrations. The total sulfur content of gaseous fuel combusted in the turbines must be determined and recorded once per operating day or using a custom schedule as approved by Ohio EPA;[33] however, the Clyde Compressor Station can elect to opt out of this provision of the rule by using a fuel that is demonstrated not to exceed potential sulfur emissions of 0.060 lb/MMBtu SO_2.[34] This demonstration can be made using one of the following methods:

1. By using a purchase contract specifying that the fuel sulfur content for the natural gas is less than or equal to 20 grains of sulfur per 100 standard cubic feet and results in potential emissions not exceeding 0.060 lb/MMBtu.
2. By using representative fuel sampling data which show that the sulfur content of the fuel does not exceed 0.060 lb SO_2/MMBtu heat input. At a minimum, the amount of fuel sampling data specified in Section 2.3.1.4 or 2.3.2.4 of Appendix D to Part 75 is this chapter is required.

Pursuant to 40 CFR 60.4365(a), in order to demonstrate continuous compliance with the applicable 0.060 lb/MMBtu potential SO_2 emissions limit, the Clyde Compressor Station, will obtain a current tariff sheet for the fuel specifying that the maximum total sulfur content for natural gas use is 20 grains of sulfur or less per 100 scf and potential sulfur emissions are less than 26 ng SO_2/J (0.060 lb SO_2/MMBtu) heat input for continental areas.

2.1.4.11.4. *Reporting Requirements*

Pursuant to 40 CFR 60.4375(b), since the Clyde Compressor Station will be conducting annual performance testing in accordance with 40 CFR 60.4340(a), a written report of the results of each performance test will be submitted to Ohio EPA and the USEPA before the close of business on the 60th day following the completion of the performance test.

Per 40 CFR 60.7(a)(1), the Clyde Compressor Station will submit notification of the date construction of each new turbines commenced. The submittal will be postmarked by no later than 30 days after the commencement of construction date. Per 40 CFR 60.7(a)(3), the submittal of the notification of the actual date of initial startup of each new turbine will be postmarked by no later than 15 days after the initial startup date.

2.1.4.12. 40 CFR 60, Subpart KKKK – Stationary Combustion Turbines – Proposed Amendments - Applicable

On August 29, 2012, U.S. EPA published proposed amendments to the Standards of Performance for Stationary Combustion Turbines established in 40 CFR 60, Subpart KKKK (NSPS KKKK).[35] These proposed amendments have yet to be finalized and are not currently effective, but because the effective date will be established as the proposal date (i.e., August 29, 2012) once finalized, the following section evaluates the applicability of the amended standards of NSPS KKKK. NGT requests that the PTIO for the Clyde Compressor Station include language acknowledging the proposed amendments to NSPS KKKK and

[33] 40 CFR 60.4370(b) and (c)

[34] 40 CFR 60.4365

[35] 77 FR 52564

clarifying that the affected combustion turbine will comply with the final effective requirements of NSPS KKKK upon promulgation.

According to the amended provisions of 40 CFR 60.4305(a), affected sources under NSPS KKKK include stationary combustion turbines constructed, modified, or reconstructed after February 18, 2005, rated at a heat input of at least 10 MMBtu/hr. The proposed combustion turbine for the Clyde Compressor Station will have a heat input greater than 10 MMBtu/hr. Therefore, the combustion turbine is subject to NSPS Subpart KKKK. The applicable requirements for each pollutant are outlined in the following subsections.

2.1.4.12.1. *NO_X Emission Limits*

In accordance with the amended standards of 40 CFR 60.4320(a) and (c), NGT must identify for each hour of operation the NO_X emission standard applicable to new mechanical drive turbines firing only natural gas with a heat input capacity greater than 50 MMBtu/hr as provided in Table 2-1. These NO_X limits are applicable to the combustion turbine during all periods of operation including startups, shutdowns, and malfunctions as specified in 40 CFR 60.4320(e).

Table 2-1. NO_X Emission Standards for Various Operating Scenarios

Operating Scenario	Heat Input Limit (lb/MMBtu)	NO_X Conc. Limit (ppmvd)
At least 75% of base load	0.093	25
Less than 75% of base load or during Startup or Shutdown	0.59	150

a. These limits are established in Table 1 of the proposed amendments to NSPS KKKK.

NGT will not use water injection, steam injection, or post-combustion controls to reduce NO_X emissions from the combustion turbine. Therefore, in accordance with 40 CFR 60.4333(c)(2) and 4340(a)(1), NGT will demonstrate compliance with the applicable emissions limitation by conducting stack tests pursuant to the requirements of 40 CFR 60.4333(b) and 4400. The required frequency of stack tests will depend on the result of the initial test.

2.1.4.12.2. *SO_2 Emission Limits*

In accordance with 40 CFR 60.4330(a) and (g), the combustion turbine must comply with one of the following:

1. Limit emissions to less than 110 ng/J of SO_2 (0.90 lb/MWh) gross output; or
2. Burn fuel which contains total potential sulfur emissions equal to or less than 26 ng/J of SO_2 (0.060 lb/MMBtu HHV) heat input.

NGT may establish compliance by either monitoring the total sulfur content of the fuel in accordance with 40 CFR 60.4360 and 60.4365 or demonstrate that the natural gas does not exceed 0.060 lb SO_2/MMBtu heat input using one of the methods identified in 40 CFR 60.4370.

If NGT elects to demonstrate compliance with the SO_2 limitations using the procedures in 40 CFR 60.4370, personnel at the Clyde Compressor Station must maintain on-site records (e.g., purchase contracts, tariff sheets, or transportation contracts) documenting that the total sulfur content of the natural gas combusted in the turbines does not exceed 0.060 lb/MMBtu or must maintain representative fuel sampling data collected in accordance with Section 2.3.1.4 or 2.3.2.4 in Appendix D to 40 CFR 75 documenting that the fuel meets the requirements to be considered either pipeline natural gas or natural gas.

2.1.4.13. 40 CFR 60, Subpart OOOO – Crude Oil and Natural Gas Production, Transmission, and Distribution – Not Applicable

NSPS Subpart OOOO establishes emission standards and compliance schedules for the control of VOC and SO_2 emissions from affected facilities that commence construction, modification or reconstruction after August 23, 2011. Affected facilities include certain units and operations located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment. "Custody transfer" is defined under 40 CFR 60.5430 as the transfer of natural gas after processing and/or treatment in the producing operations, or from storage vessels or automatic transfer facilities or other such equipment, including product loading racks, to pipelines or any other forms of transportation. "Natural gas transmission" is defined under 40 CFR 60.5430 as the pipelines used for long distance transport of natural gas (excluding processing). Specific equipment used in natural gas transmission includes the land, mains, valves, meters, boosters, regulators, storage vessels, dehydrators, compressors, and their driving units and appurtenances, and equipment used for transporting gas from a production plant, delivery point of purchased gas, gathering system, storage area, or other wholesale source of gas to one or more distribution area(s). NGT will gain custody of natural gas from production operations, or at "the point of custody transfer." NGT and its operations, including the Clyde Compressor Station, will be located in the natural gas transmission segment.[36]

Affected facilities include storage vessels located in the natural gas transmission and storage segment that have the potential for VOC emissions equal to or greater than 6 tpy per 40 CFR 60.5365(e). This requirement specifies that,

> *"The potential for VOC emissions must be calculated using a generally accepted model or calculation methodology, based on the maximum average daily throughput determined for a 30-day period of production prior to the applicable emission determination deadline specified in this section. The determination may take into account requirements under a legally and practically enforceable limit in an operating permit or other requirement established under a Federal, State, local or tribal authority."*

The Separator Vessels #1-5 (P004-P008) and the Storage Vessels #1-3 (T001-T003) each will have an annual potential to emit VOC that is less than 6 tpy, and are therefore not subject to the requirements of this subpart.

2.1.4.14. Non-Applicability of All Other NSPS

NSPS standards are developed for particular industrial source categories and the applicability of a particular NSPS to a facility can be readily ascertained based on the industrial source category covered. All other NSPS are categorically not applicable to the proposed project.

2.1.5. National Emission Standards for Hazardous Air Pollutants

NESHAPs, located in 40 CFR 63, are typically applicable to specific categories of sources that have the potential to emit HAP in levels greater than 10 tpy for any individual HAP or 25 tpy for any combination of HAP (i.e., major HAP sources). Emissions and operational limitations provided in the NESHAPs are established on the basis of a Maximum Achievable Control Technology (MACT) determination for a particular major source category.

Furthermore, generally available control technology (GACT)-based NESHAPs (located in 40 CFR 63) require area (i.e., non-major) sources to control emissions to the level achievable by the use of generally available control technologies or management practices to reduce emissions of HAP.

The Clyde Compressor Station will operate as an area (i.e., non-major) source of HAP as demonstrated in Table 1-1. Each potentially applicable subpart of 40 CFR Part 63 is discussed in the subsections below.

2.1.5.1. 40 CFR 63, Subpart A – General Provisions - Applicable

NESHAP Subpart A, *General Provisions*, contains national emission standards for HAP defined in Section 112(b) of the Clean Air Act. All affected sources, which are subject to another NESHAP, are subject to the general provisions of NESHAP Subpart A, unless specifically excluded by the source-specific NESHAP.

2.1.5.2. 40 CFR 63, Subpart T – Halogenated Solvent Cleaning – Not Applicable

NESHAP Subpart T is applicable to the use of halogenated solvent cleaners at both major and area sources of HAP. The parts washer will not use solvent cleaners containing halogens. Therefore, NESHAP Subpart T does not apply.

2.1.5.3. 40 CFR 63, Subpart HH – Oil and Natural Gas Production Facilities – Not Applicable

MACT Subpart HH applies to emission points at oil and natural gas production facilities that are HAP major or HAP area sources and that process, upgrade, or store either hydrocarbon liquids or natural gas prior to the point of custody transfer. For area sources, the affected source includes each triethylene glycol (TEG) dehydration unit located at a facility that meets the criteria specified in paragraph (a) of the regulation. Also, the natural gas production facility to which the rule applies ends at the point that the natural gas enters a facility in the natural gas transmission and storage category per 63.760(a)(3). The Clyde Compressor Station will not operate a TEG dehydration unit and the station is considered a natural gas transmission and storage facility; therefore, NESHAP Subpart HH does not apply.

2.1.5.4. 40 CFR 63, Subpart HHH – Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities – Not Applicable

MACT Subpart HHH applies to natural gas transmission and storage facilities that transport or store natural gas prior to entering the pipeline to a local distribution company or to a final end user and are major

sources of HAP emissions. The proposed Clyde Compressor Station is an area source for HAP; therefore this subpart is not applicable.

2.1.5.5. 40 CFR 63, Subpart YYYY – Stationary Combustion Turbines – Not Applicable

MACT Subpart YYYY establishes emission limitations and operating limits for HAP emissions from stationary combustion turbines located at major sources of HAP. The proposed Clyde Compressor Station is not a major source of HAP; therefore the combustion turbine at the Clyde Compressor Station is not subject to Subpart YYYY.

2.1.5.6. 40 CFR 63, Subpart ZZZZ – Reciprocating Internal Combustion Engines (RICE) – Applicable

The NESHAP found in 40 CFR 63, Subpart ZZZZ (RICE NESHAP) was designed to regulate emissions from stationary reciprocating internal combustion engines at both major and area sources of hazardous air pollutants. The proposed emergency generator engine is classified as a new RICE because it will be constructed after June 12, 2006 and located at an area source of HAP [40 CFR 63.6590(a)(2)(iii)]. Subpart ZZZZ requires all new spark-ignition RICE located at an area source of HAP to comply with NSPS Subpart JJJJ with no additional applicable requirements under the RICE NESHAP [40 CFR 63.6590(c)(1)]. The Emergency Generator (P002) will meet the requirements under the RICE NESHAP by complying with NSPS Subpart JJJJ for spark ignition RICE (refer to the discussion in Section 2.1.4.10).

2.1.5.7. 40 CFR 63, Subpart DDDDD – Industrial, Commercial, and Institutional Boilers and Process Heaters at Major Sources of HAP Emissions – Not Applicable

MACT Subpart DDDDD establishes emission limits, operational standards, and compliance demonstration requirements for HAP emissions from industrial, commercial, and institutional boilers and process heaters at major sources of HAP emissions. The Clyde Compressor Station is not a major source of HAP emissions; therefore, this regulation is not applicable.

2.1.5.8. 40 CFR 63, Subpart JJJJJJ – Industrial, Commercial, and Institutional Boilers at Area Sources of HAP Emissions – Not Applicable

The provisions of 40 CFR 63, Subpart JJJJJJ establish emission limits, operational standards, and energy assessment requirements for HAP emissions from industrial, commercial, and institutional boilers at area sources of HAP emissions. According to 40 CFR 63.11194(a)(2), affected sources include the collection of all new industrial, commercial, and institutional boilers within a subcategory (e.g., coal, biomass, oil). Furthermore, Subpart JJJJJJ specifically excludes natural gas fired boilers [40 CFR 63.11195(e)]. The proposed Process Heater (B001) is a natural gas fired catalytic style heater and does not meet the definition of industrial, commercial, or institutional boilers as defined in 40 CFR 63.11237; therefore, this regulation is not applicable.

2.1.5.9. Non-Applicability of All Other NESHAP

NESHAP standards are developed for particular industrial source categories, and the applicability of a particular NESHAP to a facility can be readily ascertained based on the industrial source covered. All other NESHAP are categorically not applicable to the proposed project.

2.2. STATE REGULATORY APPLICABILITY

2.2.1. OAC 3745-17-07 – Control of Visible Particulate Emissions from Stationary Sources - *Applicable*

OAC 3745-17-07(A) limits visible particulate emissions from all stacks to less than 20 percent opacity, as a 6-minute average, except during periods of startup, shutdown, and malfunction. However, visible emissions may exceed 20 percent opacity, as a 6-minute average, but not for more than 6 consecutive minutes in any 1-hour period. Visible emissions may not exceed 60 percent opacity, as a 6-minute average, at any time. The exhaust stacks associated with the Combustion Turbine (P001) and Emergency Generator (P002) will be subject to this visible emissions standards.

2.2.2. OAC 3745-17-10 – Restrictions on Particulate Emissions from Fuel Burning Equipment – *Not Applicable*

Pursuant to OAC 3745-17-10(A), OAC 3745-17-10 applies to facilities in which fuel, including any product or by-product of a manufacturing process, is burned for the primary purpose of producing heat or power by indirect heat transfer. The proposed Combustion Turbine (P001) and Emergency Generator (P002) will not be subject to the requirements of this rule given that these units do not produce heat or power by indirect heat transfer.

2.2.3. OAC 3745-17-11 – Restrictions of Particulate Emissions from Industrial Processes - *Applicable*

The emission limits of OAC 3745-17-11 apply to any operation, process, or activity that releases or may release particulate emissions into the ambient air. Pursuant to OAC 3745-17-11(B)(4), particulate emission from any stationary gas turbine shall not exceed 0.04 pounds per million British thermal units (lb/MMBtu) of actual heat input. Combustion Turbine (P001) will be subject to this emissions standard.

Additionally, OAC 3745-17-11(B)(5)(b) limits particulate emissions from large (i.e., greater than 600 hp) stationary internal combustion engines to 0.062 lb/MMBtu of heat input. The Emergency Generator (P002) will be subject to this emissions standard.

2.2.4. OAC 3745-18-06 – General SO_2 Emission Limit Provisions – *Not Applicable*

The emission limits of OAC 3745-18-06 apply to any operation, process, or activity that releases or may release SO_2 emissions into the ambient air. Per OAC 3745-18-06(A), stationary gas turbines and stationary IC engines are exempt from OAC 3745-18-06(D), (F), and (G) during any calendar day in which natural gas is the only fuel burned. The proposed Combustion Turbine (P001) and Emergency Generator (P002) will burn pipeline quality natural gas only, and are therefore exempt from the requirements of OAC 3745-18-06.

2.2.5. OAC 3745-21-09(L) – Storage of Petroleum Liquids in Fixed Roof Tanks – *Not Applicable*

The provisions of OAC 3745-21-09(L) prohibit the storage of any petroleum liquid with a true vapor pressure (TVP) greater than 1.52 actual pounds per square inch (psia) in fixed roof tanks unless such tanks meet the specified design requirements. Fixed roof tanks with capacities less than 40,000 gallons are exempt from the requirements of OAC 3745-21-09(L)(1) pursuant to OAC 3745-21-09(L)(2)(a). The Separator Vessels #1-5 (P004-P008) and the Storage Vessels #1-3 (T001-T003) are each sized to a nominal storage capacity less than 40,000 gallons. Therefore, OAC 3741-21-09(L) is not applicable.

2.2.6. OAC 3745-21-21 – Storage of Volatile Organic Liquids in Fixed Roof Tanks and External Floating Roof Tanks – *Not Applicable*

The Clyde Compressor Station is not located in any of the counties affected by this rule; therefore, the storage vessels are not subject to the standards of OAC 3745-21-21.

2.2.7. OAC 3745-110-03 – RACT Requirements and/or Limitations for Emissions of NO_X from Stationary Sources - *Applicable*

The emission limitations in OAC 3745-110-03 apply to any new stationary source of NO_X emissions that meets the conditions in OAC 3745-110-02(A)(2). The Combustion Turbine (P001) and Emergency Generator (P002) will be new stationary sources that meet the conditions in OAC 3745-110-02(A)(2).

In accordance with OAC 3745-110-03(K)(2), the Emergency Generator (P002) will be exempt from the emission standards of OAC 3745-110-03 given that NGT will maintain a monthly log of emergency and non-emergency operating hours per month.

Additionally, the emission limitation applicable to the Combustion Turbine (P001) under standards of NSPS KKKK is more stringent than the limit established in OAC 3745-110-03(E)(1)(c). Therefore, NGT will comply with the requirements of NSPS KKKK applicable to P001 rather than the standards of OAC 3745-110-03 pursuant to OAC 3745-110-02(A)(2)(b).

Pursuant to the provisions added to Ohio Revised Code (ORC) 3704 as a result of Senate Bill 265, sources modified or constructed after August 3, 2009, are to have rule-based best available technology (BAT) limits established by Ohio EPA for specific source categories. However, Ohio EPA has yet to promulgate the rule-based BAT limits. To address this regulatory gap, the Ohio EPA's Division of Air Pollution Control (DAPC) released a memo (February 2014 Memo) indicating that permits filed on or after August 3, 2009, must go through an interim case-by-case BAT procedure.[37]

The first step in determining BAT, according to the February 2014 Memo, is to review MACT, GACT, BACT, and LAER applicability. The next step is to determine whether the operations are of the type and size that are regulated by Reasonable Available Control Technology (RACT) requirements for VOC emissions.

The third step in the BAT analysis is to determine BAT on a case-by-case basis by: 1) reviewing past BAT determinations, and 2) determining the format for the BAT limit, which should be expressed in one of the following ways:

(1) Work practices;
(2) Source design characteristics or design efficiency of applicable air contaminant control devices;
(3) Raw material specifications or throughput limitations averaged over a 12-month rolling period; or
(4) Monthly allowable emissions averaged over a 12-month rolling period.

Furthermore, the existing "less than 10 tpy" BAT exemption pursuant to OAC 3745-31-05(A)(3)(a)(ii) is not currently approved as part of Ohio's State Implementation Plan (SIP). Ohio EPA is currently in the process of revising the procedures for specifying BAT for sources that have potential emissions less than 10 tpy. In the interim, Ohio EPA is establishing BAT for these sources based on the guidance presented in the February 2014 memo.[38]

3.1. COMBUSTION TURBINES BAT

The Combustion Turbine (P001) is expected to generate emissions of gaseous pollutants (e.g., CO, VOC, NO_X, and SO_2) and particulate matter through the combustion of natural gas. **NGT is requesting that the use of the oxidation catalyst as a control device on the combustion turbine be considered as BAT**. Section 2.1.4.11 describes the emission limitations that apply to the turbine under NSPS KKKK including a NO_X limitation of 25 ppm at 15% O_2. In accordance with footnote 5 of the February 2014 memo, applicants may evaluate NSPS limitations when identifying and requesting appropriate limits as BAT. Therefore, NGT proposes that compliance with NSPS KKKK satisfies the requirement to establish BAT for emissions of NO_X from the Combustion Turbine (P001).

[37] Ohio EPA Memo from Mike Hopkins, Assistant Chief, Permitting, DAPC, to Permit Writers and Reviewers "BAT Requirements for Permits Issued On or After February 7, 2014" dated February 7, 2014, which supersedes the BAT guidance issued on August 30, 2013. Ohio's BAT policy will be in place only until such time when the Ohio EPA develops and promulgates rules that define BAT in accordance with Ohio Revised Code (ORC) 3704.03(T) requirements.

[38] Question 34 of the February 2014 Memo.

Notwithstanding the guidance presented in the February 2014 Memo, NGT is proposing the use of the control device be accompanied by short-term and annual emissions limits of controlled pollutants (CO and VOC), as shown in Table 3-1. Refer to Appendix C for a formal request of the establishment of BAT in this format. Additionally, NGT is requesting as BAT for the remaining uncontrolled pollutants (SO_2 and PM) monthly limits as rolling, 12-month averages as specified in Table 3-2.

3.2. GAS RELEASES BAT

The evacuation of piping during maintenance and routine operations results in the release of gases directly to the atmosphere. In accordance with Item 4.f of the February 2014 memo, NGT requests as BAT for gas releases a monthly VOC limit as a rolling, 12-month average as specified in Table 3-2.

3.3. EQUIPMENT LEAKS BAT

Various piping components, including valves, connectors, flanges, and open-ended lines may result in fugitive emissions due to leaks. In accordance with Item 4.f of the February 2014 memo, NGT requests as BAT for the equipment leaks a monthly VOC limit as a rolling, 12-month average as specified in Table 3-2.

3.4. SEPARATOR VESSELS BAT

Separator Vessels #1 through 5 (P004-P008) will generate emissions of VOC through flashing, working, and standing losses. In accordance with Item 4.f of the February 2014 memo, NGT requests as BAT for each storage vessel a monthly VOC limit as a rolling, 12-month average as specified in Table 3-2.

3.5. TRUCK LOADING OPERATION BAT

The loading of pipeline liquids and used lubricating oil into tank trucks via the truck loading operation will generate emissions of VOC. In accordance with Item 4.f of the February 2014 memo, NGT requests as BAT for the truck loading operation a monthly VOC limit as a rolling, 12-month average as specified in Table 3-2. As described in Item 4.f of the February 2014 Memo, monitoring, recordkeeping, and reporting requirements will not be necessary to support this BAT limit given that potential VOC emissions will not exceed 1 tpy.

3.6. SUMMARY OF SELECTED BAT EMISSION LIMITS

Table 3-2 summarizes the requested BAT limits for each emission unit at the Clyde Compressor Station.

Table 3-1. Summary of Proposed Historical Format BAT Limits

EU ID	Emission Unit Description	CO		VOC	
		(lb/hr)	(tpy)	(lb/hr)	(tpy)
P001	Combustion Turbine	13.15	7.81	1.65	3.32

Table 3-2. Summary of Proposed BAT Limits

EU ID	Emission Unit Description	Emission Limits (ton/month, averaged over 12-month rolling period)			
		VOC	NO_X	SO_2	PM
P001	Combustion Turbine		2.59	0.27	0.52
P003	Gas Releases	1.65			
P801	Equipment Leaks	0.52			
P004	Separator Vessel #1	1.18E-02			
P005	Separator Vessel #2	1.18E-02			
P006	Separator Vessel #3	9.24E-03			
P007	Separator Vessel #4	0.05			
P008	Separator Vessel #5	1.14E-03			
J001	Loading Operation	8.42E-04			

Air dispersion modeling is sometimes necessary to demonstrate that a source will not: 1) violate Ohio EPA's policy whereby no new source exceeds the Ohio Acceptable Incremental Impact (AII) levels (i.e., consumes more than half of the available PSD increments), or 2) causes ground-level concentrations that exceed Ohio EPA's Maximum Allowable Ground Level Concentrations (MAGLCs) for toxic air pollutants.[39] This section of the PTIO application describes the analysis that was conducted to address Ohio modeling requirements for the installation of the Clyde Compressor Station.

4.1. REGULATED NSR POLLUTANT MODELING ANALYSIS

Engineering Guide #69: Air Dispersion Modeling Guidance (Engineering Guide #69) requires that increases in allowable emissions of regulated NSR pollutants from all new or modified sources be evaluated to determine whether the increases in allowable emissions exceed the Ohio modeling significant emission rates (SERs). For each regulated NSR pollutant for which the increase in allowable emissions exceeds the applicable SER, an air dispersion modeling analysis is required to demonstrate that the ambient incremental impact (AII) is less than the Ohio AII levels (one half of any PSD increment). Table 4-1 lists the Ohio modeling SERs and the corresponding Ohio AII levels.

Table 4-1. Ohio Modeling Significant Emission Rates

Pollutant	Ohio Modeling SER (tpy)	Project Increase (tpy)	Modeling Required? (Y/N)	Ohio Acceptable Incremental Impact ($\mu g/m^3$)
PM_{10}	15	6.30	N	8.5 – Annual
				15 – 24-hr
$PM_{2.5}$	10	6.30	N	2 – Annual
				4.5 – 24-hr
NO_2	40	32.81	N	12.5 – Annual
				188 – 1-hr
SO_2	40	3.22	N	10 – Annual
				45.5 – 24-hr
				256 – 3-hr
				196 – 1-hr
CO	100	10.18	N	2,500 – 8-hr
				10,000 – 1-hr

As demonstrated in Table 1-1, the installation of the Clyde Compressor Station will not result in emissions of any NSR regulated pollutant exceeding the Ohio modeling SERs, and NGT will not be required to conduct an air dispersion modeling analysis as part of this application.

[39] Engineering Guide #69: Air Dispersion Modeling Guidance, Ohio EPA Air Quality Modeling and Planning Section, 2014, Pg. 4.

4.2. AIR TOXICS MODELING ANALYSIS

Item 1 of Ohio EPA's Engineering Guide #69 requires air dispersion modeling for each toxic pollutant for which the increase in allowable emissions exceeds one (1) tpy.[40] The air dispersion modeling must demonstrate that the ambient incremental impact is less than the Maximum Allowable Ground Level Concentrations (MAGLCs) established in accordance with Ohio EPA guidance as required by ORC 3704.03(F)(4)(b).[41]

Table 1-1 and Appendix B demonstrate that the project will not result in emissions of any toxic pollutant exceeding one (1) tpy. Therefore, NGT is not required to perform an air toxics dispersion modeling analysis as part of this application.

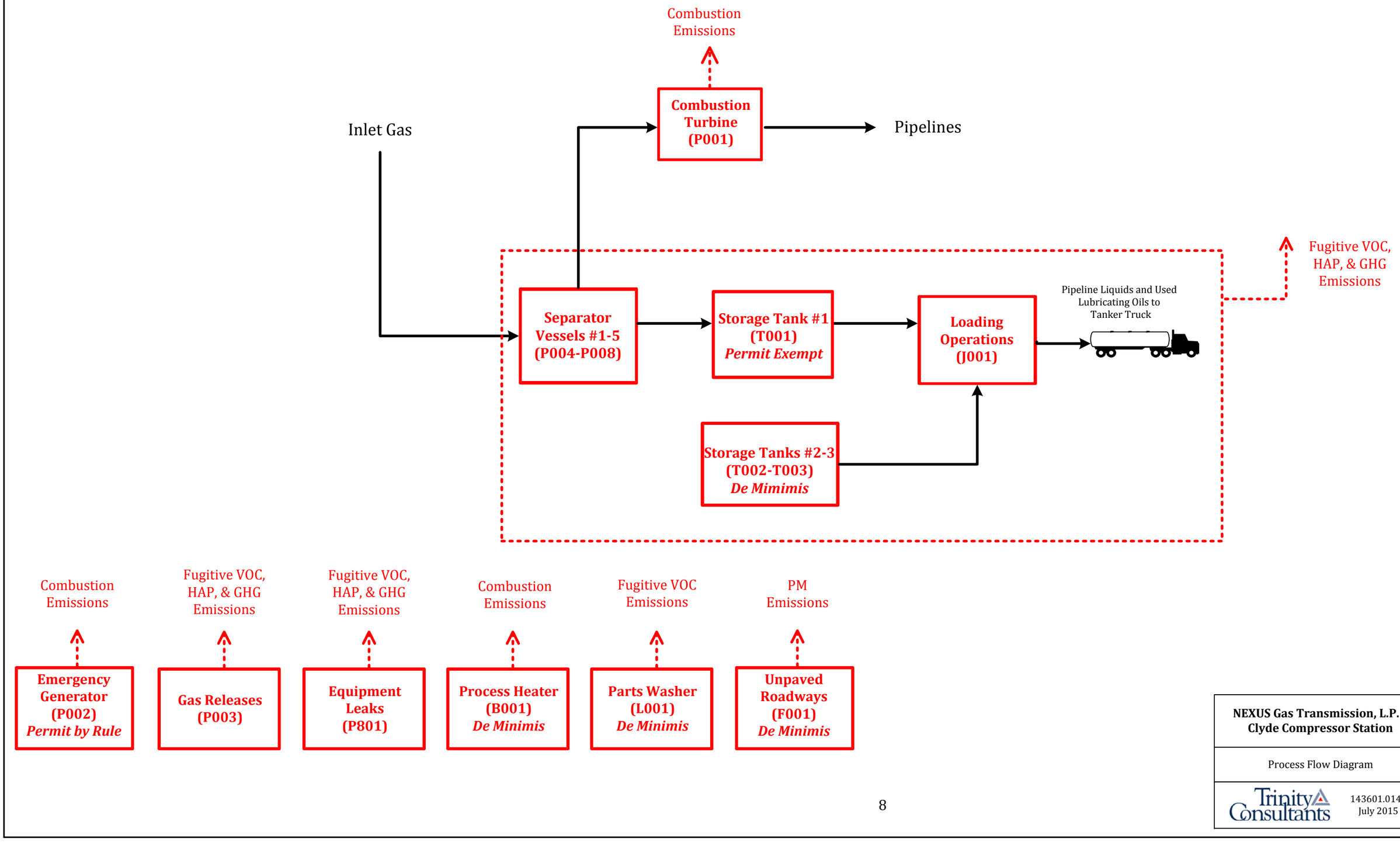
[40] Air toxic pollutants include any pollutant listed in OAC 3745-114-01.

[41] ORC 3704.03(F)(4)(b) requires that applicable MAGLCs be determined in accordance with Option A: Review of New Sources of Air Toxic Emissions, Ohio EPA Air Quality Modeling and Planning Section (May 1986).

APPENDIX A

Process Flow Diagram

FIGURE 1-2. PROCESS FLOW DIAGRAM FOR THE CLYDE COMPRESSOR STATION



NEXUS Gas Transmission, L.P. – Clyde Compressor Station	
Process Flow Diagram	
Trinity Consultants	143601.0141 July 2015

APPENDIX B

Emission Calculations Documentation

TABLE A-1
Potential to Emit
Basis
After Permitting Activity

Emission Source				Rated Capacity	Operational Limits								Data Sources
					Short-Term -- Material Flow		Short-Term -- Capacity		Annual Material Flow		Annual Utilization		
ID	FIN	EPN	Description										
CLYD TBC 01	CLYD TBC 01	CLYD TBC 01	Turbine	26,000 bhp (NEMA)	Natural Gas	234,728 scfh	Power Output	33,900 bhp	Natural Gas	1,856,942,783 scf/yr	Runtime	8,760 hrs/yr	TABLE B-1Ac
CLYD ENGEN 01	CLYD ENGEN 01	CLYD ENGEN 01	IC Engine	880 bhp	Natural Gas	6,820 scfh	Power Output	880 bhp	Natural Gas	3,409,760 scf/yr	Runtime	500 hrs/yr	TABLE C-1A
CLYD FHTR 01	CLYD FHTR 01	CLYD FHTR 01	Boilers/Heaters	0.750 MMBTU/hr (output)	Natural Gas	1,050 scfh	Heat Input	1.071 MMBTU/hr	Natural Gas	9,201,681 scf/yr	Runtime	8,760 hrs/yr	TABLE D-1A
CLYD SV V1S	CLYD SV V1S	CLYD SV V1S	Separator Vessel	530 gal (accumulation)	Pipeline Liquids	530 gal/hr			Pipeline Liquids	71 gal/yr	Runtime	N/A	TABLE F-2
CLYD SV V1D	CLYD SV V1D	CLYD SV V1D	Separator Vessel	530 gal (accumulation)	Pipeline Liquids	530 gal/hr			Pipeline Liquids	71 gal/yr	Runtime	N/A	TABLE F-3
CLYD SV V1C1	CLYD SV V1C1	CLYD SV V1C1	Separator Vessel	400 gal (accumulation)	Pipeline Liquids	400 gal/hr			Pipeline Liquids	53 gal/yr	Runtime	N/A	TABLE F-4
CLYD SV V2	CLYD SV V2	CLYD SV V2	Separator Vessel	317 gal (accumulation)	Pipeline Liquids	317 gal/hr			Pipeline Liquids	4,000 gal/yr	Runtime	N/A	TABLE F-5
CLYD SV V4SD	CLYD SV V4SD	CLYD SV V4SD	Separator Vessel	43 gal (accumulation)	Pipeline Liquids	43 gal/hr			Pipeline Liquids	6 gal/yr	Runtime	N/A	TABLE F-6
CLYD TK V5	CLYD TK V5	CLYD TK V5	Storage Tank	2,000 gal	Pipeline Liquids	2,000 gal/hr			Pipeline Liquids	4,000 gal/yr	Runtime	N/A	TABLE F-7
CLYD TK OIL1	CLYD TK OIL1	CLYD TK OIL1	Storage Tank	570 gal	Oil	570 gal/hr			Oil	208,050 gal/yr	Runtime	N/A	TABLE F-8
CLYD TK OW1	CLYD TK OW1	CLYD TK OW1	Storage Tank	3,000 gal	Oily Water	3,000 gal/hr			Oily Water	36,000 gal/yr	Runtime	N/A	TABLE F-9
CLYD TL PL	CLYD TL PL	CLYD TL PL	Truck Loading	150 gal/min	Pipeline Liquids	2,000 gal/hr			Pipeline Liquids	4,000 gal/yr	Runtime	N/A	TABLE F-10
CLYD TL OIL	CLYD TL OIL	CLYD TL OIL	Truck Loading	150 gal/min	Oil	570 gal/hr			Oil	6,840 gal/yr	Runtime	N/A	TABLE F-11
CLYD TL OW	CLYD TL OW	CLYD TL OW	Truck Loading	150 gal/min	Oily Water	3,000 gal/hr			Oily Water	36,000 gal/yr	Runtime	N/A	TABLE F-12
CLYD GR	CLYD GR ST	CLYD GR ST	Gas Release Events	Natural Gas	Natural Gas	6,635,000 scfh			Natural Gas	29,450,000 scf/yr	Runtime	N/A	TABLE G-1a
	CLYD GR PL	CLYD GR PL	Gas Release Events	Natural Gas									
CLYD PC	CLYD PC NG	CLYD PC NG	Piping Components	Natural Gas	Valves: 724; Connectors: 2,631; Flanges: 501; Open-Ended Lines: 9; Pump Seals: 0; Other (blowdown valves, relief valves, and compressor seals): 66								TABLE H-1a
	CLYD PC PL	CLYD PC PL	Piping Components	Pipeline Liquids	Valves: 100; Connectors: 666; Flanges: 161; Open-Ended Lines: 11; Pump Seals: 2; Other (blowdown valves, relief valves, and compressor seals): 2								TABLE H-2a
	CLYD PC OIL	CLYD PC OIL	Piping Components	Oil	Valves: 59; Connectors: 278; Flanges: 94; Open-Ended Lines: 0; Pump Seals: 6; Other (blowdown valves, relief valves, and compressor seals): 2								TABLE H-3a
CLYD PW	CLYD PW	CLYD PW	Parts Washer	Remote Reservoir	Solvent	N/A	Solvent Make-up	0.329 gal/hr	Solvent Make-up	120 gal/yr	Runtime	N/A	TABLE I-1

TABLE A-1
Potential to Emit
Emissions
After Permitting Activity

Emission Source				Rated Capacity	Potential to Emit (tpy)										Data
ID	FIN	EPN	Description		CO_{2-e}	NO_X	CO	$PM_{10/2.5}$	SO_2	VOC (Total)	HAP (Total)	Benzene	Formaldehyde	Hexane (n-)	Sources
CLYD TBC 01	CLYD TBC 01	CLYD TBC 01	Turbine	26,000 bhp (NEMA)	112,238	31.1302	7.8102	6.2505	3.2199	3.3152	0.5960	0.0189	0.1322		TABLE B-1Aj
CLYD ENGEN 01	CLYD ENGEN 01	CLYD ENGEN 01	IC Engine	880 bhp	432	0.9700	1.9400	0.0174	0.0010	0.8695	0.5257	0.0032	0.3845	0.0081	TABLE C-1A
CLYD FHTR 01	CLYD FHTR 01	CLYD FHTR 01	Boilers/Heaters	0.750 MMBTU/hr (output)	554	0.7076	0.4313	0.0350	0.0028	0.1663	0.0383	0.0000	0.0015	0	TABLE D-1A
CLYD SV V1S	CLYD SV V1S	CLYD SV V1S	Separator Vessel	530 gal (accumulation)	8					0.1414	0.0088	0.0021		0	TABLE F-2
CLYD SV V1D	CLYD SV V1D	CLYD SV V1D	Separator Vessel	530 gal (accumulation)	8					0.1414	0.0088	0.0021		0	TABLE F-3
CLYD SV V1C1	CLYD SV V1C1	CLYD SV V1C1	Separator Vessel	400 gal (accumulation)	6					0.1109	0.0069	0.0017		0	TABLE F-4
CLYD SV V2	CLYD SV V2	CLYD SV V2	Separator Vessel	317 gal (accumulation)	18					0.6039	0.0364	0.0077		0	TABLE E-4a & TABLE F-5
CLYD SV V4SD	CLYD SV V4SD	CLYD SV V4SD	Separator Vessel	43 gal (accumulation)	1					0.0137	0.0009	0.0002		0	TABLE F-6
CLYD TK V5	CLYD TK V5	CLYD TK V5	Storage Tank	2,000 gal	15					0.2861	0.0178	0.0043		0	TABLE F-7
CLYD TK OIL1	CLYD TK OIL1	CLYD TK OIL1	Storage Tank	570 gal						0.0021					TABLE F-8
CLYD TK OW1	CLYD TK OW1	CLYD TK OW1	Storage Tank	3,000 gal						0.0009					TABLE F-9
CLYD TL PL	CLYD TL PL	CLYD TL PL	Truck Loading	150 gal/min	1					0.0095	0.0006	0.0001		0	TABLE F-10
CLYD TL OIL	CLYD TL OIL	CLYD TL OIL	Truck Loading	150 gal/min						0.0001					TABLE F-11
CLYD TL OW	CLYD TL OW	CLYD TL OW	Truck Loading	150 gal/min						0.0005					TABLE F-12
CLYD GR	CLYD GR ST	CLYD GR ST	Gas Release Events	Natural Gas	15,401					19.8198	1.6383	0.5781		0.5766	TABLE G-1a
	CLYD GR PL	CLYD GR PL	Gas Release Events	Natural Gas											
CLYD PC	CLYD PC NG	CLYD PC NG	Piping Components	Natural Gas	997					1.2837	0.1061	0.0374		0.0373	TABLE H-1a
	CLYD PC PL	CLYD PC PL	Piping Components	Pipeline Liquids	0					4.4738	0.6515	0.0645		0.0759	TABLE H-2a
	CLYD PC OIL	CLYD PC OIL	Piping Components	Oil						0.5252					TABLE H-3a
CLYD PW	CLYD PW	CLYD PW	Parts Washer	Remote Reservoir						0.4103					TABLE I-1
TOTAL					129,678	32.8078	10.1816	6.3028	3.2237	32.1743	3.6361	0.7205	0.5182	0.7793	

TABLE B-1Aa
Ambient Temperature, Start Model, and Utilization Data
PTE - 100% Fuel Utilization at 100% Power Output

Month	#Days	Daily Average	Weighted Daily Average
JAN	31.00	22.55	1.91
FEB	28.50	25.20	1.96
MAR	31.00	36.15	3.07
APR	30.00	47.60	3.91
MAY	31.00	58.60	4.97
JUN	30.00	67.90	5.57
JUL	31.00	72.00	6.11
AUG	31.00	69.85	5.92
SEP	30.00	62.95	5.17
OCT	31.00	51.20	4.34
NOV	30.00	40.00	3.28
DEC	31.00	27.85	2.36
Annual	365.50	48.49	**48.58**

Low Temperature Data	
Below 0˚F Hours	28 hrs/yr
Below -20˚F Hours	1 hrs/yr

NOTES
1. Please refer to TABLE B-0.

Start Model and Utilization	
Utilization	100.00%
Start Model	TET - High
Starts	260.00 starts/yr

TABLE B-1Ab
Manufacturer's Operating and Emissions Data
Normal Operations
PTE - 100% Fuel Utilization at 100% Power Output

Parameters			Curve Fitting			Vendor Data						
Ambient	Temperature	°F	-20.00	-20.00	48.49	-0.01	0.01	20.00	40.00	60.00	80.00	100.00
	Altitude	ft	0	0	0	0	0	0	0	0	0	0
	Pressure	psia	14.702	14.702	14.702	14.702	14.702	14.702	14.702	14.702	14.702	14.702
	Relative Humidity	%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$	0.0003	0.0003	0.0038	0.0006	0.0006	0.0013	0.0028	0.0058	0.0124	0.0262
Fuel	Lower Heating Value (LHV)	BTU/scf	939.2	939.2	939.2	939.2	939.2	939.2	939.2	939.2	939.2	939.2
	Higher Heating Value (HHV)	BTU/scf	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6
Turbine	Net Output Power	hp	35,209	35,209	30,381	33,900	33,900	32,592	31,146	29,151	26,280	23,613
	Fuel Consumption	scf/hr	238,158	238,158	207,096	229,429	229,429	220,709	211,595	200,266	185,977	173,041
	Heat Input at LHV	MMBTU/hr	223.68	223.68	194.50	215.48	215.48	207.29	198.73	188.09	174.67	162.52
	Heat Input at HHV	MMBTU/hr	248.53	248.53	216.12	239.42	239.42	230.32	220.81	208.99	194.08	180.58
	Heat Rate at LHV	BTU/hp-hr	6,353	6,353	6,402	6,356	6,356	6,360	6,381	6,452	6,646	6,883
	Heat Rate at HHV	BTU/hp-hr	7,059	7,059	7,113	7,063	7,063	7,067	7,090	7,169	7,385	7,647
Exhaust	Temperature	°F	830	830	864	839	839	848	858	873	897	924
	Water Fraction	%, by vol	5.94%	5.94%	6.40%	6.00%	6.00%	6.06%	6.25%	6.70%	7.61%	9.28%
	Non-Water Fraction	%, by vol	94.06%	94.06%	93.60%	94.00%	94.00%	93.94%	93.75%	93.30%	92.39%	90.72%
	O_2 Content	%, by vol (dry)	15.13%	15.13%	15.36%	15.20%	15.20%	15.27%	15.33%	15.39%	15.43%	15.44%
	Molecular Weight	lb/lb-mol	28.60	28.60	28.53	28.59	28.59	28.58	28.55	28.50	28.39	28.21
	Flow Rate	lb/hr	607,028	607,028	548,329	591,246	591,246	575,480	557,800	533,101	498,286	464,319
		scfm (1 atm, 68°F)	136,511	136,511	123,547	132,949	132,949	129,440	125,614	120,237	112,851	105,846
		acfm	333,391	333,391	309,589	326,960	326,960	320,535	313,439	303,438	289,926	277,339
NO_X Emissions		lb/lb-mol	46.01	46.01	46.01	46.01	46.01	46.01	46.01	46.01	46.01	46.01
		ppmvd, 15% O_2	120	9	9	9	9	9	9	9	9	9
		ppmvw	110.39	8.28	7.91	8.17	8.17	8.07	7.97	7.84	7.71	7.56
		lb/hr	107.80	8.08	7.00	7.78	7.78	7.47	7.16	6.75	6.23	5.72
CO Emissions		lb/lb-mol	28.01	28.01	28.01	28.01	28.01	28.01	28.01	28.01	28.01	28.01
		ppmvd, 15% O_2	150	25	25	25	25	25	25	25	25	25
		ppmvw	137.98	23.00	21.99	22.70	22.70	22.41	22.13	21.78	21.41	20.99
		lb/hr	82.03	13.67	11.83	13.15	13.15	12.64	12.11	11.41	10.53	9.68
UHC Emissions		lb/lb-mol	18.37	18.37	18.37	18.37	18.37	18.37	18.37	18.37	18.37	18.37
		ppmvd, 15% O_2	75	25	25	25	25	25	25	25	25	25
		ppmvw	68.99	23.00	21.99	22.70	22.70	22.41	22.13	21.78	21.41	20.99
		lb/hr	26.90	8.97	7.76	8.63	8.63	8.29	7.94	7.49	6.91	6.35

NOTES

1. Operating and emissions data was provided by the manufacturer for the following ambient temperatures: 0°F, 20°F, 40°F, 60°F, 80°F, and 100°F.
   Specific Humidity is estimate using curve fitting equation: $6.15E\text{-}04e^{3.75E\text{-}02T}$
   All other parameter values estimated using cubic spline.
2. Pollutant concentrations (ppmvd at 15% O2) for 0°F and -20°F based on information provided in a document published by the manufacturer.
3. Ambient pressure and humidity will vary. However, it is believed that any variation would not affect compliance with the proposed emission representations.
4. The heating value of the natural gas used to fuel the turbine will vary. However, it is believed that any variation would not affect compliance with the proposed emission representations.

TABLE B-1Ab
Manufacturer's Operating and Emissions Data
Normal Operations
PTE - 100% Fuel Utilization at 100% Power Output

Vendor Data												
Make:	Solar											
Model:	250-30002S4											
Rate	30,000 hp (ISO)											
Capacity:	26,000 hp (NEMA)											
Load:	100%											
Ambient	Temperature	°F				-0.01	0.01	20.00	40.00	60.00	80.00	100.00
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$				0.0006	0.0006	0.0014	0.0031	0.0066	0.0133	0.0253
Fuel	Lower Heating Value (LHV)	BTU/scf				939.2	939.2	939.2	939.2	939.2	939.2	939.2
Turbine	Net Output Power	hp				33,900	33,900	32,592	31,146	29,151	26,280	23,613
	Heat Input at LHV	MMBTU/hr				215.48	215.48	207.29	198.73	188.09	174.67	162.52
Exhaust	Temperature	°F				839	839	848	858	873	897	924
	Water Fraction	%				6.00%	6.00%	6.06%	6.25%	6.70%	7.61%	9.28%
	O_2 Content	% (dry)				15.20%	15.20%	15.27%	15.33%	15.39%	15.43%	15.44%
	Molecular Weight	lb/lb-mol				28.59	28.59	28.58	28.55	28.50	28.39	28.21
	Flow Rate	lb/hr				591,246	591,246	575,480	557,800	533,101	498,286	464,319
		acfm				326,960	326,960	320,535	313,439	303,438	289,926	277,339
Guaranteed	NO_X	ppmvd, 15% O_2	120	9		9	9	9	9	9	9	9
Emissions	CO	ppmvd, 15% O_2	150	25		25	25	25	25	25	25	25
	UHC	ppmvd, 15% O_2	75	25		25	25	25	25	25	25	25

TABLE B-1Ac
Gas-Fired Turbines
Emission Estimates
Normal Operations
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar				
Model	250-30002S4				
Normal Operating Load	100%				
Fuel	Natural Gas				
Fuel Higher Heating Value (HHV)	1,020 BTU/scf			1,020 BTU/scf	
Ambient Temperature	48.49 °F			0.01 °F	
Power Output	30,381 bhp (mech.)			33,900 bhp (mech.)	
	22,656 kW (elec.)			25,280 kW (elec.)	
Heat Rate at HHV	7,113 BTU/hp-hr			7,063 BTU/hp-hr	
Operating Hours	8,760 hrs/yr				
Fuel Consumption	211,878 scfh			234,728 scfh	
	1,856.053 MMscf/yr				
Heat Input at HHV	216.12 MMBTU/hr			239.42 MMBTU/hr	
	1,893,174 MMBTU/yr	Average	Maximum		Maximum
NO_X	33.03 lb/MMscf	6.9983 lb/hr	30.6524 tpy	33.13 lb/MMscf	7.7768 lb/hr
CO	55.86 lb/MMscf	11.8345 lb/hr	51.8350 tpy	56.03 lb/MMscf	13.1510 lb/hr
SO_2	3.47 lb/MMscf	0.7348 lb/hr	3.2184 tpy	3.47 lb/MMscf	0.8140 lb/hr
$PM_{10/2.5}$	6.73 lb/MMscf	1.4264 lb/hr	6.2475 tpy	6.73 lb/MMscf	1.5802 lb/hr
$CO_{2\text{-}e}$	120,801 lb/MMscf	25,595 lb/hr	112,106 tpy	120,803 lb/MMscf	28,356 lb/hr
CO_2	120,017 lb/MMscf	25,429 lb/hr	111,379 tpy	120,017 lb/MMscf	28,171 lb/hr
N_2O	0.23 lb/MMscf	0.0479 lb/hr	0.2099 tpy	0.23 lb/MMscf	0.0531 lb/hr
TOC (Total)	36.64 lb/MMscf	7.7622 lb/hr	33.9986 tpy	36.75 lb/MMscf	8.6257 lb/hr
Methane	28.64 lb/MMscf	6.0687 lb/hr	26.5807 tpy	28.73 lb/MMscf	6.7438 lb/hr
Ethane	1.00 lb/MMscf	0.2117 lb/hr	0.9272 tpy	1.00 lb/MMscf	0.2352 lb/hr
VOC (Total)	6.99 lb/MMscf	1.4819 lb/hr	6.4906 tpy	7.02 lb/MMscf	1.6467 lb/hr
VOC (non-HAP)	3.57 lb/MMscf	0.7569 lb/hr	3.3154 tpy	3.58 lb/MMscf	0.8411 lb/hr
HAP (Total)	3.42 lb/MMscf	0.7249 lb/hr	3.1753 tpy	3.43 lb/MMscf	0.8056 lb/hr
Acetaldehyde	1.33E-01 lb/MMscf	0.0282 lb/hr	0.1236 tpy	1.34E-01 lb/MMscf	0.0314 lb/hr
Acrolein	2.13E-02 lb/MMscf	0.0045 lb/hr	0.0198 tpy	2.14E-02 lb/MMscf	0.0050 lb/hr
Benzene	4.00E-02 lb/MMscf	0.0085 lb/hr	0.0371 tpy	4.01E-02 lb/MMscf	0.0094 lb/hr
Biphenyl					
Butadiene (1,3-)	1.43E-03 lb/MMscf	0.0003 lb/hr	0.0013 tpy	1.44E-03 lb/MMscf	0.0003 lb/hr
Carbon Tetrachloride					
Chlorobenzene					
Chloroform					
Dichloropropene (1,3-)					
Ethylbenzene	1.07E-01 lb/MMscf	0.0226 lb/hr	0.0989 tpy	1.07E-01 lb/MMscf	0.0251 lb/hr
Ethylene Dibromide					
Formaldehyde	2.36E+00 lb/MMscf	0.5010 lb/hr	2.1945 tpy	2.37E+00 lb/MMscf	0.5568 lb/hr
Hexane (n-)					
Methanol					
Methylene Chloride					
Methylnaphthalene (2-)					
Naphthalene	4.33E-03 lb/MMscf	0.0009 lb/hr	0.0040 tpy	4.34E-03 lb/MMscf	0.0010 lb/hr
PAH	7.33E-03 lb/MMscf	0.0016 lb/hr	0.0068 tpy	7.35E-03 lb/MMscf	0.0017 lb/hr
Phenol					
Propylene Oxide	9.66E-02 lb/MMscf	0.0205 lb/hr	0.0896 tpy	9.69E-02 lb/MMscf	0.0227 lb/hr
Styrene					
Tetrachloroethane (1,1,2,2-)					
Toluene	4.33E-01 lb/MMscf	0.0917 lb/hr	0.4018 tpy	4.34E-01 lb/MMscf	0.1019 lb/hr
Trichloroethane (1,1,2-)					
Trimethylpentane (2,2,4-)					
Vinyl Chloride					
Xylenes	2.13E-01 lb/MMscf	0.0452 lb/hr	0.1978 tpy	2.14E-01 lb/MMscf	0.0502 lb/hr

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Manufacturer provided operating and emissions data (TABLE B-1Ab).
3. The annual emissions are based on a representative annual average ambient temperature (TABLE B-1Aa).
   Maximum hourly emissions are based on an ambient temperature of 0°F.
4. NOX, CO, and TOC (Total) emission factor based on Vendor Guarantee.
5. CO2 and N2O emission factors based on 40 CFR 98, Subpart C, Table C-1 and 40 CFR 98, Subpart C, Table C-2, respectively.
6. SO2 emission factor based on AP-42, Section 3.1 (Revised 4/00), Table 3.1-2a.
7. PM10/2.5 emission factor based on AP-42, Section 3.1 (Revised 4/00), Table 3.1-2a, not Solar's PIL 171 dated 06/01/2012 (173% greater).
8. Methane, Ethane, and VOC (Total) emissions based on scaling of AP-42, Section 3.1 (Revised 4/00), Table 3.1-2a using Vendor Guarantee.
   Speciated VOC (non-HAP) emissions based on scaling of AP-42, Section 3.1 (Revised 4/00), Table 3.1-2a using Vendor Guarantee.
   $EF_{Scaled} = (EF_{AP42})(EF_{TOC}/EF_{TOC\text{-}AP42})$

TABLE B-1Ad
Manufacturer's Operating and Emissions Data
Startup/Shutdown Step 2: Iginition-Idle
PTE - 100% Fuel Utilization at 100% Power Output

Parameters			Interpolated	Vendor Data					
Ambient	Temperature	°F	48.49	0.01	20.00	40.00	60.00	80.00	100.00
	Altitude	ft	0	0	0	0	0	0	0
	Pressure	psia	14.702	14.702	14.702	14.702	14.702	14.702	14.702
	Relative Humidity	%	60%	60%	60%	60%	60%	60%	60%
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$	0.0038	0.0006	0.0013	0.0028	0.0058	0.0124	0.0262
Fuel	Lower Heating Value (LHV)	BTU/scf	939.2	939.2	939.2	939.2	939.2	939.2	939.2
	Higher Heating Value (HHV)	BTU/scf	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6
Turbine	Net Output Power	hp	3,041	3,390	3,259	3,115	2,915	2,628	2,361
	Fuel Consumption	scf/hr	66,421	68,761	67,920	66,983	65,503	63,511	60,796
	Heat Input at LHV	MMBTU/hr	62.38	64.58	63.79	62.91	61.52	59.65	57.10
	Heat Input at HHV	MMBTU/hr	69.31	71.76	70.88	69.90	68.36	66.28	63.44
	Heat Rate at LHV	BTU/hp-hr	20,514	19,050	19,573	20,196	21,105	22,698	24,185
	Heat Rate at HHV	BTU/hp-hr	22,793	21,167	21,748	22,440	23,450	25,220	26,872
Exhaust	Temperature	°F	838	737	779	821	861	900	935
	Water Fraction	%, by vol	4.40%	3.58%	3.81%	4.18%	4.80%	5.91%	7.72%
	Non-Water Fraction	%, by vol	95.60%	96.42%	96.19%	95.82%	95.20%	94.09%	92.28%
	O_2 Content	%, by vol (dry)	17.39%	17.64%	17.53%	17.43%	17.33%	17.20%	17.11%
	Molecular Weight	lb/lb-mol	28.66	28.74	28.72	28.68	28.62	28.50	28.30
	Flow Rate	lb/hr	273,420	301,815	289,208	277,244	263,781	230,080	214,821
		scfm (1 atm, 68°F)	61,324	67,517	64,740	62,117	59,234	51,881	48,805
		acfm	150,713	153,006	151,860	150,647	148,141	133,583	128,897
NO_X Emissions		lb/lb-mol	46.01	46.01	46.01	46.01	46.01	46.01	46.01
		ppmvd, 15% O_2	50	50	50	50	50	50	50
		ppmvw	28.43	26.64	27.47	28.18	28.80	29.50	29.64
		lb/hr	12.48	12.87	12.73	12.53	12.21	10.96	10.35
CO Emissions		lb/lb-mol	28.01	28.01	28.01	28.01	28.01	28.01	28.01
		ppmvd, 15% O_2	2,000	2,000	2,000	2,000	2,000	2,000	2,000
		ppmvw	1,137.25	1,065.52	1,098.85	1,127.10	1,152.08	1,180.11	1,185.56
		lb/hr	303.91	313.42	309.94	305.18	297.42	266.85	252.07
UHC Emissions		lb/lb-mol	18.37	18.37	18.37	18.37	18.37	18.37	18.37
		ppmvd, 15% O_2	200	200	200	200	200	200	200
		ppmvw	113.73	106.55	109.88	112.71	115.21	118.01	118.56
		lb/hr	19.93	20.56	20.33	20.02	19.51	17.50	16.53

NOTES

1. Footnotes 1 thru 4 of TABLE B-1Ab.

TABLE B-1Ad
Manufacturer's Operating and Emissions Data
Startup/Shutdown Step 2: Iginition-Idle
PTE - 100% Fuel Utilization at 100% Power Output

Vendor Data									
Make:	Solar								
Model:	250-30002S4								
Rate Capacity:	30,000 hp (ISO)								
	26,000 hp (NEMA)								
Load:	10%								
Ambient	Temperature	°F		0.01	20.00	40.00	60.00	80.00	100.00
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$		0.0006	0.0014	0.0031	0.0066	0.0133	0.0253
Fuel	Lower Heating Value (LHV)	BTU/scf		939.2	939.2	939.2	939.2	939.2	939.2
Turbine	Net Output Power	hp		3,390	3,259	3,115	2,915	2,628	2,361
	Heat Input at LHV	MMBTU/hr		64.58	63.79	62.91	61.52	59.65	57.10
Exhaust	Temperature	°F		737	779	821	861	900	935
	Water Fraction	%		3.58%	3.81%	4.18%	4.80%	5.91%	7.72%
	O_2 Content	% (dry)		17.64%	17.53%	17.43%	17.33%	17.20%	17.11%
	Molecular Weight	lb/lb-mol		28.74	28.72	28.68	28.62	28.50	28.30
	Flow Rate	lb/hr		301,815	289,208	277,244	263,781	230,080	214,821
		acfm		153,006	151,860	150,647	148,141	133,583	128,897
Estimated Emissions	NO_X	ppmvd, 15% O_2		50	50	50	50	50	50
	CO	ppmvd, 15% O_2		2,000	2,000	2,000	2,000	2,000	2,000
	UHC	ppmvd, 15% O_2		200	200	200	200	200	200

TABLE B-1Ae
Manufacturer's Operating and Emissions Data
Startup/Shutdown Step 3: Loading/Thermal Stabilization
PTE - 100% Fuel Utilization at 100% Power Output

Parameters			Interpolated	Vendor Data					
Ambient	Temperature	°F	48.49	0.01	20.00	40.00	60.00	80.00	100.00
	Altitude	ft	0	0	0	0	0	0	0
	Pressure	psia	14.702	14.702	14.702	14.702	14.702	14.702	14.702
	Relative Humidity	%	60%	60%	60%	60%	60%	60%	60%
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$	0.0038	0.0006	0.0013	0.0028	0.0058	0.0124	0.0262
Fuel	Lower Heating Value (LHV)	BTU/scf	939.2	939.2	939.2	939.2	939.2	939.2	939.2
	Higher Heating Value (HHV)	BTU/scf	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6
Turbine	Net Output Power	hp	7,602	8,475	8,148	7,787	7,288	6,570	5,903
	Fuel Consumption	scf/hr	101,589	106,846	104,546	102,609	99,872	95,848	90,503
	Heat Input at LHV	MMBTU/hr	95.41	100.35	98.19	96.37	93.80	90.02	85.00
	Heat Input at HHV	MMBTU/hr	106.01	111.50	109.10	107.08	104.22	100.02	94.44
	Heat Rate at LHV	BTU/hp-hr	12,550	11,841	12,051	12,376	12,870	13,702	14,399
	Heat Rate at HHV	BTU/hp-hr	13,945	13,156	13,390	13,751	14,301	15,224	15,999
Exhaust	Temperature	°F	897	796	838	880	921	960	984
	Water Fraction	%, by vol	5.12%	4.28%	4.52%	4.90%	5.51%	6.55%	8.28%
	Non-Water Fraction	%, by vol	94.88%	95.72%	95.48%	95.10%	94.49%	93.45%	91.72%
	O_2 Content	%, by vol (dry)	16.68%	16.94%	16.83%	16.72%	16.62%	16.54%	16.51%
	Molecular Weight	lb/lb-mol	28.61	28.69	28.67	28.64	28.57	28.46	28.27
	Flow Rate	lb/hr	347,975	389,910	370,850	354,836	338,013	318,919	299,026
		scfm (1 atm, 68°F)	78,175	87,321	83,036	79,645	76,029	72,024	68,003
		acfm	200,891	207,638	204,052	202,052	198,781	193,628	185,907
NO_X Emissions		lb/lb-mol	46.01	46.01	46.01	46.01	46.01	46.01	46.01
		ppmvd, 15% O_2	50	50	50	50	50	50	50
		ppmvw	33.96	32.12	32.93	33.69	34.27	34.53	34.12
		lb/hr	19.00	20.09	19.60	19.20	18.66	17.80	16.61
CO Emissions		lb/lb-mol	28.01	28.01	28.01	28.01	28.01	28.01	28.01
		ppmvd, 15% O_2	1,013	1,013	1,013	1,013	1,013	1,013	1,013
		ppmvw	688.04	650.81	667.21	682.52	694.36	699.56	691.33
		lb/hr	234.36	247.74	241.74	236.85	230.10	219.57	204.82
UHC Emissions		lb/lb-mol	18.37	18.37	18.37	18.37	18.37	18.37	18.37
		ppmvd, 15% O_2	110	110	110	110	110	110	110
		ppmvw	74.71	70.67	72.45	74.11	75.40	75.96	75.07
		lb/hr	16.69	17.65	17.22	16.87	16.39	15.64	14.59

NOTES

1. Footnotes 1 thru 4 of TABLE B-1Ab.

TABLE B-1Ae
Manufacturer's Operating and Emissions Data
Startup/Shutdown Step 3: Loading/Thermal Stabilization
PTE - 100% Fuel Utilization at 100% Power Output

Vendor Data									
Make:	Solar								
Model:	250-30002S4								
Rate Capacity:	30,000 hp (ISO)								
	26,000 hp (NEMA)								
Load:	24%								
Ambient	Temperature	°F		0.01	20.00	40.00	60.00	80.00	100.00
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$		0.0006	0.0014	0.0031	0.0066	0.0133	0.0253
Fuel	Lower Heating Value (LHV)	BTU/scf		939.2	939.2	939.2	939.2	939.2	939.2
Turbine	Net Output Power	hp		8,475	8,148	7,787	7,288	6,570	5,903
	Heat Input at LHV	MMBTU/hr		100.35	98.19	96.37	93.80	90.02	85.00
Exhaust	Temperature	°F		796	838	880	921	960	984
	Water Fraction	%		4.28%	4.52%	4.90%	5.51%	6.55%	8.28%
	O_2 Content	% (dry)		16.94%	16.83%	16.72%	16.62%	16.54%	16.51%
	Molecular Weight	lb/lb-mol		28.69	28.67	28.64	28.57	28.46	28.27
	Flow Rate	lb/hr		389,910	370,850	354,836	338,013	318,919	299,026
		acfm		207,638	204,052	202,052	198,781	193,628	185,907
Estimated Emissions	NO_X	ppmvd, 15% O_2		50	50	50	50	50	50
	CO	ppmvd, 15% O_2		1,013	1,013	1,013	1,013	1,013	1,013
	UHC	ppmvd, 15% O_2		110	110	110	110	110	110

TABLE B-1Af
Gas-Fired Turbines
Emission Estimates
Startup
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar				
Model	250-30002S4				
Fuel	Natural Gas				
Ambient Temperature	48.49 °F			0.01 °F	
Maximum Event Frequency		2 events/hr	260 events/yr		2 events/hr
Maximum Startup Time		18.00 min/hr	39 hrs/yr		18.00 min/hr
Fuel Consumption		26,960 scf/hr	3.50 MMscf/yr		28,245 scf/hr
		Average	Maximum		Maximum
NO_X	2.5241 lbs/event	5.0483 lb/hr	0.3281 tpy	2.6522 lbs/event	5.3044 lb/hr
CO	38.6316 lbs/event	77.2631 lb/hr	5.0221 tpy	40.4455 lbs/event	80.8909 lb/hr
SO_2	0.0467 lbs/event	0.0935 lb/hr	0.0061 tpy	0.0490 lbs/event	0.0980 lb/hr
$PM_{10/2.5}$	0.0907 lbs/event	0.1815 lb/hr	0.0118 tpy	0.0951 lbs/event	0.1901 lb/hr
CO_{2-e}	1,671 lbs/event	3,342 lb/hr	217 tpy	1,750 lbs/event	3,501 lb/hr
CO_2	1,618 lbs/event	3,236 lb/hr	210 tpy	1,695 lbs/event	3,390 lb/hr
N_2O	0.0030 lbs/event	0.0061 lb/hr	0.0004 tpy	0.0032 lbs/event	0.0064 lb/hr
TOC (Total)	2.6659 lbs/event	5.3317 lb/hr	0.3466 tpy	2.7924 lbs/event	5.5848 lb/hr
Methane	2.0842 lbs/event	4.1684 lb/hr	0.2709 tpy	2.1831 lbs/event	4.3663 lb/hr
Ethane	0.0727 lbs/event	0.1454 lb/hr	0.0095 tpy	0.0762 lbs/event	0.1523 lb/hr
VOC (Total)	0.5089 lbs/event	1.0179 lb/hr	0.0662 tpy	0.5331 lbs/event	1.0662 lb/hr
VOC (non-HAP)	0.2600 lbs/event	0.5199 lb/hr	0.0338 tpy	0.2723 lbs/event	0.5446 lb/hr
HAP (Total)	0.2490 lbs/event	0.4979 lb/hr	0.0324 tpy	0.2608 lbs/event	0.5216 lb/hr
Acetaldehyde	9.69E-03 lbs/event	0.0194 lb/hr	0.0013 tpy	1.02E-02 lbs/event	0.0203 lb/hr
Acrolein	1.55E-03 lbs/event	0.0031 lb/hr	0.0002 tpy	1.62E-03 lbs/event	0.0032 lb/hr
Benzene	2.91E-03 lbs/event	0.0058 lb/hr	0.0004 tpy	3.05E-03 lbs/event	0.0061 lb/hr
Biphenyl					
Butadiene (1,3-)	1.04E-04 lbs/event	0.0002 lb/hr	0.0000 tpy	1.09E-04 lbs/event	0.0002 lb/hr
Carbon Tetrachloride					
Chlorobenzene					
Chloroform					
Dichloropropene (1,3-)					
Ethylbenzene	7.76E-03 lbs/event	0.0155 lb/hr	0.0010 tpy	8.12E-03 lbs/event	0.0162 lb/hr
Ethylene Dibromide					
Formaldehyde	1.72E-01 lbs/event	0.3441 lb/hr	0.0224 tpy	1.80E-01 lbs/event	0.3605 lb/hr
Hexane (n-)					
Methanol					
Methylene Chloride					
Methylnaphthalene (2-)					
Naphthalene	3.15E-04 lbs/event	0.0006 lb/hr	0.0000 tpy	3.30E-04 lbs/event	0.0007 lb/hr
PAH	5.33E-04 lbs/event	0.0011 lb/hr	0.0001 tpy	5.58E-04 lbs/event	0.0011 lb/hr
Phenol					
Propylene Oxide	7.03E-03 lbs/event	0.0141 lb/hr	0.0009 tpy	7.36E-03 lbs/event	0.0147 lb/hr
Styrene					
Tetrachloroethane (1,1,2,2-)					
Toluene	3.15E-02 lbs/event	0.0630 lb/hr	0.0041 tpy	3.30E-02 lbs/event	0.0660 lb/hr
Trichloroethane (1,1,2-)					
Trimethylpentane (2,2,4-)					
Vinyl Chloride					
Xylenes	1.55E-02 lbs/event	0.0310 lb/hr	0.0020 tpy	1.62E-02 lbs/event	0.0325 lb/hr

NOTES

1. Emissions of NOx, CO, and UHC are estimated using information provided in TABLE B-1Ad and TABLE B-1Ae.

	48.49 °F		0.01 °F	
	Step 2	Step 3	Step 2	Step 3
Duration	3.00 min/event	6.00 min/event	3.00 min/event	6.00 min/event
NO_X	0.6240 lb/event	1.9001 lb/event	0.6435 lb/event	2.0086 lb/event
CO	15.1955 lb/event	23.4361 lb/event	15.6711 lb/event	24.7743 lb/event
UHC	0.9967 lb/event	1.6692 lb/event	1.0279 lb/event	1.7645 lb/event
Fuel	3,321 scf/event	10,159 scf/event	3,438 scf/event	10,685 scf/event

2. Footnotes 4 thru 8 of TABLE B-1Ac.
3. The frequency of startup events was provided by Technical Services.

TABLE B-1Ag
Gas-Fired Turbines
Emission Estimates
Shutdown
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar				
Model	250-30002S4				
Fuel	Natural Gas				
Ambient Temperature	48.49 °F			0.01 °F	
Maximum Event Frequency		2 events/hr	260 events/yr		2 events/hr
Maximum Startup Time		17.00 min/hr	36.83 hrs/yr		17.00 min/hr
Fuel Consumption		28,784 scf/hr	3.74 MMscf/yr		30,273 scf/hr
		Average	Maximum		Maximum
NO_X	2.6919 lbs/event	5.3837 lb/hr	0.3499 tpy	2.8456 lbs/event	5.6911 lb/hr
CO	33.2011 lbs/event	66.4022 lb/hr	4.3161 tpy	35.0970 lbs/event	70.1940 lb/hr
SO_2	0.0499 lbs/event	0.0998 lb/hr	0.0065 tpy	0.0525 lbs/event	0.1050 lb/hr
$PM_{10/2.5}$	0.0969 lbs/event	0.1938 lb/hr	0.0126 tpy	0.1019 lbs/event	0.2038 lb/hr
CO_{2-e}	1,774 lbs/event	3,549 lb/hr	231 tpy	1,867 lbs/event	3,733 lb/hr
CO_2	1,727 lbs/event	3,455 lb/hr	225 tpy	1,817 lbs/event	3,633 lb/hr
N_2O	0.0033 lbs/event	0.0065 lb/hr	0.0004 tpy	0.0034 lbs/event	0.0068 lb/hr
TOC (Total)	2.3647 lbs/event	4.7294 lb/hr	0.3074 tpy	2.4997 lbs/event	4.9994 lb/hr
Methane	1.8488 lbs/event	3.6975 lb/hr	0.2403 tpy	1.9543 lbs/event	3.9087 lb/hr
Ethane	0.0645 lbs/event	0.1290 lb/hr	0.0084 tpy	0.0682 lbs/event	0.1363 lb/hr
VOC (Total)	0.4514 lbs/event	0.9029 lb/hr	0.0587 tpy	0.4772 lbs/event	0.9544 lb/hr
VOC (non-HAP)	0.2306 lbs/event	0.4612 lb/hr	0.0300 tpy	0.2438 lbs/event	0.4875 lb/hr
HAP (Total)	0.2208 lbs/event	0.4417 lb/hr	0.0287 tpy	0.2335 lbs/event	0.4669 lb/hr
Acetaldehyde	8.60E-03 lbs/event	0.0172 lb/hr	0.0011 tpy	9.09E-03 lbs/event	0.0182 lb/hr
Acrolein	1.38E-03 lbs/event	0.0028 lb/hr	0.0002 tpy	1.45E-03 lbs/event	0.0029 lb/hr
Benzene	2.58E-03 lbs/event	0.0052 lb/hr	0.0003 tpy	2.73E-03 lbs/event	0.0055 lb/hr
Biphenyl					
Butadiene (1,3-)	9.24E-05 lbs/event	0.0002 lb/hr	0.0000 tpy	9.77E-05 lbs/event	0.0002 lb/hr
Carbon Tetrachloride					
Chlorobenzene					
Chloroform					
Dichloropropene (1,3-)					
Ethylbenzene	6.88E-03 lbs/event	0.0138 lb/hr	0.0009 tpy	7.27E-03 lbs/event	0.0145 lb/hr
Ethylene Dibromide					
Formaldehyde	1.53E-01 lbs/event	0.3053 lb/hr	0.0198 tpy	1.61E-01 lbs/event	0.3227 lb/hr
Hexane (n-)					
Methanol					
Methylene Chloride					
Methylnaphthalene (2-)					
Naphthalene	2.79E-04 lbs/event	0.0006 lb/hr	0.0000 tpy	2.95E-04 lbs/event	0.0006 lb/hr
PAH	4.73E-04 lbs/event	0.0009 lb/hr	0.0001 tpy	5.00E-04 lbs/event	0.0010 lb/hr
Phenol					
Propylene Oxide	6.23E-03 lbs/event	0.0125 lb/hr	0.0008 tpy	6.59E-03 lbs/event	0.0132 lb/hr
Styrene					
Tetrachloroethane (1,1,2,2-)					
Toluene	2.79E-02 lbs/event	0.0559 lb/hr	0.0036 tpy	2.95E-02 lbs/event	0.0591 lb/hr
Trichloroethane (1,1,2-)					
Trimethylpentane (2,2,4-)					
Vinyl Chloride					
Xylenes	1.38E-02 lbs/event	0.0275 lb/hr	0.0018 tpy	1.45E-02 lbs/event	0.0291 lb/hr

NOTES

1. Emissions of NOx, CO, and UHC are estimated using information provided in TABLE B-1Ad and TABLE B-1Ae.

	48.49 °F		0.01 °F	
	Step 2	Step 3	Step 2	Step 3
Duration	0.00 min/event	8.50 min/event	0.00 min/event	8.50 min/event
NO_X	0.0000 lb/event	2.6919 lb/event	0.0000 lb/event	2.8456 lb/event
CO	0.0000 lb/event	33.2011 lb/event	0.0000 lb/event	35.0970 lb/event
UHC	0.0000 lb/event	2.3647 lb/event	0.0000 lb/event	2.4997 lb/event
Fuel	0 scf/event	14,392 scf/event	0 scf/event	15,137 scf/event

2. Footnotes 4 thru 8 of TABLE B-1Ac.
3. The frequency of startup events was provided by Technical Services.

TABLE B-1Ah
Gas-Fired Turbines
Emission Estimates
Low Temperatures
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar					
Model	250-30002S4					
Normal Operating Load	100%					
Fuel	Natural Gas					
Fuel Higher Heating Value (HHV)	1,020 BTU/scf			1,020 BTU/scf		
Ambient Temperature	-20.00 °F			-20.00 °F		
Power Output	35,209 bhp (mech.)			35,209 bhp (mech.)		
	26,256 kW (elec.)			26,256 kW (elec.)		
Heat Rate at HHV	7,059 BTU/hp-hr			7,059 BTU/hp-hr		
Operating Hours	27 hrs/yr			1 hrs/yr		
Fuel Consumption	243,658 scfh			243,658 scfh		
	6.579 MMscf/yr			0.244 MMscf/yr		
Heat Input at HHV	248.53 MMBTU/hr	0°F ≥ T > -20°F		248.53 MMBTU/hr	T ≤ -20°F	
	6,710 MMBTU/yr	Hourly	Annual	249 MMBTU/yr	Hourly	Annual
NO_X	33.18 lb/MMscf	8.0848 lb/hr	0.1091 tpy	442.41 lb/MMscf	107.7979 lb/hr	0.0539 tpy
CO	56.11 lb/MMscf	13.6719 lb/hr	0.1846 tpy	336.67 lb/MMscf	82.0316 lb/hr	0.0410 tpy
SO_2	3.47 lb/MMscf	0.8450 lb/hr	0.0114 tpy	3.47 lb/MMscf	0.8450 lb/hr	0.0004 tpy
$PM_{10/2.5}$	6.73 lb/MMscf	1.6403 lb/hr	0.0221 tpy	6.73 lb/MMscf	1.6403 lb/hr	0.0008 tpy
CO_{2-e}	120,804 lb/MMscf	29,435 lb/hr	397 tpy	122,243 lb/MMscf	29,785 lb/hr	15 tpy
CO_2	120,017 lb/MMscf	29,243 lb/hr	395 tpy	120,017 lb/MMscf	29,243 lb/hr	15 tpy
N_2O	0.23 lb/MMscf	0.0551 lb/hr	0.0007 tpy	0.23 lb/MMscf	0.0551 lb/hr	0.0000 tpy
TOC (Total)	36.80 lb/MMscf	8.9674 lb/hr	0.1211 tpy	110.41 lb/MMscf	26.9023 lb/hr	0.0135 tpy
Methane	28.77 lb/MMscf	7.0109 lb/hr	0.0946 tpy	86.32 lb/MMscf	21.0327 lb/hr	0.0105 tpy
Ethane	1.00 lb/MMscf	0.2446 lb/hr	0.0033 tpy	3.01 lb/MMscf	0.7337 lb/hr	0.0004 tpy
VOC (Total)	7.03 lb/MMscf	1.7120 lb/hr	0.0231 tpy	21.08 lb/MMscf	5.1359 lb/hr	0.0026 tpy
VOC (non-HAP)	3.59 lb/MMscf	0.8745 lb/hr	0.0118 tpy	10.77 lb/MMscf	2.6234 lb/hr	0.0013 tpy
HAP (Total)	3.44 lb/MMscf	0.8375 lb/hr	0.0113 tpy	10.31 lb/MMscf	2.5125 lb/hr	0.0013 tpy
Acetaldehyde	1.34E-01 lb/MMscf	0.0326 lb/hr	0.0004 tpy	4.01E-01 lb/MMscf	0.0978 lb/hr	0.0000 tpy
Acrolein	2.14E-02 lb/MMscf	0.0052 lb/hr	0.0001 tpy	6.42E-02 lb/MMscf	0.0157 lb/hr	0.0000 tpy
Benzene	4.01E-02 lb/MMscf	0.0098 lb/hr	0.0001 tpy	1.20E-01 lb/MMscf	0.0293 lb/hr	0.0000 tpy
Biphenyl						
Butadiene (1,3-)	1.44E-03 lb/MMscf	0.0004 lb/hr	0.0000 tpy	4.32E-03 lb/MMscf	0.0011 lb/hr	0.0000 tpy
Carbon Tetrachloride						
Chlorobenzene						
Chloroform						
Dichloropropene (1,3-)						
Ethylbenzene	1.07E-01 lb/MMscf	0.0261 lb/hr	0.0004 tpy	3.21E-01 lb/MMscf	0.0783 lb/hr	0.0000 tpy
Ethylene Dibromide						
Formaldehyde	2.38E+00 lb/MMscf	0.5788 lb/hr	0.0078 tpy	7.13E+00 lb/MMscf	1.7364 lb/hr	0.0009 tpy
Hexane (n-)						
Methanol						
Methylene Chloride						
Methylnaphthalene (2-)						
Naphthalene	4.35E-03 lb/MMscf	0.0011 lb/hr	0.0000 tpy	1.30E-02 lb/MMscf	0.0032 lb/hr	0.0000 tpy
PAH	7.36E-03 lb/MMscf	0.0018 lb/hr	0.0000 tpy	2.21E-02 lb/MMscf	0.0054 lb/hr	0.0000 tpy
Phenol						
Propylene Oxide	9.70E-02 lb/MMscf	0.0236 lb/hr	0.0003 tpy	2.91E-01 lb/MMscf	0.0709 lb/hr	0.0000 tpy
Styrene						
Tetrachloroethane (1,1,2,2-)						
Toluene	4.35E-01 lb/MMscf	0.1060 lb/hr	0.0014 tpy	1.30E+00 lb/MMscf	0.3179 lb/hr	0.0002 tpy
Trichloroethane (1,1,2-)						
Trimethylpentane (2,2,4-)						
Vinyl Chloride						
Xylenes	2.14E-01 lb/MMscf	0.0522 lb/hr	0.0007 tpy	6.42E-01 lb/MMscf	0.1565 lb/hr	0.0001 tpy

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Operating hours for low ambient temperatures best on best fit of available data (see TABLE B-1Aa).
3. Manufacturer provided data on: power output, heat rate, along with NOx, CO, and UHC (or TOC) emissions.
4. Footnotes 4 thru 8 of TABLE B-1Ac.

TABLE B-1Ai
Gas-Fired Turbines
Maximum Emission Estimates
Normal Operations, Startup, Shutdown, and Low Temperature Operations
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar																	
Model	250-30002S4																	
Normal Operating Load	100%																	
Operations	Normal			Startup			Shutdown			Startup/Shutdown w/ Normal			Low Temperatures			Combined Operations		
Maximum Annual Combined Event Frequency	8,760 hrs/yr			39 hrs/yr			37 hrs/yr			8,760 hrs/yr			28 hrs/yr			8,760 hrs/yr		
	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum	Hourly			Hourly		Maximum	Hourly		Maximum
Pollutant	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Maximum Annual	Average	Maximum	Annual	Average	Maximum	Annual
NO_X	6.9983 lb/hr	7.7768 lb/hr	30.6524 tpy	5.0483 lb/hr	5.3044 lb/hr	0.3281 tpy	5.3837 lb/hr	5.6911 lb/hr	0.3499 tpy	7.0925 lb/hr	14.2358 lb/hr	31.0651 tpy	11.6460 lb/hr	107.7979 lb/hr	0.1630 tpy	7.1074 lb/hr	107.7979 lb/hr	31.1302 tpy
CO	11.8345 lb/hr	13.1510 lb/hr	51.8350 tpy	77.2631 lb/hr	80.8909 lb/hr	5.0221 tpy	66.4022 lb/hr	70.1940 lb/hr	4.3161 tpy	13.8640 lb/hr	156.5645 lb/hr	60.7245 tpy	16.1133 lb/hr	82.0316 lb/hr	0.2256 tpy	13.8777 lb/hr	156.5645 lb/hr	60.7844 tpy
SO_2	0.7348 lb/hr	0.8140 lb/hr	3.2184 tpy	0.0935 lb/hr	0.0980 lb/hr	0.0061 tpy	0.0998 lb/hr	0.1050 lb/hr	0.0065 tpy	0.7348 lb/hr	0.8140 lb/hr	3.2184 tpy	0.8450 lb/hr	0.8450 lb/hr	0.0118 tpy	0.7351 lb/hr	0.8450 lb/hr	3.2199 tpy
$PM_{10/2.5}$	1.4264 lb/hr	1.5802 lb/hr	6.2475 tpy	0.1815 lb/hr	0.1901 lb/hr	0.0118 tpy	0.1938 lb/hr	0.2038 lb/hr	0.0126 tpy	1.4264 lb/hr	1.5802 lb/hr	6.2475 tpy	1.6403 lb/hr	1.6403 lb/hr	0.0230 tpy	1.4270 lb/hr	1.6403 lb/hr	6.2505 tpy
CO_{2-e}	25,595 lb/hr	28,356 lb/hr	112,106 tpy	3,342 lb/hr	3,501 lb/hr	217 tpy	3,549 lb/hr	3,733 lb/hr	231 tpy	25,595 lb/hr	28,356 lb/hr	112,106 tpy	29,447 lb/hr	29,785 lb/hr	412 tpy	25,607 lb/hr	29,785 lb/hr	112,160 tpy
CO_2	25,429 lb/hr	28,171 lb/hr	111,379 tpy	3,236 lb/hr	3,390 lb/hr	210 tpy	3,455 lb/hr	3,633 lb/hr	225 tpy	25,429 lb/hr	28,171 lb/hr	111,379 tpy	29,243 lb/hr	29,243 lb/hr	409 tpy	25,441 lb/hr	29,243 lb/hr	111,433 tpy
N_2O	0.0479 lb/hr	0.0531 lb/hr	0.2099 tpy	0.0061 lb/hr	0.0064 lb/hr	0.0004 tpy	0.0065 lb/hr	0.0068 lb/hr	0.0004 tpy	0.0479 lb/hr	0.0531 lb/hr	0.2099 tpy	0.0551 lb/hr	0.0551 lb/hr	0.0008 tpy	0.0479 lb/hr	0.0551 lb/hr	0.2100 tpy
TOC (Total)	7.7622 lb/hr	8.6257 lb/hr	33.9986 tpy	5.3317 lb/hr	5.5848 lb/hr	0.3466 tpy	4.7294 lb/hr	4.9994 lb/hr	0.3074 tpy	7.8443 lb/hr	14.1782 lb/hr	34.3582 tpy	9.6080 lb/hr	26.9023 lb/hr	0.1345 tpy	7.8502 lb/hr	26.9023 lb/hr	34.3841 tpy
Methane	6.0687 lb/hr	6.7438 lb/hr	26.5807 tpy	4.1684 lb/hr	4.3663 lb/hr	0.2709 tpy	3.6975 lb/hr	3.9087 lb/hr	0.2403 tpy	6.1329 lb/hr	11.0848 lb/hr	26.8619 tpy	7.5117 lb/hr	21.0327 lb/hr	0.1052 tpy	6.1375 lb/hr	21.0327 lb/hr	26.8821 tpy
Ethane	0.2117 lb/hr	0.2352 lb/hr	0.9272 tpy	0.1454 lb/hr	0.1523 lb/hr	0.0095 tpy	0.1290 lb/hr	0.1363 lb/hr	0.0084 tpy	0.2139 lb/hr	0.3867 lb/hr	0.9370 tpy	0.2620 lb/hr	0.7337 lb/hr	0.0037 tpy	0.2141 lb/hr	0.7337 lb/hr	0.9377 tpy
VOC (Total)	1.4819 lb/hr	1.6467 lb/hr	6.4906 tpy	1.0179 lb/hr	1.0662 lb/hr	0.0662 tpy	0.9029 lb/hr	0.9544 lb/hr	0.0587 tpy	1.4976 lb/hr	2.7068 lb/hr	6.5593 tpy	1.8342 lb/hr	5.1359 lb/hr	0.0257 tpy	1.4987 lb/hr	5.1359 lb/hr	6.5642 tpy
VOC (non-HAP)	0.7569 lb/hr	0.8411 lb/hr	3.3154 tpy	0.5199 lb/hr	0.5446 lb/hr	0.0338 tpy	0.4612 lb/hr	0.4875 lb/hr	0.0300 tpy	0.7649 lb/hr	1.3826 lb/hr	3.3505 tpy	0.9369 lb/hr	2.6234 lb/hr	0.0131 tpy	0.7655 lb/hr	2.6234 lb/hr	3.3530 tpy
HAP (Total)	0.7249 lb/hr	0.8056 lb/hr	3.1753 tpy	0.4979 lb/hr	0.5216 lb/hr	0.0324 tpy	0.4417 lb/hr	0.4669 lb/hr	0.0287 tpy	0.7326 lb/hr	1.3242 lb/hr	3.2088 tpy	0.8973 lb/hr	2.5125 lb/hr	0.0126 tpy	0.7332 lb/hr	2.5125 lb/hr	3.2113 tpy
Acetaldehyde	2.82E-02 lb/hr	3.14E-02 lb/hr	1.24E-01 tpy	1.94E-02 lb/hr	2.03E-02 lb/hr	1.26E-03 tpy	1.72E-02 lb/hr	1.82E-02 lb/hr	1.12E-03 tpy	2.85E-02 lb/hr	5.16E-02 lb/hr	1.25E-01 tpy	3.49E-02 lb/hr	9.78E-02 lb/hr	4.89E-04 tpy	2.85E-02 lb/hr	9.78E-02 lb/hr	1.25E-01 tpy
Acrolein	4.52E-03 lb/hr	5.02E-03 lb/hr	1.98E-02 tpy	3.10E-03 lb/hr	3.25E-03 lb/hr	2.02E-04 tpy	2.75E-03 lb/hr	2.91E-03 lb/hr	1.79E-04 tpy	4.56E-03 lb/hr	8.25E-03 lb/hr	2.00E-02 tpy	5.59E-03 lb/hr	1.57E-02 lb/hr	7.83E-05 tpy	4.57E-03 lb/hr	1.57E-02 lb/hr	2.00E-02 tpy
Benzene	8.47E-03 lb/hr	9.41E-03 lb/hr	3.71E-02 tpy	5.82E-03 lb/hr	6.09E-03 lb/hr	3.78E-04 tpy	5.16E-03 lb/hr	5.45E-03 lb/hr	3.35E-04 tpy	8.56E-03 lb/hr	1.55E-02 lb/hr	3.75E-02 tpy	1.05E-02 lb/hr	2.93E-02 lb/hr	1.47E-04 tpy	8.56E-03 lb/hr	2.93E-02 lb/hr	3.75E-02 tpy
Biphenyl																		
Butadiene (1,3-)	3.03E-04 lb/hr	3.37E-04 lb/hr	1.33E-03 tpy	2.08E-04 lb/hr	2.18E-04 lb/hr	1.35E-05 tpy	1.85E-04 lb/hr	1.95E-04 lb/hr	1.20E-05 tpy	3.07E-04 lb/hr	5.54E-04 lb/hr	1.34E-03 tpy	3.76E-04 lb/hr	1.05E-03 lb/hr	5.26E-06 tpy	3.07E-04 lb/hr	1.05E-03 lb/hr	1.34E-03 tpy
Carbon Tetrachloride																		
Chlorobenzene																		
Chloroform																		
Dichloropropene (1,3-)																		
Ethylbenzene	2.26E-02 lb/hr	2.51E-02 lb/hr	9.89E-02 tpy	1.55E-02 lb/hr	1.62E-02 lb/hr	1.01E-03 tpy	1.38E-02 lb/hr	1.45E-02 lb/hr	8.94E-04 tpy	2.28E-02 lb/hr	4.12E-02 lb/hr	1.00E-01 tpy	2.80E-02 lb/hr	7.83E-02 lb/hr	3.91E-04 tpy	2.28E-02 lb/hr	7.83E-02 lb/hr	1.00E-01 tpy
Ethylene Dibromide																		
Formaldehyde	5.01E-01 lb/hr	5.57E-01 lb/hr	2.19E+00 tpy	3.44E-01 lb/hr	3.60E-01 lb/hr	2.24E-02 tpy	3.05E-01 lb/hr	3.23E-01 lb/hr	1.98E-02 tpy	5.06E-01 lb/hr	9.15E-01 lb/hr	2.22E+00 tpy	6.20E-01 lb/hr	1.74E+00 lb/hr	8.68E-03 tpy	5.07E-01 lb/hr	1.74E+00 lb/hr	2.22E+00 tpy
Hexane (n-)																		
Methanol																		
Methylene Chloride																		
Methylnaphthalene (2-)																		
Naphthalene	9.17E-04 lb/hr	1.02E-03 lb/hr	4.02E-03 tpy	6.30E-04 lb/hr	6.60E-04 lb/hr	4.10E-05 tpy	5.59E-04 lb/hr	5.91E-04 lb/hr	3.63E-05 tpy	9.27E-04 lb/hr	1.68E-03 lb/hr	4.06E-03 tpy	1.14E-03 lb/hr	3.18E-03 lb/hr	1.59E-05 tpy	9.28E-04 lb/hr	3.18E-03 lb/hr	4.06E-03 tpy
PAH	1.55E-03 lb/hr	1.73E-03 lb/hr	6.80E-03 tpy	1.07E-03 lb/hr	1.12E-03 lb/hr	6.93E-05 tpy	9.46E-04 lb/hr	1.00E-03 lb/hr	6.15E-05 tpy	1.57E-03 lb/hr	2.84E-03 lb/hr	6.87E-03 tpy	1.92E-03 lb/hr	5.38E-03 lb/hr	2.69E-05 tpy	1.57E-03 lb/hr	5.38E-03 lb/hr	6.88E-03 tpy
Phenol																		
Propylene Oxide	2.05E-02 lb/hr	2.27E-02 lb/hr	8.96E-02 tpy	1.41E-02 lb/hr	1.47E-02 lb/hr	9.14E-04 tpy	1.25E-02 lb/hr	1.32E-02 lb/hr	8.10E-04 tpy	2.07E-02 lb/hr	3.74E-02 lb/hr	9.06E-02 tpy	2.53E-02 lb/hr	7.09E-02 lb/hr	3.55E-04 tpy	2.07E-02 lb/hr	7.09E-02 lb/hr	9.06E-02 tpy
Styrene																		
Tetrachloroethane (1,1,2,2-)																		
Toluene	9.17E-02 lb/hr	1.02E-01 lb/hr	4.02E-01 tpy	6.30E-02 lb/hr	6.60E-02 lb/hr	4.10E-03 tpy	5.59E-02 lb/hr	5.91E-02 lb/hr	3.63E-03 tpy	9.27E-02 lb/hr	1.68E-01 lb/hr	4.06E-01 tpy	1.14E-01 lb/hr	3.18E-01 lb/hr	1.59E-03 tpy	9.28E-02 lb/hr	3.18E-01 lb/hr	4.06E-01 tpy
Trichloroethane (1,1,2-)																		
Trimethylpentane (2,2,4-)																		
Vinyl Chloride																		
Xylenes	4.52E-02 lb/hr	5.02E-02 lb/hr	1.98E-01 tpy	3.10E-02 lb/hr	3.25E-02 lb/hr	2.02E-03 tpy	2.75E-02 lb/hr	2.91E-02 lb/hr	1.79E-03 tpy	4.56E-02 lb/hr	8.25E-02 lb/hr	2.00E-01 tpy	5.59E-02 lb/hr	1.57E-01 lb/hr	7.83E-04 tpy	4.57E-02 lb/hr	1.57E-01 lb/hr	2.00E-01 tpy

NOTES

1. See TABLE B-1Ac, TABLE B-1Af, TABLE B-1Ag, and TABLE B-1Ah.
2. If $E(t)_{normal} > E(t)_{transient}$, then $E(8{,}760\ hrs/yr)_{all} = E(8{,}760\ hrs/yr)_{normal}$
   Otherwise, $E(8{,}760\ hrs/yr)_{all} = E(8{,}760\ hrs/yr)_{normal} - E(t)_{normal} + E(t)_{transient}$.
   where t = the duration of transient operation.

TABLE B-1Aj
Gas-Fired Turbines
Maximum Emission Estimates
Normal Operations, Startup, Shutdown, and Low Temperature Operations
PTE - 100% Fuel Utilization at 100% Power Output

Make		Solar																		
Model		250-30002S4																		
Normal Operating Load		100%																		
Operations		Normal			Startup			Shutdown			Startup/Shutdown w/ Normal			Low Temperatures			Combined Operations		
Maximum Annual Combined Event Frequency		8,760 hrs/yr			39 hrs/yr			37 hrs/yr			8,760 hrs/yr			28 hrs/yr			8,760 hrs/yr		
Pollutant	Control Efficiency	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum
		Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual
NO_X		6.9983 lb/hr	7.7768 lb/hr	30.6524 tpy	5.0483 lb/hr	5.3044 lb/hr	0.3281 tpy	5.3837 lb/hr	5.6911 lb/hr	0.3499 tpy	7.0925 lb/hr	14.2358 lb/hr	31.0651 tpy	11.6460 lb/hr	107.7979 lb/hr	0.1630 tpy	7.1074 lb/hr	107.7979 lb/hr	31.1302 tpy
CO	95.00% by weight	0.5917 lb/hr	0.6575 lb/hr	2.5917 tpy	77.2631 lb/hr	80.8909 lb/hr	5.0221 tpy	3.3201 lb/hr	3.5097 lb/hr	0.2158 tpy	1.7825 lb/hr	84.6746 lb/hr	7.8072 tpy	0.8057 lb/hr	4.1016 lb/hr	0.0113 tpy	1.7832 lb/hr	84.6746 lb/hr	7.8102 tpy
SO_2		0.7348 lb/hr	0.8140 lb/hr	3.2184 tpy	0.0935 lb/hr	0.0980 lb/hr	0.0061 tpy	0.0998 lb/hr	0.1050 lb/hr	0.0065 tpy	0.7348 lb/hr	0.8140 lb/hr	3.2184 tpy	0.8450 lb/hr	0.8450 lb/hr	0.0118 tpy	0.7351 lb/hr	0.8450 lb/hr	3.2199 tpy
$PM_{10/2.5}$		1.4264 lb/hr	1.5802 lb/hr	6.2475 tpy	0.1815 lb/hr	0.1901 lb/hr	0.0118 tpy	0.1938 lb/hr	0.2038 lb/hr	0.0126 tpy	1.4264 lb/hr	1.5802 lb/hr	6.2475 tpy	1.6403 lb/hr	1.6403 lb/hr	0.0230 tpy	1.4270 lb/hr	1.6403 lb/hr	6.2505 tpy
CO_{2-e}		25,613 lb/hr	28,375 lb/hr	112,184 tpy	3,342 lb/hr	3,501 lb/hr	217 tpy	3,648 lb/hr	3,838 lb/hr	237 tpy	25,613 lb/hr	28,375 lb/hr	112,184 tpy	29,471 lb/hr	29,908 lb/hr	413 tpy	25,625 lb/hr	29,908 lb/hr	112,238 tpy
CO_2		25,447 lb/hr	28,191 lb/hr	111,457 tpy	3,236 lb/hr	3,390 lb/hr	210 tpy	3,554 lb/hr	3,738 lb/hr	231 tpy	25,447 lb/hr	28,191 lb/hr	111,457 tpy	29,267 lb/hr	29,366 lb/hr	410 tpy	25,459 lb/hr	29,366 lb/hr	111,510 tpy
N_2O		0.0479 lb/hr	0.0531 lb/hr	0.2099 tpy	0.0061 lb/hr	0.0064 lb/hr	0.0004 tpy	0.0065 lb/hr	0.0068 lb/hr	0.0004 tpy	0.0479 lb/hr	0.0531 lb/hr	0.2099 tpy	0.0551 lb/hr	0.0551 lb/hr	0.0008 tpy	0.0479 lb/hr	0.0551 lb/hr	0.2100 tpy
TOC (Total)	10.91% by weight	6.9154 lb/hr	7.6847 lb/hr	30.2897 tpy	5.3317 lb/hr	5.5848 lb/hr	0.3466 tpy	4.2134 lb/hr	4.4540 lb/hr	0.2739 tpy	6.9972 lb/hr	13.2408 lb/hr	30.6479 tpy	8.5598 lb/hr	23.9675 lb/hr	0.1198 tpy	7.0025 lb/hr	23.9675 lb/hr	30.6709 tpy
Methane	0.00% by weight	6.0687 lb/hr	6.7438 lb/hr	26.5807 tpy	4.1684 lb/hr	4.3663 lb/hr	0.2709 tpy	3.6975 lb/hr	3.9087 lb/hr	0.2403 tpy	6.1329 lb/hr	11.0848 lb/hr	26.8619 tpy	7.5117 lb/hr	21.0327 lb/hr	0.1052 tpy	6.1375 lb/hr	21.0327 lb/hr	26.8821 tpy
Ethane	50.00% by weight	0.1058 lb/hr	0.1176 lb/hr	0.4636 tpy	0.1454 lb/hr	0.1523 lb/hr	0.0095 tpy	0.0645 lb/hr	0.0682 lb/hr	0.0042 tpy	0.1080 lb/hr	0.2695 lb/hr	0.4732 tpy	0.1310 lb/hr	0.3668 lb/hr	0.0018 tpy	0.1081 lb/hr	0.3668 lb/hr	0.4736 tpy
VOC (Total)	50.00% by weight	0.7409 lb/hr	0.8234 lb/hr	3.2453 tpy	1.0179 lb/hr	1.0662 lb/hr	0.0662 tpy	0.4514 lb/hr	0.4772 lb/hr	0.0293 tpy	0.7563 lb/hr	1.8865 lb/hr	3.3127 tpy	0.9171 lb/hr	2.5679 lb/hr	0.0128 tpy	0.7569 lb/hr	2.5679 lb/hr	3.3152 tpy
VOC (non-HAP)	19.10% by weight	0.6124 lb/hr	0.6805 lb/hr	2.6823 tpy	0.5199 lb/hr	0.5446 lb/hr	0.0338 tpy	0.3731 lb/hr	0.3944 lb/hr	0.0243 tpy	0.6203 lb/hr	1.2226 lb/hr	2.7171 tpy	0.7580 lb/hr	2.1224 lb/hr	0.0106 tpy	0.6208 lb/hr	2.1224 lb/hr	2.7192 tpy
HAP (Total)	8.23E-01 by weight	0.1285 lb/hr	0.1428 lb/hr	0.5630 tpy	0.4979 lb/hr	0.5216 lb/hr	0.0324 tpy	0.0783 lb/hr	0.0828 lb/hr	0.0051 tpy	0.1360 lb/hr	0.6639 lb/hr	0.5956 tpy	0.1591 lb/hr	0.4455 lb/hr	0.0022 tpy	0.1361 lb/hr	0.6639 lb/hr	0.5960 tpy
Acetaldehyde	80.00% by weight	5.65E-03 lb/hr	6.27E-03 lb/hr	2.47E-02 tpy	1.94E-02 lb/hr	2.03E-02 lb/hr	1.26E-03 tpy	3.44E-03 lb/hr	3.64E-03 lb/hr	2.24E-04 tpy	5.94E-03 lb/hr	2.66E-02 lb/hr	2.60E-02 tpy	6.99E-03 lb/hr	1.96E-02 lb/hr	9.78E-05 tpy	5.94E-03 lb/hr	2.66E-02 lb/hr	2.60E-02 tpy
Acrolein	50.00% by weight	2.26E-03 lb/hr	2.51E-03 lb/hr	9.89E-03 tpy	3.10E-03 lb/hr	3.25E-03 lb/hr	2.02E-04 tpy	1.38E-03 lb/hr	1.45E-03 lb/hr	8.94E-05 tpy	2.31E-03 lb/hr	5.75E-03 lb/hr	1.01E-02 tpy	2.80E-03 lb/hr	7.83E-03 lb/hr	3.91E-05 tpy	2.31E-03 lb/hr	7.83E-03 lb/hr	1.01E-02 tpy
Benzene	50.00% by weight	4.23E-03 lb/hr	4.70E-03 lb/hr	1.85E-02 tpy	5.82E-03 lb/hr	6.09E-03 lb/hr	3.78E-04 tpy	2.58E-03 lb/hr	2.73E-03 lb/hr	1.68E-04 tpy	4.32E-03 lb/hr	1.08E-02 lb/hr	1.89E-02 tpy	5.24E-03 lb/hr	1.47E-02 lb/hr	7.34E-05 tpy	4.33E-03 lb/hr	1.47E-02 lb/hr	1.89E-02 tpy
Biphenyl	0.00% by weight																		
Butadiene (1,3-)	50.00% by weight	1.52E-04 lb/hr	1.69E-04 lb/hr	6.65E-04 tpy	2.08E-04 lb/hr	2.18E-04 lb/hr	1.35E-05 tpy	9.24E-05 lb/hr	9.77E-05 lb/hr	6.01E-06 tpy	1.55E-04 lb/hr	3.86E-04 lb/hr	6.78E-04 tpy	1.88E-04 lb/hr	5.26E-04 lb/hr	2.63E-06 tpy	1.55E-04 lb/hr	5.26E-04 lb/hr	6.79E-04 tpy
Carbon Tetrachloride	50.00% by weight																		
Chlorobenzene	50.00% by weight																		
Chloroform	50.00% by weight																		
Dichloropropene (1,3-)	50.00% by weight																		
Ethylbenzene	50.00% by weight	1.13E-02 lb/hr	1.25E-02 lb/hr	4.95E-02 tpy	1.55E-02 lb/hr	1.62E-02 lb/hr	1.01E-03 tpy	6.88E-03 lb/hr	7.27E-03 lb/hr	4.47E-04 tpy	1.15E-02 lb/hr	2.87E-02 lb/hr	5.05E-02 tpy	1.40E-02 lb/hr	3.91E-02 lb/hr	1.96E-04 tpy	1.15E-02 lb/hr	3.91E-02 lb/hr	5.05E-02 tpy
Ethylene Dibromide	50.00% by weight																		
Formaldehyde	95.00% by weight	2.51E-02 lb/hr	2.78E-02 lb/hr	1.10E-01 tpy	3.44E-01 lb/hr	3.60E-01 lb/hr	2.24E-02 tpy	1.53E-02 lb/hr	1.61E-02 lb/hr	9.92E-04 tpy	3.02E-02 lb/hr	3.88E-01 lb/hr	1.32E-01 tpy	3.10E-02 lb/hr	8.68E-02 lb/hr	4.34E-04 tpy	3.02E-02 lb/hr	3.88E-01 lb/hr	1.32E-01 tpy
Hexane (n-)	50.00% by weight																		
Methanol	95.00% by weight																		
Methylene Chloride	50.00% by weight																		
Methylnaphthalene (2-)	50.00% by weight																		
Naphthalene	50.00% by weight	4.59E-04 lb/hr	5.10E-04 lb/hr	2.01E-03 tpy	6.30E-04 lb/hr	6.60E-04 lb/hr	4.10E-05 tpy	2.79E-04 lb/hr	2.95E-04 lb/hr	1.82E-05 tpy	4.68E-04 lb/hr	1.17E-03 lb/hr	2.05E-03 tpy	5.68E-04 lb/hr	1.59E-03 lb/hr	7.95E-06 tpy	4.69E-04 lb/hr	1.59E-03 lb/hr	2.05E-03 tpy
PAH	50.00% by weight	7.76E-04 lb/hr	8.63E-04 lb/hr	3.40E-03 tpy	1.07E-03 lb/hr	1.12E-03 lb/hr	6.93E-05 tpy	4.73E-04 lb/hr	5.00E-04 lb/hr	3.07E-05 tpy	7.92E-04 lb/hr	1.98E-03 lb/hr	3.47E-03 tpy	9.61E-04 lb/hr	2.69E-03 lb/hr	1.35E-05 tpy	7.93E-04 lb/hr	2.69E-03 lb/hr	3.47E-03 tpy
Phenol	50.00% by weight																		
Propylene Oxide	50.00% by weight	1.02E-02 lb/hr	1.14E-02 lb/hr	4.48E-02 tpy	1.41E-02 lb/hr	1.47E-02 lb/hr	9.14E-04 tpy	6.23E-03 lb/hr	6.59E-03 lb/hr	4.05E-04 tpy	1.04E-02 lb/hr	2.61E-02 lb/hr	4.57E-02 tpy	1.27E-02 lb/hr	3.55E-02 lb/hr	1.77E-04 tpy	1.05E-02 lb/hr	3.55E-02 lb/hr	4.58E-02 tpy
Styrene	0.00% by weight																		
Tetrachloroethane (1,1,2,2-)	50.00% by weight																		
Toluene	50.00% by weight	4.59E-02 lb/hr	5.10E-02 lb/hr	2.01E-01 tpy	6.30E-02 lb/hr	6.60E-02 lb/hr	4.10E-03 tpy	2.79E-02 lb/hr	2.95E-02 lb/hr	1.82E-03 tpy	4.68E-02 lb/hr	1.17E-01 lb/hr	2.05E-01 tpy	5.68E-02 lb/hr	1.59E-01 lb/hr	7.95E-04 tpy	4.69E-02 lb/hr	1.59E-01 lb/hr	2.05E-01 tpy
Trichloroethane (1,1,2-)	50.00% by weight																		
Trimethylpentane (2,2,4-)	50.00% by weight																		
Vinyl Chloride	0.00% by weight																		
Xylenes	50.00% by weight	2.26E-02 lb/hr	2.51E-02 lb/hr	9.89E-02 tpy	3.10E-02 lb/hr	3.25E-02 lb/hr	2.02E-03 tpy	1.38E-02 lb/hr	1.45E-02 lb/hr	8.94E-04 tpy	2.31E-02 lb/hr	5.75E-02 lb/hr	1.01E-01 tpy	2.80E-02 lb/hr	7.83E-02 lb/hr	3.91E-04 tpy	2.31E-02 lb/hr	7.83E-02 lb/hr	1.01E-01 tpy

NOTES

1. See TABLE B-1Ai.
2. It's assumed that oxidation catalyst will be ineffective during startup events.
3. $CO2 = CO2_{uncontrolled} + CE_{CO\text{-}control\ efficiency} * CO_{uncontrolled} * (MW_{CO2}/MW_{CO}) = CO2_{uncontrolled} + CE_{CO\text{-}control\ efficiency} * CO_{uncontrolled} * (44.0095/28.0101)$.

TABLE C-1A
4-Stroke Lean-Burn Reciprocating Engines
Hourly and Annual Emission Estimates
Uncontrolled

Type		4slb				
Service		Emergency				
JJJJ Relevant Date		Manufactured: On or After 01/01/2009				
ZZZZ Status		New RICE at Area HAP Source				
Make		Waukesha				
Model		VGF36GL				
Fuel		Natural Gas				
Fuel Higher Heating Value (HHV)		1,020 BTU/scf			1,020 BTU/scf	
Ambient Temperature		80 °F			80 °F	
Power Output		880 bhp (mech.)			880 bhp (mech.)	
		625 kW (elec.)			625 kW (elec.)	
Heat Rate at HHV		7,904 BTU/hp-hr			7,904 BTU/hp-hr	
Operating Hours		500 hrs/yr				
Fuel Consumption		6,820 scfh			6,820 scfh	
		3.410 MMscf/yr				
Heat Input at HHV		6.96 MMBTU/hr			6.96 MMBTU/hr	
		3,478 MMBTU/yr	Uncontrolled			Uncontrolled
Pollutant	Control Efficiency	Uncontrolled	Average Hourly	Maximum Annual	Uncontrolled	Maximum Hourly
NO_X		568.97 lb/MMscf	3.8801 lb/hr	0.9700 tpy	568.97 lb/MMscf	3.8801 lb/hr
CO		1,137.93 lb/MMscf	7.7601 lb/hr	1.9400 tpy	1,137.93 lb/MMscf	7.7601 lb/hr
SO_2		0.60 lb/MMscf	0.0041 lb/hr	0.0010 tpy	0.60 lb/MMscf	0.0041 lb/hr
$PM_{10/2.5}$		10.19 lb/MMscf	0.0695 lb/hr	0.0174 tpy	10.19 lb/MMscf	0.0695 lb/hr
CO_{2-e}		253,565 lb/MMscf	1,729 lb/hr	432 tpy	253,565 lb/MMscf	1,729 lb/hr
CO_2		120,017 lb/MMscf	818 lb/hr	205 tpy	120,017 lb/MMscf	818 lb/hr
N_2O		0.23 lb/MMscf	0.0015 lb/hr	0.0004 tpy	0.23 lb/MMscf	0.0015 lb/hr
TOC (Total)		6,278.90 lb/MMscf	42.8191 lb/hr	10.7048 tpy	6,278.90 lb/MMscf	42.8191 lb/hr
Methane		5,339.20 lb/MMscf	36.4108 lb/hr	9.1027 tpy	5,339.20 lb/MMscf	36.4108 lb/hr
Ethane		429.69 lb/MMscf	2.9303 lb/hr	0.7326 tpy	429.69 lb/MMscf	2.9303 lb/hr
VOC (Total)		510.01 lb/MMscf	3.4780 lb/hr	0.8695 tpy	510.01 lb/MMscf	3.4780 lb/hr
VOC (non-HAP)		201.64 lb/MMscf	1.3751 lb/hr	0.3438 tpy	201.64 lb/MMscf	1.3751 lb/hr
HAP (Total)		308.37 lb/MMscf	2.1029 lb/hr	0.5257 tpy	308.37 lb/MMscf	2.1029 lb/hr
Acetaldehyde		3.57E+01 lb/MMscf	2.44E-01 lb/hr	6.09E-02 tpy	3.57E+01 lb/MMscf	2.44E-01 lb/hr
Acrolein		2.20E+01 lb/MMscf	1.50E-01 lb/hr	3.74E-02 tpy	2.20E+01 lb/MMscf	1.50E-01 lb/hr
Benzene		1.88E+00 lb/MMscf	1.28E-02 lb/hr	3.20E-03 tpy	1.88E+00 lb/MMscf	1.28E-02 lb/hr
Biphenyl		9.06E-01 lb/MMscf	6.18E-03 lb/hr	1.54E-03 tpy	9.06E-01 lb/MMscf	6.18E-03 lb/hr
Butadiene (1,3-)		1.14E+00 lb/MMscf	7.78E-03 lb/hr	1.94E-03 tpy	1.14E+00 lb/MMscf	7.78E-03 lb/hr
Carbon Tetrachloride		1.57E-01 lb/MMscf	1.07E-03 lb/hr	2.67E-04 tpy	1.57E-01 lb/MMscf	1.07E-03 lb/hr
Chlorobenzene		1.30E-01 lb/MMscf	8.86E-04 lb/hr	2.21E-04 tpy	1.30E-01 lb/MMscf	8.86E-04 lb/hr
Chloroform		1.22E-01 lb/MMscf	8.30E-04 lb/hr	2.08E-04 tpy	1.22E-01 lb/MMscf	8.30E-04 lb/hr
Dichloropropene (1,3-)		1.13E-01 lb/MMscf	7.69E-04 lb/hr	1.92E-04 tpy	1.13E-01 lb/MMscf	7.69E-04 lb/hr
Ethylbenzene		1.70E-01 lb/MMscf	1.16E-03 lb/hr	2.89E-04 tpy	1.70E-01 lb/MMscf	1.16E-03 lb/hr
Ethylene Dibromide		1.89E-01 lb/MMscf	1.29E-03 lb/hr	3.23E-04 tpy	1.89E-01 lb/MMscf	1.29E-03 lb/hr
Formaldehyde		2.26E+02 lb/MMscf	1.54E+00 lb/hr	3.84E-01 tpy	2.26E+02 lb/MMscf	1.54E+00 lb/hr
Hexane (n-)		4.74E+00 lb/MMscf	3.23E-02 lb/hr	8.08E-03 tpy	4.74E+00 lb/MMscf	3.23E-02 lb/hr
Methanol		1.07E+01 lb/MMscf	7.28E-02 lb/hr	1.82E-02 tpy	1.07E+01 lb/MMscf	7.28E-02 lb/hr
Methylene Chloride		8.54E-02 lb/MMscf	5.83E-04 lb/hr	1.46E-04 tpy	8.54E-02 lb/MMscf	5.83E-04 lb/hr
Methylnaphthalene (2-)		1.42E-01 lb/MMscf	9.67E-04 lb/hr	2.42E-04 tpy	1.42E-01 lb/MMscf	9.67E-04 lb/hr
Naphthalene		3.18E-01 lb/MMscf	2.17E-03 lb/hr	5.42E-04 tpy	3.18E-01 lb/MMscf	2.17E-03 lb/hr
PAH		1.15E-01 lb/MMscf	7.84E-04 lb/hr	1.96E-04 tpy	1.15E-01 lb/MMscf	7.84E-04 lb/hr
Phenol		1.03E-01 lb/MMscf	6.99E-04 lb/hr	1.75E-04 tpy	1.03E-01 lb/MMscf	6.99E-04 lb/hr
Propylene Oxide						
Styrene		1.01E-01 lb/MMscf	6.87E-04 lb/hr	1.72E-04 tpy	1.01E-01 lb/MMscf	6.87E-04 lb/hr
Tetrachloroethane (1,1,2,2-)		1.81E-01 lb/MMscf	1.24E-03 lb/hr	3.09E-04 tpy	1.81E-01 lb/MMscf	1.24E-03 lb/hr
Toluene		1.74E+00 lb/MMscf	1.19E-02 lb/hr	2.97E-03 tpy	1.74E+00 lb/MMscf	1.19E-02 lb/hr
Trichloroethane (1,1,2-)		1.36E-01 lb/MMscf	9.26E-04 lb/hr	2.32E-04 tpy	1.36E-01 lb/MMscf	9.26E-04 lb/hr
Trimethylpentane (2,2,4-)		1.07E+00 lb/MMscf	7.28E-03 lb/hr	1.82E-03 tpy	1.07E+00 lb/MMscf	7.28E-03 lb/hr
Vinyl Chloride		6.36E-02 lb/MMscf	4.34E-04 lb/hr	1.09E-04 tpy	6.36E-02 lb/MMscf	4.34E-04 lb/hr
Xylenes		7.86E-01 lb/MMscf	5.36E-03 lb/hr	1.34E-03 tpy	7.86E-01 lb/MMscf	5.36E-03 lb/hr

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Maximum hourly emissions based on 100% of rated capacity.
3. Vendor provided data on power output and heat rate.
4. SO2 and PM10/2.5 emission factors based on AP-42, Section 3.2 (Revised 7/00), Table 3.2-2.
5. CO2 and N2O emission factors based on 40 CFR 98, Subpart C, Table C-1 and 40 CFR 98, Subpart C, Table C-2, respectively.
6. NOX and CO emission factors based on 40 CFR 60, Subpart JJJJ.
7. TOC (Total) and TOC specie emissions are estimated based on scaling of AP-42 using 40 CFR 60, Subpart JJJJ (VOC - Formaldehyde) data.
   Emission factors based on: $EF_i = [EF_{(VOC - Formaldehyde)}]/[(EF_{VOC-AP42} - EF_{Formaldehyde-AP42})] (EF_{i-AP42})$

TABLE D-1A
Natural Gas Combustion
Hourly and Annual Emission Estimates
Uncontrolled

Application		Process Heater				
Combustion Process		Conventional				
Add-on Controls		None				
Package (Make: Model)		Engineering Technology, Inc.: N/A				
Burner (Make: Model)		Unknown: Unknown				
Fuel		Natural Gas				
Fuel Higher Heating Value (HHV)		1,020 BTU/scf			1,020 BTU/scf	
Heat Output at HHV		0.750 MMBTU/hr			0.788 MMBTU/hr	
Thermal Efficiency		70%			70%	
Operating Hours		8,760 hrs/yr				
Fuel Consumption		1,050 scfh			1,103 scfh	
		9.202 MMscf/yr				
Heat Input at HHV		1.071 MMBTU/hr			1.125 MMBTU/hr	
		9,386 MMBTU/yr	Uncontrolled			Uncontrolled
Pollutant	Control Efficiency	Uncontrolled	Average Hourly	Maximum Annual	Uncontrolled	Maximum Hourly
NO_X		153.80 lb/MMscf	0.1616 lb/hr	0.7076 tpy	153.80 lb/MMscf	0.1696 lb/hr
CO		93.75 lb/MMscf	0.0985 lb/hr	0.4313 tpy	93.75 lb/MMscf	0.1034 lb/hr
SO_2		0.60 lb/MMscf	0.0006 lb/hr	0.0028 tpy	0.60 lb/MMscf	0.0007 lb/hr
$PM_{10/2.5}$		7.60 lb/MMscf	0.0080 lb/hr	0.0350 tpy	7.60 lb/MMscf	0.0084 lb/hr
$CO_{2\text{-}e}$		120,338.86 lb/MMscf	126.4064 lb/hr	553.6599 tpy	120,338.86 lb/MMscf	132.7267 lb/hr
CO_2		120,017.45 lb/MMscf	126.0688 lb/hr	552.1811 tpy	120,017.45 lb/MMscf	132.3722 lb/hr
N_2O		0.23 lb/MMscf	0.0002 lb/hr	0.0010 tpy	0.23 lb/MMscf	0.0002 lb/hr
TOC (Total)		60.00 lb/MMscf	0.0630 lb/hr	0.2761 tpy	60.00 lb/MMscf	0.0662 lb/hr
Methane		10.16 lb/MMscf	0.0107 lb/hr	0.0467 tpy	10.16 lb/MMscf	0.0112 lb/hr
Ethane		13.69 lb/MMscf	0.0144 lb/hr	0.0630 tpy	13.69 lb/MMscf	0.0151 lb/hr
VOC (Total)		36.15 lb/MMscf	0.0380 lb/hr	0.1663 tpy	36.15 lb/MMscf	0.0399 lb/hr
VOC (non-HAP)		27.83 lb/MMscf	0.0292 lb/hr	0.1280 tpy	27.83 lb/MMscf	0.0307 lb/hr
HAP (Total)		8.32 lb/MMscf	0.0087 lb/hr	0.0383 tpy	8.32 lb/MMscf	0.0092 lb/hr
Acetaldehyde						
Acrolein						
Benzene		9.28E-03 lb/MMscf	9.74E-06 lb/hr	4.27E-05 tpy	9.28E-03 lb/MMscf	1.02E-05 lb/hr
Biphenyl						
Butadiene (1,3-)						
Carbon Tetrachloride						
Chlorobenzene						
Chloroform						
Dichloropropene (1,3-)						
Ethylbenzene						
Ethylene Dibromide						
Formaldehyde		3.31E-01 lb/MMscf	3.48E-04 lb/hr	1.52E-03 tpy	3.31E-01 lb/MMscf	3.65E-04 lb/hr
Hexane (n-)		7.95E+00 lb/MMscf	8.35E-03 lb/hr	3.66E-02 tpy	7.95E+00 lb/MMscf	8.77E-03 lb/hr
Methanol						
Methylene Chloride						
Methylnaphthalene (2-)		1.06E-04 lb/MMscf	1.11E-07 lb/hr	4.88E-07 tpy	1.06E-04 lb/MMscf	1.17E-07 lb/hr
Naphthalene		2.69E-03 lb/MMscf	2.83E-06 lb/hr	1.24E-05 tpy	2.69E-03 lb/MMscf	2.97E-06 lb/hr
PAH						
Phenol						
Propylene Oxide						
Styrene						
Tetrachloroethane (1,1,2,2-)						
Toluene		1.50E-02 lb/MMscf	1.58E-05 lb/hr	6.91E-05 tpy	1.50E-02 lb/MMscf	1.66E-05 lb/hr
Trichloroethane (1,1,2-)						
Trimethylpentane (2,2,4-)						
Vinyl Chloride						
Xylenes						

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Maximum hourly emissions based on 105% of rated capacity.
3. Vendor provided data on: heat output and heat input.
4. CO2 and N2O emission factors based on 40 CFR 98, Subpart C, Table C-1 and 40 CFR 98, Subpart C, Table C-2, respectively.
5. NOX, CO and TOC (Total) emission factors based on vendor data.
6. SO2 and PM10/2.5 emission factors based on AP-42, Section 1.4 (Revised 3/98), Table 1.4-2.
7. Remaining TOC specie emission factors based on scaling of AP-42, Section 1.4 (Revised 3/98), Table 1.4-3 using vendor HC data.
   $EF_i = (EF_{HC}/EF_{TOC\text{-}AP42})\ (EF_{i\text{-}AP42})$

TABLE E-1
Flash Analysis
Summary of Laboratory Analysis

	FEED Pressurized Liquid	VAPOR Flash Gas	LIQUID Residual Liquid
Pressure	575.000 psig	0.034 psig	0.034 psig
	589.696 psia	14.730 psia	14.730 psia
Temperature	72 °F	60 °F	60 °F
API Gravity at 60°F	73.960 n.d.	788.526 n.d.	61.227 n.d.
Specific Gravity at 60°F	0.6887 n.d. (water)	0.1538 n.d. (water)	0.7342 n.d. (water)
	3.3880 n.d. (air)	0.9301 n.d. (air)	4.4320 n.d. (air)
Molecular Weight	98.125 lb/lb-mol	26.938 lb/lb-mol	128.362 lb/lb-mol
Density at 60°F and 14.730 psia	5.747 lb/gal	1.283 lb/gal	6.126 lb/gal
	0.2593 lb/ft^3	0.0712 lb/ft^3	0.3392 lb/ft^3
	22.1622 ft^3/gal	18.0282 ft^3/gal	18.0610 ft^3/gal
	930.8120 ft^3/bbl	757.1853 ft^3/bbl	758.5600 ft^3/bbl
	378.4123 $ft^3/lb\text{-}mol$	378.4123 $ft^3/lb\text{-}mol$	378.4123 $ft^3/lb\text{-}mol$
	17.0747 gal/lb-mol	20.9900 gal/lb-mol	20.9520 gal/lb-mol
	2.4598 lb-mol/bbl	2.0010 lb-mol/bbl	2.0046 lb-mol/bbl
Density at 68°F and 14.696 psia	947.3299 scf/bbl	770.6220 scf/bbl	772.0211 scf/bbl
	385.1275 scf/lb-mol	385.1275 scf/lb-mol	385.1275 scf/lb-mol
	2.4598 lb-mol/bbl	2.0010 lb-mol/bbl	2.0046 lb-mol/bbl
Vapor to Liquid Mole Ratio (V/L)	0.4249 n.d. ($lb\text{-}mol_{VAPOR}/lb\text{-}mol_{LIQUID}$)		
Mole Balance	1.0000 bbl	0.3666 bbl	0.8612 bbl
	2.4598 lb-mol	0.7335 lb-mol	1.7263 lb-mol
	947.3299 scf	282.4903 scf	664.8396 scf
Flash Factor (FF)	328.0318 scf_{VAPOR}/bbl_{LIQUID}		

NOTES

1. Sample Data:
   - Location: Atlanta, TX
   - Date: 04/15/09
   - Time: Not Recorded
2. Reference Conditions:

	SPL	Standard
T =	60 °F	68 °F
P =	14.730 psia	14.696 psia
Water	8.344 lb/gal	8.338 lb/gal
Air	0.0765 lb/ft^3	0.0752 lb/ft^3

3. V + L = F => F = (1 + V/L)L {Overall Mole Balance}.

TABLE E-2
Flash Analysis
Extrapolation of Specie Mole Percentages

Component						Liquid Dump Flash Data				
						Input			Output	
						Liquid	Scaled	*Calculated*	Vapor	Liquid
Name (i)	GC Postition	SPL Class	Formula	Type	HAP	z_i ($mol_{i\text{-}F}/mol_F$)		z_i ($mol_{i\text{-}F}/mol_F$)	y_i ($mol_{i\text{-}V}/mol_V$)	x_i ($mol_{i\text{-}L}/mol_L$)
Nitrogen	1		N2			0.034%	0.034%	0.030%	0.101%	0.000%
Carbon Dioxide	3		CO2	GHG		0.968%	0.968%	0.970%	3.163%	0.038%
Methane	2		C01H04	GHG		20.922%	20.922%	20.921%	69.445%	0.303%
Ethane	4		C02H06			3.391%	3.391%	3.390%	10.467%	0.383%
Propane	5		C03H08	VOC		2.183%	2.183%	2.180%	5.339%	0.838%
Butane (i-)	6		C04H10	VOC		1.232%	1.232%	1.230%	2.126%	0.849%
Butane (n-)	7		C04H10	VOC		1.721%	1.721%	1.720%	2.495%	1.391%
Pentane (i-)	8		C05H12	VOC		2.354%	2.354%	2.350%	1.895%	2.543%
Pentane (n-)	9		C05H12	VOC		1.622%	1.622%	1.620%	1.056%	1.859%
Dimethylbutane (2,2-)	10	Hexanes	C06H14	VOC		0.174%	0.174%	0.174%	0.050%	0.227%
Dimethylbutane (2,3-)	11	Hexanes	C06H14	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Cyclopentane	12	Hexanes	C05H10	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylpentane (2-)	13	Hexanes	C06H14	VOC		1.218%	1.218%	1.218%	0.352%	1.586%
Methylpentane (3-)	14	Hexanes	C06H14	VOC		0.912%	0.912%	0.912%	0.264%	1.187%
Hexane (n-)	15	Hexanes	C06H14	VOC	X	1.937%	1.937%	1.937%	0.561%	2.522%
Dimethylpentane (2,2-)	16	Heptanes	C07H16	VOC		0.311%	0.311%	0.311%	0.032%	0.430%
Methylcyclopentane	17	Heptanes	C06H12	VOC		1.134%	1.134%	1.134%	0.116%	1.566%
Dimethylpentane (2,4-)	18	Heptanes	C07H16	VOC		0.128%	0.128%	0.128%	0.013%	0.177%
Trimethylbutane (2,2,3-)	19	Heptanes	C07H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Benzene	20	Heptanes	C06H06	VOC	X	1.713%	1.713%	1.713%	0.175%	2.366%
Dimethylpentane (3,3-)	21	Heptanes	C07H16	VOC		0.221%	0.221%	0.221%	0.023%	0.305%
Cyclohexane	22	Heptanes	C06H12	VOC		1.106%	1.106%	1.106%	0.113%	1.528%
Methylhexane (2-)	23	Heptanes	C07H16	VOC		2.292%	2.292%	2.292%	0.235%	3.166%
Dimethylpentane (2,3-)	24	Heptanes	C07H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclopentane (1,1-)	25	Heptanes	C07H14	VOC		0.603%	0.603%	0.603%	0.062%	0.833%
Methylhexane (3-)	26	Heptanes	C07H16	VOC		2.379%	2.379%	2.379%	0.244%	3.286%
Dimethylcyclopentane (1,t-3-)	27	Heptanes	C07H14	VOC		0.163%	0.163%	0.163%	0.017%	0.225%
Dimethylcyclopentane (1,c-3-)	28	Heptanes	C07H14	VOC		0.266%	0.266%	0.266%	0.027%	0.367%
Ethylpentane (3-)	29	Heptanes	C07H16	VOC		0.029%	0.029%	0.029%	0.003%	0.040%
Dimethylcyclopentane (1,t-2-)	30	Heptanes	C07H14	VOC		0.222%	0.222%	0.222%	0.023%	0.307%
Trimethylpentane (2,2,4-)	31	Heptanes	C08H18	VOC	X	0.021%	0.021%	0.021%	0.002%	0.029%
Heptane (n-)	32	Heptanes	C07H16	VOC		3.742%	3.742%	3.742%	0.383%	5.169%
Methylcyclohexane	33	Octanes	C07H14	VOC		3.301%	3.301%	3.301%	0.136%	4.646%
Trimethylcyclopentane (1,1,3-)	34	Octanes	C08H16	VOC		0.225%	0.225%	0.225%	0.009%	0.317%
Dimethylhexane (2,2-)	35	Octanes	C08H18	VOC		0.095%	0.095%	0.095%	0.004%	0.134%
Dimethylcyclopentane (1,c-2-)	36	Octanes	C07H14	VOC		0.848%	0.848%	0.848%	0.035%	1.193%
Dimethylhexane (2,5-)	37	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,4-)	38	Octanes	C08H18	VOC		0.143%	0.143%	0.143%	0.006%	0.201%
Ethylcyclopentane	39	Octanes	C07H14	VOC		0.464%	0.464%	0.464%	0.019%	0.653%
Trimethylpentane (2,2,3-)	40	Octanes	C08H18	VOC		0.028%	0.028%	0.028%	0.001%	0.039%
Trimethylcyclopentane (1,t-2,c-4-)	41	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (3,3-)	42	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	43	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylpentane (2,3,4-)	44	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,3-)	45	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Toluene	46	Octanes	C07H08	VOC	X	4.444%	4.444%	4.444%	0.183%	6.255%
Trimethylcyclopentane (1,1,2-)	47	Octanes	C08H16	VOC		0.371%	0.371%	0.371%	0.015%	0.522%
Dimethylhexane (3,4-)	48	Octanes	C08H18	VOC		3.505%	3.505%	3.505%	0.144%	4.933%
Methylheptane (2-)	49	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylheptane (4-)	50	Octanes	C08H18	VOC		2.896%	2.896%	2.896%	0.119%	4.076%
Dimethylhexane (3,4-)	51	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylheptane (3-)	52	Octanes	C08H18	VOC		0.416%	0.416%	0.416%	0.017%	0.585%
Ethylhexane (3-)	53	Octanes	C08H18	VOC		0.111%	0.111%	0.111%	0.005%	0.156%
Trimethylcyclopentane (1,c-2,t-4-)	54	Octanes	C08H16	VOC		0.028%	0.028%	0.028%	0.001%	0.039%
Dimethylcyclohexane (1,c-3-)	55	Octanes	C08H16	VOC		0.170%	0.170%	0.170%	0.007%	0.239%
Trimethylcyclopentane (1,c-2,t-3-)	56	Octanes	C08H16	VOC		0.170%	0.170%	0.170%	0.007%	0.239%
Dimethylcyclohexane (1,t-4-)	57	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,5-)	58	Octanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,1-)	59	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	60	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	61	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	62	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,4-)	63	Octanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	64	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Cycloheptane	65	Octanes	C07H14	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Octane (n-)	66	Octanes	C08H18	VOC		4.372%	4.372%	4.372%	0.180%	6.153%
Trimethylhexane (2,4,4-)	67	Nonanes	C09H20	VOC		0.190%	0.190%	0.190%	0.003%	0.269%
Tetramethylpentane (2,2,4,4-)	68	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	69	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Dimethylcyclohexane (1,c-4-)	70	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Trimethylcyclopentane (1,c-2,c-3-)	71	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Propylcyclopentane (i-)	72	Nonanes	C08H16	VOC		0.348%	0.348%	0.348%	0.006%	0.493%
Trimethylhexane (2,3,5-)	73	Nonanes	C09H20	VOC		0.006%	0.006%	0.006%	0.000%	0.009%
Dimethylheptane (2,2-)	74	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,4-)	75	Nonanes	C09H20	VOC		0.158%	0.158%	0.158%	0.003%	0.224%
Methylcyclopentane (1-ethyl-c-2-)	76	Nonanes	C08H16	VOC		0.181%	0.181%	0.181%	0.003%	0.257%
Trimethylhexane (2,2,3-)	77	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%

TABLE E-2
Flash Analysis
Extrapolation of Specie Mole Percentages

Component						Liquid Dump Flash Data				
						Input			Output	
						Liquid	Scaled	*Calculated*	Vapor	Liquid
Name (i)	GC Postition	SPL Class	Formula	Type	HAP	z_i ($mol_{i\text{-}F}/mol_F$)		z_i ($mol_{i\text{-}F}/mol_F$)	y_i ($mol_{i\text{-}V}/mol_V$)	x_i ($mol_{i\text{-}L}/mol_L$)
Dimethylcyclohexane (1,c-2-)	78	Nonanes	C08H16	VOC		0.510%	0.510%	0.510%	0.009%	0.723%
Dimethylheptane (2,6-)	79	Nonanes	C09H20	VOC		0.112%	0.112%	0.112%	0.002%	0.159%
Propylcyclopentane (n-)	80	Nonanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	81	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclohexane	82	Nonanes	C08H16	VOC		1.365%	1.365%	1.365%	0.023%	1.935%
Dimethylheptane (2,5-)	83	Nonanes	C09H20	VOC		0.067%	0.067%	0.067%	0.001%	0.095%
Dimethylheptane (3,5-)	84	Nonanes	C09H20	VOC		0.067%	0.067%	0.067%	0.001%	0.095%
Trimethylcyclohexane (1,1,3-)	85	Nonanes	C09H18	VOC		0.077%	0.077%	0.077%	0.001%	0.109%
Trimethylhexane (2,3,3-)	86	Nonanes	C09H20	VOC		0.038%	0.038%	0.038%	0.001%	0.054%
Dimethylheptane (3,3-)	87	Nonanes	C09H20	VOC		0.038%	0.038%	0.038%	0.001%	0.054%
Trimethylcyclohexane (1,1,4-)	88	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Tetramethylpentane (2,2,3,3-)	89	Nonanes	C09H20	VOC		0.261%	0.261%	0.261%	0.004%	0.370%
Ethylbenzene	90	Nonanes	C08H10	VOC	X	0.406%	0.406%	0.406%	0.007%	0.576%
Trimethylhexane (2,3,4-)	91	Nonanes	C09H20	VOC		0.007%	0.007%	0.007%	0.000%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	92	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,3-)	93	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	94	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Xylene (m-)	95	Nonanes	C08H10	VOC	X	2.462%	2.462%	2.462%	0.042%	3.490%
Xylene (p-)	96	Nonanes	C08H10	VOC	X	2.462%	2.462%	2.462%	0.042%	3.490%
Dimethylheptane (3,4-)	97	Nonanes	C09H20	VOC		0.092%	0.092%	0.092%	0.002%	0.130%
Methyloctane (2-)	98	Nonanes	C09H20	VOC		0.782%	0.782%	0.782%	0.013%	1.109%
Methyloctane (4-)	99	Nonanes	C09H20	VOC		0.782%	0.782%	0.782%	0.013%	1.109%
Dimethylheptane (3,4-)	100	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methyloctane (3-)	101	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Butylcyclopentane (i-)	102	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	103	Nonanes	C09H18	VOC		0.231%	0.231%	0.231%	0.004%	0.327%
Trimethylcyclohexane (1,t-2,c-4-)	104	Nonanes	C09H18	VOC		0.231%	0.231%	0.231%	0.004%	0.327%
Xylene (o-)	105	Nonanes	C08H10	VOC	X	0.547%	0.547%	0.547%	0.009%	0.775%
Trimethylcyclohexane (1,1,2-)	106	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	107	Nonanes	C09H18	VOC		0.200%	0.200%	0.200%	0.003%	0.284%
Trimethylcyclohexane (1,c-2,c-4-)	108	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Nonane (n-)	109	Nonanes	C09H20	VOC		2.884%	2.884%	2.884%	0.050%	4.088%
Unknowns	110	Decanes+	C10+	VOC		10.753%	10.753%	10.753%	0.079%	15.288%
TOTAL						100.001%	100.000%	99.984%	100.001%	99.976%
TOC (Total)						98.999%	98.998%	98.984%	96.737%	99.938%
VOC (Total)						74.686%	74.685%	74.673%	16.825%	99.252%
Hexanes						4.241%	4.240%	4.241%	1.227%	5.521%
Heptanes						14.330%	14.310%	14.330%	1.468%	19.795%
Octanes						21.587%	21.610%	21.587%	0.888%	30.382%
Nonanes						14.663%	14.660%	14.663%	0.252%	20.786%
Decanes+						10.753%	10.770%	10.753%	0.079%	15.288%
HAP (Total)						13.992%	13.992%	13.992%	1.022%	19.503%
Xylenes						1.209%	1.209%	1.209%	0.021%	1.714%

NOTES

1. Sample Data: Location: Atlanta, TX
   Date: 04/15/09
   Dimethyloctane (2,3-) Time: Not Recorded
2. $v_i + l_i = f_i$; $y_i = v_i/V$; $x_i = l_i/L$; $z_i = f_i/F \Rightarrow y_iV + x_iL = z_iF \Rightarrow y_i(V/L)L + x_iL = z_i(1 + V/L)L \Rightarrow z_i = [y_i(V/L) + x_i]/[1 + (V/L)]$ {Mole Balance}.
3. $V/L =$ 0.4249 $1 + V/L =$ 1.4249
4. z_i is refined to the same number if significant digits as y_i and x_i using the component mole balance and laboratory results for V/L.
5. z_i is scale using the hydrocarbon (e.g., hexanes+) z_i percentage in the flash analysis results, with the exception of HAP species.
6. $[y_i ; x_i]$ mole percent for species of hydrocarbons is estimated using scaled lab mole percent results for z_i and $[y ; x]_{HC}$ for the hydrocarbon.

(assumes v_i/l_i is same for all hydrocarbon species)

$(v/l)_{hexanes} =$ 0.2219
$y_{hexanes} =$ 1.227% $x_{hexanes} =$ 5.520% $z_{hexanes} =$ 4.240%
$y_i = z_i(y/z)_{hexanes} =$ 0.2894 z_i
$x_i = z_i(x/z)_{hexanes} =$ 1.3019 z_i

$(v/l)_{heptanes} =$ 0.0740
$y_{heptanes} =$ 1.466% $x_{heptanes} =$ 19.767% $z_{heptanes} =$ 14.310%
$y_i = z_i(y/z)_{heptanes} =$ 0.1024 z_i
$x_i = z_i(x/z)_{heptanes} =$ 1.3814 z_i

$(v/l)_{octanes} =$ 0.0292
$y_{octanes} =$ 0.889% $x_{octanes} =$ 30.414% $z_{octanes} =$ 21.610%
$y_i = z_i(y/z)_{octanes} =$ 0.0411 z_i
$x_i = z_i(x/z)_{octanes} =$ 1.4074 z_i

$(v/l)_{nonanes} =$ 0.0121
$y_{nonanes} =$ 0.252% $x_{nonanes} =$ 20.782% $z_{nonanes} =$ 14.660%
$y_i = z_i(y/z)_{nonanes} =$ 0.0172 z_i
$x_i = z_i(x/z)_{nonanes} =$ 1.4176 z_i

$(v/l)_{decanes+} =$ 0.0051
$y_{decanes+} =$ 0.079% $x_{decanes+} =$ 15.313% $z_{decanes+} =$ 10.770%
$y_i = z_i(y/z)_{decanes+} =$ 0.0073 z_i
$x_i = z_i(x/z)_{decanes+} =$ 1.4218 z_i

TABLE E-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Nitrogen			28.013	0.0727	0.030%	0.009%
Carbon Dioxide	GHG		44.010	0.1143	0.970%	0.435%
Methane	GHG		16.042	0.0417	20.924%	3.421%
Ethane			30.069	0.0781	3.391%	1.039%
Propane	VOC		44.096	0.1145	2.181%	0.980%
Butane (i-)	VOC		58.122	0.1509	1.230%	0.729%
Butane (n-)	VOC		58.122	0.1509	1.720%	1.019%
Pentane (i-)	VOC		72.149	0.1873	2.350%	1.728%
Pentane (n-)	VOC		72.149	0.1873	1.620%	1.191%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.174%	0.153%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	1.218%	1.070%
Methylpentane (3-)	VOC		86.175	0.2238	0.912%	0.801%
Hexane (n-)	VOC	X	86.175	0.2238	1.937%	1.701%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.311%	0.318%
Methylcyclopentane	VOC		84.159	0.2185	1.134%	0.973%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.128%	0.131%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	1.713%	1.364%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.221%	0.226%
Cyclohexane	VOC		84.159	0.2185	1.106%	0.949%
Methylhexane (2-)	VOC		100.202	0.2602	2.292%	2.341%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.603%	0.603%
Methylhexane (3-)	VOC		100.202	0.2602	2.379%	2.430%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.163%	0.163%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.266%	0.266%
Ethylpentane (3-)	VOC		100.202	0.2602	0.029%	0.030%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.222%	0.222%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.021%	0.024%
Heptane (n-)	VOC		100.202	0.2602	3.743%	3.822%
Methylcyclohexane	VOC		98.186	0.2549	3.302%	3.304%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.225%	0.257%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.095%	0.111%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	0.848%	0.849%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.143%	0.166%
Ethylcyclopentane	VOC		98.186	0.2549	0.464%	0.464%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.028%	0.033%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE E-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	4.445%	4.174%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.371%	0.424%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	3.506%	4.081%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	2.896%	3.372%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.416%	0.484%
Ethylhexane (3-)	VOC		114.229	0.2966	0.111%	0.129%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.028%	0.032%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.170%	0.194%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.170%	0.194%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	4.373%	5.090%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.190%	0.248%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.053%	0.061%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.053%	0.061%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.053%	0.061%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.348%	0.398%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.006%	0.008%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.158%	0.207%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.181%	0.207%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.510%	0.583%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.112%	0.146%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	1.365%	1.561%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.067%	0.088%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.067%	0.088%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.077%	0.099%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.038%	0.050%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.038%	0.050%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE E-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.261%	0.341%
Ethylbenzene	VOC	X	106.165	0.2757	0.406%	0.439%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.007%	0.009%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	2.462%	2.664%
Xylene (p-)	VOC	X	106.165	0.2757	2.462%	2.664%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.092%	0.120%
Methyloctane (2-)	VOC		128.255	0.3330	0.782%	1.022%
Methyloctane (4-)	VOC		128.255	0.3330	0.782%	1.022%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.231%	0.297%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.231%	0.297%
Xylene (o-)	VOC	X	106.165	0.2757	0.547%	0.592%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.200%	0.257%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	2.884%	3.770%
Unknowns	VOC		**283.704**	0.7366	10.755%	31.094%
Pressurized Liquid			98.125	0.2548	100.000%	100.000%
TOC (Total)			98.677	0.2562	99.000%	99.556%
VOC (Total)			124.943	0.3244	74.685%	95.096%
HAP (Total)			92.449	0.2400	7.356%	6.931%
Xylenes			106.165	0.2757	5.472%	5.920%

NOTES

1. Normalized mole percentages from TABLE E-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE E-1.

MW = 98.125 lb/lb-mol

TABLE E-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Nitrogen			28.013	0.0727	0.101%	0.105%
Carbon Dioxide	GHG		44.010	0.1143	3.163%	5.167%
Methane	GHG		16.042	0.0417	69.444%	41.356%
Ethane			30.069	0.0781	10.467%	11.683%
Propane	VOC		44.096	0.1145	5.339%	8.739%
Butane (i-)	VOC		58.122	0.1509	2.126%	4.587%
Butane (n-)	VOC		58.122	0.1509	2.495%	5.383%
Pentane (i-)	VOC		72.149	0.1873	1.895%	5.075%
Pentane (n-)	VOC		72.149	0.1873	1.056%	2.828%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.050%	0.161%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	0.352%	1.128%
Methylpentane (3-)	VOC		86.175	0.2238	0.264%	0.844%
Hexane (n-)	VOC	X	86.175	0.2238	0.561%	1.793%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.032%	0.119%
Methylcyclopentane	VOC		84.159	0.2185	0.116%	0.363%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.013%	0.049%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	0.175%	0.509%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.023%	0.084%
Cyclohexane	VOC		84.159	0.2185	0.113%	0.354%
Methylhexane (2-)	VOC		100.202	0.2602	0.235%	0.873%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.062%	0.225%
Methylhexane (3-)	VOC		100.202	0.2602	0.244%	0.907%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.017%	0.061%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.027%	0.099%
Ethylpentane (3-)	VOC		100.202	0.2602	0.003%	0.011%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.023%	0.083%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.002%	0.009%
Heptane (n-)	VOC		100.202	0.2602	0.383%	1.426%
Methylcyclohexane	VOC		98.186	0.2549	0.136%	0.495%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.009%	0.039%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.004%	0.017%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	0.035%	0.127%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.006%	0.025%
Ethylcyclopentane	VOC		98.186	0.2549	0.019%	0.070%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.001%	0.005%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE E-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	0.183%	0.625%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.015%	0.064%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.144%	0.611%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	0.119%	0.505%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.017%	0.073%
Ethylhexane (3-)	VOC		114.229	0.2966	0.005%	0.019%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.001%	0.005%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.007%	0.029%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.007%	0.029%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	0.180%	0.763%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.003%	0.016%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.001%	0.004%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.001%	0.004%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.001%	0.004%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.006%	0.025%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.003%	0.013%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.003%	0.013%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.009%	0.037%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.002%	0.009%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	0.023%	0.098%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.001%	0.005%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.001%	0.005%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.001%	0.006%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.001%	0.003%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.001%	0.003%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE E-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.004%	0.021%
Ethylbenzene	VOC	X	106.165	0.2757	0.007%	0.028%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.000%	0.001%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	0.042%	0.167%
Xylene (p-)	VOC	X	106.165	0.2757	0.042%	0.167%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.002%	0.008%
Methyloctane (2-)	VOC		128.255	0.3330	0.013%	0.064%
Methyloctane (4-)	VOC		128.255	0.3330	0.013%	0.064%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.004%	0.019%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.004%	0.019%
Xylene (o-)	VOC	X	106.165	0.2757	0.009%	0.037%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.003%	0.016%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	0.050%	0.236%
Unknowns	VOC		**473.700**	1.2300	0.079%	1.387%
Flash Gas			26.938	0.0699	100.000%	100.000%
TOC (Total)			26.379	0.0685	96.736%	94.728%
VOC (Total)			66.745	0.1733	16.825%	41.688%
HAP (Total)			88.115	0.2288	0.762%	2.492%
Xylenes			106.165	0.2757	0.094%	0.371%

NOTES

1. Normalized mole percentages from TABLE E-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE E-1, unless value negative.

MW = 26.938 lb/lb-mol

TABLE E-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Nitrogen			28.013	0.0727	0.000%	0.000%
Carbon Dioxide	GHG		44.010	0.1143	0.038%	0.013%
Methane	GHG		16.042	0.0417	0.303%	0.038%
Ethane			30.069	0.0781	0.383%	0.090%
Propane	VOC		44.096	0.1145	0.838%	0.288%
Butane (i-)	VOC		58.122	0.1509	0.849%	0.385%
Butane (n-)	VOC		58.122	0.1509	1.391%	0.630%
Pentane (i-)	VOC		72.149	0.1873	2.544%	1.430%
Pentane (n-)	VOC		72.149	0.1873	1.859%	1.045%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.227%	0.152%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	1.586%	1.065%
Methylpentane (3-)	VOC		86.175	0.2238	1.188%	0.797%
Hexane (n-)	VOC	X	86.175	0.2238	2.522%	1.693%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.430%	0.335%
Methylcyclopentane	VOC		84.159	0.2185	1.567%	1.027%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.177%	0.138%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	2.367%	1.440%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.305%	0.238%
Cyclohexane	VOC		84.159	0.2185	1.528%	1.002%
Methylhexane (2-)	VOC		100.202	0.2602	3.167%	2.472%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.833%	0.637%
Methylhexane (3-)	VOC		100.202	0.2602	3.287%	2.566%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.225%	0.172%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.368%	0.281%
Ethylpentane (3-)	VOC		100.202	0.2602	0.040%	0.031%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.307%	0.235%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.029%	0.026%
Heptane (n-)	VOC		100.202	0.2602	5.170%	4.036%
Methylcyclohexane	VOC		98.186	0.2549	4.647%	3.555%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.317%	0.277%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.134%	0.119%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	1.194%	0.913%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.201%	0.179%
Ethylcyclopentane	VOC		98.186	0.2549	0.653%	0.500%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.039%	0.035%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE E-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	6.256%	4.491%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.522%	0.457%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	4.934%	4.391%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	4.077%	3.628%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.586%	0.521%
Ethylhexane (3-)	VOC		114.229	0.2966	0.156%	0.139%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.039%	0.034%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.239%	0.209%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.239%	0.209%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	6.155%	5.477%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.269%	0.269%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.075%	0.066%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.075%	0.066%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.075%	0.066%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.493%	0.431%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.009%	0.009%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.224%	0.224%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.257%	0.224%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.723%	0.632%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.159%	0.159%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	1.935%	1.692%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.095%	0.095%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.095%	0.095%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.109%	0.107%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.054%	0.054%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.054%	0.054%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE E-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.370%	0.370%
Ethylbenzene	VOC	X	106.165	0.2757	0.576%	0.476%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.010%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	3.491%	2.887%
Xylene (p-)	VOC	X	106.165	0.2757	3.491%	2.887%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.130%	0.130%
Methyloctane (2-)	VOC		128.255	0.3330	1.109%	1.108%
Methyloctane (4-)	VOC		128.255	0.3330	1.109%	1.108%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.328%	0.322%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.328%	0.322%
Xylene (o-)	VOC	X	106.165	0.2757	0.776%	0.641%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.284%	0.279%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	4.089%	4.086%
Unknowns	VOC		**283.170**	0.7353	15.292%	33.734%
Residual Liquid			128.362	0.3333	100.000%	100.000%
TOC (Total)			128.394	0.3334	99.962%	99.987%
VOC (Total)			129.116	0.3353	99.276%	99.859%
HAP (Total)			92.587	0.2404	10.159%	7.327%
Xylenes			106.165	0.2757	7.757%	6.416%

NOTES

1. Normalized mole percentages from TABLE E-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE E-1.

MW = 128.362 lb/lb-mol

TABLE E-4a
Flash Analysis
Maximum Hourly and Annual Emission Estimates

Station ID	CLYD-SV-V2				
Service	Pipeline Liquids				
Liquids Holding Capacity	317 gal			317 gal	
Liquids Input Rate	4,000 gal/yr			317 gal/hr	
Flash Gas Density	0.0769 lb/scf			0.0769 lb/scf	
Flash Factor	328.03 scf/bbl			328.03 scf/bbl	
Flash Gas Rate	31,241 scf/yr			2,473 scfh	
Flash Losses	2,404 lb/yr	Average	Maximum	190 lb/hr	Maximum
Flash Gas	100.00% by weight	0.2744 lb/hr	1.2018 tpy	100.00% by weight	190.2917 lb/hr
CO_{2-e}	1039.07% by weight	2.8511 lb/hr	12.4880 tpy	1039.07% by weight	1,977 lb/hr
CO_2	5.17% by weight	0.0142 lb/hr	0.0621 tpy	5.17% by weight	9.8332 lb/hr
TOC (Total)	94.73% by weight	0.2599 lb/hr	1.1385 tpy	94.73% by weight	180.2587 lb/hr
Methane	41.36% by weight	0.1135 lb/hr	0.4970 tpy	41.36% by weight	78.6974 lb/hr
Ethane	11.68% by weight	0.0321 lb/hr	0.1404 tpy	11.68% by weight	22.2326 lb/hr
VOC (Total)	41.69% by weight	0.1144 lb/hr	0.5010 tpy	41.69% by weight	79.3286 lb/hr
HAP (Total)	2.49% by weight	0.0068 lb/hr	0.0300 tpy	2.49% by weight	4.7425 lb/hr
Benzene	0.5089% by weight	0.0014 lb/hr	0.0061 tpy	0.5089% by weight	0.9683 lb/hr
Ethylbenzene	0.0275% by weight	0.0001 lb/hr	0.0003 tpy	0.0275% by weight	0.0523 lb/hr
Hexane (n-)	1.7932% by weight	0.0049 lb/hr	0.0216 tpy	1.7932% by weight	3.4123 lb/hr
Methanol					
Naphthalene					
Toluene	0.6253% by weight	0.0017 lb/hr	0.0075 tpy	0.6253% by weight	1.1899 lb/hr
Trimethylpentane (2,2,4-)	0.0091% by weight	0.0000 lb/hr	0.0001 tpy	0.0091% by weight	0.0174 lb/hr
Xylenes	0.3706% by weight	0.0010 lb/hr	0.0045 tpy	0.3706% by weight	0.7053 lb/hr

NOTES

1. Separator Characteristics: Flash is represented for separators that receive majority of liquids, but flash may be emitted from other separators.
   - Orientation: Vertical Fixed Roof Tank
   - Height/Length: 10.00 ft
   - Diameter: 4.00 ft
   - Capacity (physical): 940 gal
   - Capacity (liquid): 317 gal — 34% of physical capacity
2. Liquid input rates:
   - a. maximum hourly based on operator experience; 317 gal
   - b. maximum annual based on operating experience and safety factor; and 4,000 gal
   - c. average hourly is just the maximum annual divided by 8,760 hrs/yr.
3. Flash gas density is 110% of the value extracted from TABLE E-3b.
   Density (TABLE E-3b): 0.0699 lb/scf Safety Factor: 110%
4. Flash factor extracted from TABLE E-1.
5. Speciated emissions vapor weight percentages extracted from TABLE E-3b.

TABLE F-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum		mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ M_i	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	T (°F)	P_i (psia)	(mol_i/mol_L) f_{v-i}	(lb_i/lb_L) f_{m-i}	(mol_i/mol_V)	(lb_i/lb_V)
Nitrogen			28.013	3.7362	2.6465E+02	-6.7880E+00	0.0000E+00	0.0000E+00	-345.75	-232.60	68.00		0.000%	0.000%	0.000%	0.000%
Carbon Dioxide	GHG		44.010	35.0169	-1.5119E+03	-1.1334E+01	9.3368E-03	1.7136E-09	-68.80	87.80	68.00	833.1743	0.038%	0.013%	1.087%	2.183%
Methane	GHG		16.042	14.6667	-5.7097E+02	-3.3373E+00	-2.1999E-09	1.3096E-05	-295.60	-115.60	68.00	7,889.8148	0.303%	0.038%	82.053%	60.088%
Ethane			30.069	20.6973	-1.1341E+03	-5.2514E+00	-9.8774E-11	6.7329E-06	-297.40	89.60	68.00	546.5426	0.383%	0.090%	7.185%	9.862%
Propane	VOC		44.096	21.4469	-1.4627E+03	-5.2610E+00	3.2820E-11	3.7349E-06	-306.40	206.60	68.00	121.5870	0.838%	0.288%	3.497%	7.039%
Butane (i-)	VOC		58.122	31.2541	-1.9532E+03	-8.8060E+00	8.9246E-11	5.7501E-06	-254.20	275.00	68.00	44.2751	0.849%	0.385%	1.290%	3.423%
Butane (n-)	VOC		58.122	27.0441	-1.9049E+03	-7.1805E+00	-6.6845E-11	4.2190E-06	-216.40	305.60	68.00	30.1688	1.391%	0.630%	1.440%	3.821%
Pentane (i-)	VOC		72.149	29.2963	-2.1762E+03	-7.8830E+00	-4.6512E-11	3.8997E-06	-256.00	368.60	68.00	11.1082	2.544%	1.430%	0.970%	3.193%
Pentane (n-)	VOC		72.149	33.3239	-2.4227E+03	-9.2354E+00	9.0199E-11	4.1050E-06	-202.00	386.60	68.00	8.1938	1.859%	1.045%	0.523%	1.722%
Dimethylbutane (2,2-)	VOC		86.175	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.227%	0.152%	0.039%	0.155%
Dimethylbutane (2,3-)	VOC		86.175	33.6319	-2.5524E+03	-9.3142E+00	1.4759E-10	3.9140E-06	-223.60	500.00	68.00	3.6998	0.000%	0.000%	0.000%	0.000%
Cyclopentane	VOC		70.133	29.1547	-2.3512E+03	-7.6965E+00	-1.6212E-10	3.1250E-06	-137.20	462.20	68.00	5.0181	0.000%	0.000%	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	30.7477	-2.4888E+03	-8.2295E+00	-2.3723E-11	3.2402E-06	-243.40	437.00	68.00	3.3041	1.586%	1.065%	0.180%	0.707%
Methylpentane (3-)	VOC		86.175	35.2848	-2.6773E+03	-9.8546E+00	2.2352E-11	4.0277E-06	-261.40	447.80	68.00	2.9617	1.188%	0.797%	0.121%	0.475%
Hexane (n-)	VOC	X	86.175	69.7378	-3.6278E+03	-2.3927E+01	1.2810E-02	-1.6844E-16	-139.00	453.20	68.00	2.3626	2.522%	1.693%	0.204%	0.804%
Dimethylpentane (2,2-)	VOC		100.202	6.2875	-2.1682E+03	2.6936E+00	-1.5525E-02	1.0917E-05	-191.20	478.40	68.00	1.6191	0.430%	0.335%	0.024%	0.109%
Methylcyclopentane	VOC		84.159	32.4766	-2.6434E+03	-8.7933E+00	2.0749E-11	3.2158E-06	-223.60	500.00	68.00	2.1257	1.567%	1.027%	0.114%	0.439%
Dimethylpentane (2,4-)	VOC		100.202	35.9436	-2.8460E+03	-9.9938E+00	8.0693E-11	3.6419E-06	-182.20	476.60	68.00	1.5074	0.177%	0.138%	0.009%	0.042%
Trimethylbutane (2,2,3-)	VOC		100.202	32.3633	-2.6614E+03	-8.7743E+00	-7.6870E-10	3.2006E-06	-11.20	496.40	68.00	1.5789	0.000%	0.000%	0.000%	0.000%
Benzene	VOC	X	78.112	31.7718	-2.7254E+03	-8.4443E+00	-5.3534E-09	2.7187E-06	42.80	552.20	68.00	1.4495	2.367%	1.440%	0.118%	0.420%
Dimethylpentane (3,3-)	VOC		100.202	30.2570	-2.6313E+03	-7.9839E+00	4.6848E-13	2.7170E-06	-209.20	505.40	68.00	1.2681	0.305%	0.238%	0.013%	0.061%
Cyclohexane	VOC		84.159	48.5529	-3.0874E+03	-1.5521E+01	7.3830E-03	6.3563E-12	44.60	537.80	68.00	1.5112	1.528%	1.002%	0.079%	0.304%
Methylhexane (2-)	VOC		100.202	54.1075	-3.3785E+03	-1.7547E+01	8.2594E-03	-3.4967E-14	-180.40	494.60	68.00	0.9987	3.167%	2.472%	0.109%	0.496%
Dimethylpentane (2,3-)	VOC		100.202	39.7737	-2.9050E+03	-1.2012E+01	5.1334E-03	-2.3807E-14	-171.40	507.20	68.00	1.0467	0.000%	0.000%	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	58.1943	-3.4151E+03	-1.9294E+01	9.6704E-03	-2.4361E-15	-94.00	525.20	68.00	1.1616	0.833%	0.637%	0.033%	0.149%
Methylhexane (3-)	VOC		100.202	35.2535	-2.9310E+03	-9.6667E+00	-5.2026E-11	3.2107E-06	-182.20	503.60	68.00	0.9291	3.287%	2.566%	0.105%	0.479%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	53.1912	-3.3121E+03	-1.7277E+01	8.3107E-03	5.0896E-14	-209.20	536.00	68.00	0.9791	0.225%	0.172%	0.008%	0.034%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	35.4255	-2.7286E+03	-1.0444E+01	4.6608E-03	1.7565E-14	-209.20	532.40	68.00	1.0075	0.368%	0.281%	0.013%	0.057%
Ethylpentane (3-)	VOC		100.202	8.5463	-2.2979E+03	1.5503E+00	-1.2233E-02	8.2670E-06	-180.40	514.40	68.00	0.8755	0.040%	0.031%	0.001%	0.006%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	36.8109	-2.9536E+03	-1.0275E+01	-4.6212E-12	3.6730E-06	-178.60	536.00	68.00	0.9713	0.307%	0.235%	0.010%	0.046%
Trimethylpentane (2,2,4-)	VOC	X	114.229	50.3422	-3.2789E+03	-1.6111E+01	7.4260E-03	-9.1804E-14	-160.60	519.80	68.00	0.7453	0.029%	0.026%	0.001%	0.004%
Heptane (n-)	VOC		100.202	65.0257	-3.8188E+03	-2.1684E+01	1.0387E-02	1.0206E-14	-130.00	512.60	68.00	0.6808	5.170%	4.036%	0.121%	0.552%
Methylcyclohexane	VOC		98.186	38.0955	-3.0738E+03	-1.0684E+01	-5.1766E-11	3.5282E-06	-194.80	570.20	68.00	0.6925	4.647%	3.555%	0.110%	0.495%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.317%	0.277%	0.000%	0.001%
Dimethylhexane (2,2-)	VOC		114.229	38.7670	-3.1841E+03	-1.0857E+01	1.9275E-12	3.4797E-06	-185.80	530.60	68.00	0.5066	0.134%	0.119%	0.002%	0.012%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	36.3623	-3.0025E+03	-1.0070E+01	-1.0435E-09	3.3726E-06	-65.20	557.60	68.00	0.7110	1.194%	0.913%	0.029%	0.131%
Dimethylhexane (2,5-)	VOC		114.229	40.0260	-3.2647E+03	-1.1282E+01	-6.5408E-10	3.6200E-06	-131.80	530.60	68.00	0.4490	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	56.2877	-3.6225E+03	-1.8225E+01	8.1864E-03	8.7232E-12	30.20	537.80	68.00	0.4499	0.201%	0.179%	0.003%	0.016%
Ethylcyclopentane	VOC		98.186	36.3631	-3.0448E+03	-1.0038E+01	3.5007E-11	3.2347E-06	-216.40	566.60	68.00	0.5963	0.653%	0.500%	0.013%	0.060%
Trimethylpentane (2,2,3-)	VOC		114.229	35.9540	-3.0569E+03	-9.8896E+00	-7.2916E-11	3.1060E-06	-169.60	555.80	68.00	0.4788	0.039%	0.035%	0.001%	0.003%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	38.0712	-3.1736E+03	-1.0617E+01	6.3090E-11	3.3817E-06	-194.80	552.20	68.00	0.4250	0.000%	0.000%	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%

TABLE F-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum		mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ M_i	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	T (°F)	P_i (psia)	(mol_i/mol_L) f_{v-i}	(lb_i/lb_L) f_{m-i}	(mol_i/mol_V)	(lb_i/lb_V)
Trimethylpentane (2,3,4-)	VOC		114.229	34.1565	-3.0232E+03	-9.2267E+00	2.7691E-11	2.7828E-06	-164.20	559.40	68.00	0.4029	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,3-)	VOC		114.229	57.3778	-3.7143E+03	-1.8599E+01	8.2907E-03	-2.8441E-12	30.20	554.00	68.00	0.3451	0.000%	0.000%	0.000%	0.000%
Toluene	VOC	X	92.138	34.0775	-3.0379E+03	-9.1635E+00	1.0289E-11	2.7035E-06	-139.00	606.20	68.00	0.4219	6.256%	4.491%	0.091%	0.381%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.522%	0.457%	0.000%	0.001%
Dimethylhexane (3,4-)	VOC		114.229	38.6119	-3.2685E+03	-1.0752E+01	3.6386E-09	3.2771E-06	30.20	564.80	68.00	0.3186	4.934%	4.391%	0.054%	0.281%
Methylheptane (2-)	VOC		114.229	37.6930	-3.2611E+03	-1.0391E+01	-1.0524E-12	3.0560E-06	-164.20	548.60	68.00	0.3028	0.000%	0.000%	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	40.2080	-3.3661E+03	-1.1279E+01	-8.7855E-11	3.4055E-06	-185.80	552.20	68.00	0.3001	4.077%	3.628%	0.042%	0.219%
Dimethylhexane (3,4-)	VOC		114.229	38.6119	-3.2685E+03	-1.0752E+01	3.6386E-09	3.2771E-06	30.20	564.80	68.00	0.3186	0.000%	0.000%	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	52.8828	-3.6231E+03	-1.6804E+01	7.1828E-03	7.4077E-14	-184.00	555.80	68.00	0.2869	0.586%	0.521%	0.006%	0.030%
Ethylhexane (3-)	VOC		114.229	40.2079	-3.3651E+03	-1.1285E+01	-5.4180E-09	3.4199E-06	30.20	557.60	68.00	0.2931	0.156%	0.139%	0.002%	0.008%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.039%	0.034%	0.000%	0.000%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	32.4775	-3.0067E+03	-8.5896E+00	7.0258E-11	2.1739E-06	-103.00	604.40	68.00	0.3176	0.239%	0.209%	0.003%	0.013%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.239%	0.209%	0.000%	0.001%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	32.5731	-2.9872E+03	-8.6494E+00	-2.1355E-09	2.2946E-06	-34.60	602.60	68.00	0.3364	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	7.8816	-2.6422E+03	2.3902E+00	-1.5376E-02	9.7931E-06	-158.80	563.00	68.00	0.2426	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	33.1329	-3.0084E+03	-8.8498E+00	-4.3621E-10	2.3704E-06	-27.40	604.40	68.00	0.3361	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Cycloheptane	VOC		98.186	54.0858	-3.6109E+03	-1.7331E+01	7.5272E-03	1.7553E-12	17.60	627.80	68.00	0.3185	0.000%	0.000%	0.000%	0.000%
Octane (n-)	VOC		114.229	29.0948	-3.0114E+03	-7.2653E+00	-2.2696E-11	1.4680E-06	-70.60	564.80	68.00	0.2040	6.155%	5.477%	0.043%	0.225%
Trimethylhexane (2,4,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.269%	0.269%	0.047%	0.275%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	-3.8184	-2.2442E+03	7.0671E+00	-1.9644E-02	1.1435E-05	-86.80	568.40	68.00	0.2957	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	32.4384	-3.0550E+03	-8.5372E+00	2.2892E-10	2.0099E-06	-130.00	617.00	68.00	0.2590	0.075%	0.066%	0.001%	0.003%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	31.9151	-3.0253E+03	-8.3613E+00	5.7055E-12	1.9673E-06	-124.60	617.00	68.00	0.2640	0.075%	0.066%	0.001%	0.003%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.075%	0.066%	0.000%	0.000%
Propylcyclopentane (i-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.493%	0.431%	0.000%	0.001%
Trimethylhexane (2,3,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.009%	0.009%	0.001%	0.009%
Dimethylheptane (2,2-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.224%	0.224%	0.039%	0.228%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.257%	0.224%	0.000%	0.001%
Trimethylhexane (2,2,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	32.1635	-3.0728E+03	-8.4344E+00	6.8943E-10	1.9558E-06	-58.00	631.40	68.00	0.2121	0.723%	0.632%	0.005%	0.027%
Dimethylheptane (2,6-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.159%	0.159%	0.028%	0.162%
Propylcyclopentane (n-)	VOC		112.213	33.9220	-3.2097E+03	-8.9914E+00	-3.2992E-11	2.0684E-06	-178.60	626.00	68.00	0.1793	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	32.7090	-3.1283E+03	-8.6023E+00	-3.9268E-11	1.9935E-06	-167.80	636.80	68.00	0.1870	1.935%	1.692%	0.012%	0.064%
Dimethylheptane (2,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.095%	0.095%	0.017%	0.097%
Dimethylheptane (3,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.095%	0.095%	0.017%	0.097%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.109%	0.107%	0.000%	0.000%
Trimethylhexane (2,3,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.054%	0.054%	0.009%	0.055%

TABLE F-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum		mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ $\mathbf{M_i}$	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	**T** (°F)	P_i (psia)	(mol_i/mol_L) $\mathbf{f_{v\text{-}i}}$	(lb_i/lb_L) $\mathbf{f_{m\text{-}i}}$	(mol_i/mol_V)	(lb_i/lb_V)
Dimethylheptane (3,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.054%	0.054%	0.009%	0.055%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Tetramethylpentane (2,2,3,3-)	VOC		128.255	35.4216	-3.2760E+03	-9.5678E+00	9.0298E-10	2.4355E-06	14.00	640.40	68.00	0.1369	0.370%	0.370%	0.002%	0.010%
Ethylbenzene	VOC	X	106.165	36.1998	-3.3402E+03	-9.7970E+00	-1.1467E-11	2.5758E-06	-139.00	651.20	68.00	0.1388	0.576%	0.476%	0.003%	0.013%
Trimethylhexane (2,3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.010%	0.010%	0.002%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	34.6803	-3.2981E+03	-9.2570E+00	-4.3563E-10	-2.4103E-06	-54.40	649.40	68.00	0.0468	3.491%	2.887%	0.006%	0.027%
Xylene (p-)	VOC	X	106.165	60.0531	-4.0159E+03	-1.9441E+01	8.2881E-03	-2.3647E-12	55.40	649.40	68.00	0.1277	3.491%	2.887%	0.015%	0.074%
Dimethylheptane (3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.130%	0.130%	0.023%	0.133%
Methyloctane (2-)	VOC		128.255	6.0191	-2.8579E+03	3.4068E+00	-1.6572E-02	9.8047E-06	-112.00	597.20	68.00	0.0881	1.109%	1.108%	0.003%	0.020%
Methyloctane (4-)	VOC		128.255	11.2012	-2.9467E+03	1.2133E+00	-1.4423E-02	9.1770E-06	-171.40	599.00	68.00	0.0974	1.109%	1.108%	0.004%	0.022%
Dimethylheptane (3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	9.8147	-2.9609E+03	1.9061E+00	-1.5675E-02	9.7961E-06	-160.60	602.60	68.00	0.0889	0.000%	0.000%	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.328%	0.322%	0.000%	0.001%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.328%	0.322%	0.000%	0.001%
Xylene (o-)	VOC	X	106.165	37.2413	-3.4573E+03	-1.0126E+01	9.0676E-11	2.6123E-06	-13.00	674.60	68.00	0.0946	0.776%	0.641%	0.003%	0.012%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.284%	0.279%	0.000%	0.001%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Nonane (n-)	VOC		128.255	8.8817	-2.8042E+03	1.5262E+00	-1.0464E-02	5.7972E-06	-63.40	613.40	68.00	0.0627	4.089%	4.086%	0.009%	0.051%
Unknowns	VOC		283.170	116.5157	-8.0140E+03	-3.8799E+01	1.3398E-02	-4.4444E-13	50.00	813.20	68.00	0.0000	15.292%	33.734%	0.000%	0.000%
Residual Liquid	Liquid	128.362 lb/lb-mol	Vapor	68.00 °F		29.1420 psia			21.907 lb/lb-mol				100.000%	100.000%	100.000%	100.000%
TOC (Total)		128.394 lb/lb-mol		68.00 °F		28.8362 psia			21.664 lb/lb-mol				99.962%	99.987%	98.913%	97.817%
VOC (Total)		129.116 lb/lb-mol		68.00 °F		2.8403 psia			63.095 lb/lb-mol				99.276%	99.859%	9.676%	27.868%
HAP (Total)		95.690 lb/lb-mol		68.00 °F		0.6569 psia			86.481 lb/lb-mol				19.507%	14.542%	0.440%	1.736%
Xylenes		106.165 lb/lb-mol		68.00 °F		0.0880 psia			106.165 lb/lb-mol				7.757%	6.416%	0.023%	0.114%

NOTES

1. Liquid composition of residual liquid based on SPL flash analysis (see TABLE E-3c).
2. Vapor pressure data for unknowns based on: Pentadecane (n-)

TABLE F-2
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		CLYD-SV-V1S				
Service		Pipeline Liquids				
Capacity		530 gal			530 gal	
Temperature of Stored Liquid		56.84 °F			84.59 °F	
Vapor Pressure		4.9552 psia			8.1762 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		0.13 turnover/yr				
		71 gal/yr			530 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					43.8327 lbs/month	
		282.2447 lb/yr			0.0589 lb/hr	
Working Losses		**7.79E-03** lb/gal			**1.01E-02** lb/gal	
		0.5490 lb/yr	Average	Maximum	5.3346 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.1156 lb/hr	0.5064 tpy	358.84% by weight	0.2114 lb/hr
	Work		0.0002 lb/hr	0.0010 tpy		19.1425 lb/hr
	Total		0.1158 lb/hr	0.5074 tpy		19.3540 lb/hr
CO_{2-e}		5398.27% by weight	1.7427 lb/hr	7.6330 tpy	5398.27% by weight	291 lb/hr
CO_2		7.83% by weight	0.0025 lb/hr	0.0111 tpy	7.83% by weight	0.4225 lb/hr
TOC (Total)		351.00% by weight	0.1133 lb/hr	0.4963 tpy	351.00% by weight	18.9314 lb/hr
Methane		215.62% by weight	0.0696 lb/hr	0.3049 tpy	215.62% by weight	11.6293 lb/hr
Ethane		35.39% by weight	0.0114 lb/hr	0.0500 tpy	35.39% by weight	1.9086 lb/hr
VOC (Total)		100.00% by weight	0.0323 lb/hr	0.1414 tpy	100.00% by weight	5.3935 lb/hr
HAP (Total)		6.23% by weight	0.0020 lb/hr	0.0088 tpy	6.23% by weight	0.3359 lb/hr
Benzene		1.5063% by weight	4.86E-04 lb/hr	2.13E-03 tpy	1.5063% by weight	8.12E-02 lb/hr
Ethylbenzene		0.0477% by weight	1.54E-05 lb/hr	6.74E-05 tpy	0.0477% by weight	2.57E-03 lb/hr
Hexane (n-)		2.8866% by weight	9.32E-04 lb/hr	4.08E-03 tpy	2.8866% by weight	1.56E-01 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	4.41E-04 lb/hr	1.93E-03 tpy	1.3668% by weight	7.37E-02 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	4.48E-06 lb/hr	1.96E-05 tpy	0.0139% by weight	7.49E-04 lb/hr
Xylenes		0.4073% by weight	1.31E-04 lb/hr	5.76E-04 tpy	0.4073% by weight	2.20E-02 lb/hr

NOTES

1. Tank Characteristics:

		TANKS 4.09d			
Orientation	Vertical Fixed Roof Tank		Above Ground?	Yes	
Height/Length	10.83 ft	10.83 ft	Shell/Roof Color	Gray/Medium	or less solar
Diameter	5.00 ft		Shell Condition	Good	absorptance
Capacity (estimated)	1,591 gal		Vacuum Setting	-0.03 psig	
Capacity (nominal)	1,590 gal		Pressure Setting	0.03 psig	

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Toledo, Ohio
Material	Gasoline (RVP 10)	Selection based on VOC vapor pressure (see TABLE F-1).	
Liquid Molecular Weight	92.00 lb/lb-mol	Vapor Molecular Weight	66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.5928	4.0125	41.74	47.10	8.2282	8.9768	1,590
February	28	3.7908	4.3550	44.33	51.15	10.1377	9.4717	1,590
March	31	4.3224	5.1309	50.78	59.45	16.7093	10.7997	1,590
April	30	4.9749	6.1598	57.87	69.03	24.8157	12.4300	1,590
May	31	5.6532	7.1986	64.49	77.48	35.3718	14.1250	1,590
June	30	6.2211	8.0083	69.56	83.42	41.8397	15.5439	1,590
July	31	6.4052	8.1762	71.12	84.59	43.8327	16.0038	1,590
August	31	6.1405	7.6954	68.86	81.18	37.6080	15.3426	1,590
September	30	5.5821	6.8015	63.83	74.37	27.1777	13.9474	1,590
October	31	4.8396	5.7058	56.46	64.98	18.7576	12.0922	1,590
November	30	4.2150	4.7293	49.53	55.29	10.2743	10.5316	1,590
December	31	3.7246	4.1032	43.48	48.20	7.4919	9.3061	1,590
ALL	365	4.9552	8.1762	56.84	84.59	282.2447	148.5708	19,080

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01

4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-3
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		CLYD-SV-V1D				
Service		Pipeline Liquids				
Capacity		530 gal			530 gal	
Temperature of Stored Liquid		56.84 °F			84.59 °F	
Vapor Pressure		4.9552 psia			8.1762 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		0.13 turnover/yr				
		71 gal/yr			530 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					43.8327 lbs/month	
		282.2447 lb/yr			0.0589 lb/hr	
Working Losses		**7.79E-03** lb/gal			**1.01E-02** lb/gal	
		0.5490 lb/yr	Average	Maximum	5.3346 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.1156 lb/hr	0.5064 tpy	358.84% by weight	0.2114 lb/hr
	Work		0.0002 lb/hr	0.0010 tpy		19.1425 lb/hr
	Total		0.1158 lb/hr	0.5074 tpy		19.3540 lb/hr
CO_{2-e}		5398.27% by weight	1.7427 lb/hr	7.6330 tpy	5398.27% by weight	291 lb/hr
CO_2		7.83% by weight	0.0025 lb/hr	0.0111 tpy	7.83% by weight	0.4225 lb/hr
TOC (Total)		351.00% by weight	0.1133 lb/hr	0.4963 tpy	351.00% by weight	18.9314 lb/hr
Methane		215.62% by weight	0.0696 lb/hr	0.3049 tpy	215.62% by weight	11.6293 lb/hr
Ethane		35.39% by weight	0.0114 lb/hr	0.0500 tpy	35.39% by weight	1.9086 lb/hr
VOC (Total)		100.00% by weight	0.0323 lb/hr	0.1414 tpy	100.00% by weight	5.3935 lb/hr
HAP (Total)		6.23% by weight	0.0020 lb/hr	0.0088 tpy	6.23% by weight	0.3359 lb/hr
Benzene		1.5063% by weight	4.86E-04 lb/hr	2.13E-03 tpy	1.5063% by weight	8.12E-02 lb/hr
Ethylbenzene		0.0477% by weight	1.54E-05 lb/hr	6.74E-05 tpy	0.0477% by weight	2.57E-03 lb/hr
Hexane (n-)		2.8866% by weight	9.32E-04 lb/hr	4.08E-03 tpy	2.8866% by weight	1.56E-01 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	4.41E-04 lb/hr	1.93E-03 tpy	1.3668% by weight	7.37E-02 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	4.48E-06 lb/hr	1.96E-05 tpy	0.0139% by weight	7.49E-04 lb/hr
Xylenes		0.4073% by weight	1.31E-04 lb/hr	5.76E-04 tpy	0.4073% by weight	2.20E-02 lb/hr

NOTES

1. Tank Characteristics:

		TANKS 4.09d			
Orientation	Vertical Fixed Roof Tank		Above Ground?	Yes	
Height/Length	10.83 ft	10.83 ft	Shell/Roof Color	Gray/Medium	or less solar
Diameter	5.00 ft		Shell Condition	Good	absorptance
Capacity (estimated)	1,591 gal		Vacuum Setting	-0.03 psig	
Capacity (nominal)	1,590 gal		Pressure Setting	0.03 psig	

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Toledo, Ohio
Material	Gasoline (RVP 10)	Selection based on VOC vapor pressure (see TABLE F-1).	
Liquid Molecular Weight	92.00 lb/lb-mol	Vapor Molecular Weight	66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.5928	4.0125	41.74	47.10	8.2282	8.9768	1,590
February	28	3.7908	4.3550	44.33	51.15	10.1377	9.4717	1,590
March	31	4.3224	5.1309	50.78	59.45	16.7093	10.7997	1,590
April	30	4.9749	6.1598	57.87	69.03	24.8157	12.4300	1,590
May	31	5.6532	7.1986	64.49	77.48	35.3718	14.1250	1,590
June	30	6.2211	8.0083	69.56	83.42	41.8397	15.5439	1,590
July	31	6.4052	8.1762	71.12	84.59	43.8327	16.0038	1,590
August	31	6.1405	7.6954	68.86	81.18	37.6080	15.3426	1,590
September	30	5.5821	6.8015	63.83	74.37	27.1777	13.9474	1,590
October	31	4.8396	5.7058	56.46	64.98	18.7576	12.0922	1,590
November	30	4.2150	4.7293	49.53	55.29	10.2743	10.5316	1,590
December	31	3.7246	4.1032	43.48	48.20	7.4919	9.3061	1,590
ALL	365	4.9552	8.1762	56.84	84.59	282.2447	148.5708	19,080

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01

4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-4
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		CLYD-SV-V1C1				
Service		Pipeline Liquids				
Capacity		400 gal			400 gal	
Temperature of Stored Liquid		56.84 °F			84.59 °F	
Vapor Pressure		4.9552 psia			8.1762 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		0.13 turnover/yr				
		53 gal/yr			400 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					34.5057 lbs/month	
		221.4637 lb/yr			0.0464 lb/hr	
Working Losses		**7.79E-03** lb/gal			**1.01E-02** lb/gal	
		0.4144 lb/yr	Average	Maximum	4.0261 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.0907 lb/hr	0.3973 tpy	358.84% by weight	0.1664 lb/hr
	Work		0.0002 lb/hr	0.0007 tpy		14.4472 lb/hr
	Total		0.0909 lb/hr	0.3981 tpy		14.6136 lb/hr
CO_{2-e}		5398.27% by weight	1.3673 lb/hr	5.9888 tpy	5398.27% by weight	220 lb/hr
CO_2		7.83% by weight	0.0020 lb/hr	0.0087 tpy	7.83% by weight	0.3190 lb/hr
TOC (Total)		351.00% by weight	0.0889 lb/hr	0.3894 tpy	351.00% by weight	14.2946 lb/hr
Methane		215.62% by weight	0.0546 lb/hr	0.2392 tpy	215.62% by weight	8.7810 lb/hr
Ethane		35.39% by weight	0.0090 lb/hr	0.0393 tpy	35.39% by weight	1.4411 lb/hr
VOC (Total)		100.00% by weight	0.0253 lb/hr	0.1109 tpy	100.00% by weight	4.0725 lb/hr
HAP (Total)		6.23% by weight	0.0016 lb/hr	0.0069 tpy	6.23% by weight	0.2537 lb/hr
Benzene		1.5063% by weight	3.82E-04 lb/hr	1.67E-03 tpy	1.5063% by weight	6.13E-02 lb/hr
Ethylbenzene		0.0477% by weight	1.21E-05 lb/hr	5.29E-05 tpy	0.0477% by weight	1.94E-03 lb/hr
Hexane (n-)		2.8866% by weight	7.31E-04 lb/hr	3.20E-03 tpy	2.8866% by weight	1.18E-01 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	3.46E-04 lb/hr	1.52E-03 tpy	1.3668% by weight	5.57E-02 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	3.52E-06 lb/hr	1.54E-05 tpy	0.0139% by weight	5.65E-04 lb/hr
Xylenes		0.4073% by weight	1.03E-04 lb/hr	4.52E-04 tpy	0.4073% by weight	1.66E-02 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	10.00 ft	Shell/Roof Color	Gray/Medium or less solar
Diameter	4.50 ft	Shell Condition	Good absorptance
Capacity (estimated)	1,190 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	1,200 gal	Pressure Setting	0.03 psig

2. Stored Liquid Characteristics:

Basis: USEPA TANKS 4.09d — MET Station: Toledo, Ohio
Material: Gasoline (RVP 10) — Selection based on VOC vapor pressure (see TABLE F-1).
Liquid Molecular Weight: 92.00 lb/lb-mol — Vapor Molecular Weight: 66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.5928	4.0125	41.74	47.10	6.4036	6.7750	1,200
February	28	3.7908	4.3550	44.33	51.15	7.8983	7.1484	1,200
March	31	4.3224	5.1309	50.78	59.45	13.0531	8.1507	1,200
April	30	4.9749	6.1598	57.87	69.03	19.4404	9.3812	1,200
May	31	5.6532	7.1986	64.49	77.48	27.7794	10.6604	1,200
June	30	6.2211	8.0083	69.56	83.42	32.9188	11.7313	1,200
July	31	6.4052	8.1762	71.12	84.59	34.5057	12.0783	1,200
August	31	6.1405	7.6954	68.86	81.18	29.5821	11.5793	1,200
September	30	5.5821	6.8015	63.83	74.37	21.3389	10.5263	1,200
October	31	4.8396	5.7058	56.46	64.98	14.6865	9.1262	1,200
November	30	4.2150	4.7293	49.53	55.29	8.0221	7.9484	1,200
December	31	3.7246	4.1032	43.48	48.20	5.8349	7.0235	1,200
ALL	365	4.9552	8.1762	56.84	84.59	221.4637	112.1289	14,400

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-5
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		CLYD-SV-V2				
Service		Pipeline Liquids				
Capacity		317 gal			317 gal	
Temperature of Stored Liquid		56.84 °F			84.59 °F	
Vapor Pressure		4.9552 psia			8.1762 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		12.63 turnover/yr				
		4,000 gal/yr			317 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					27.2006 lbs/month	
		174.5332 lb/yr			0.0366 lb/hr	
Working Losses		**7.79E-03** lb/gal			**1.01E-02** lb/gal	
		31.1469 lb/yr	Average	Maximum	3.1873 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.0715 lb/hr	0.3131 tpy	358.84% by weight	0.1312 lb/hr
	Work		0.0128 lb/hr	0.0559 tpy		11.4374 lb/hr
	Total		0.0843 lb/hr	0.3690 tpy		11.5686 lb/hr
CO_{2-e}		5398.27% by weight	1.2675 lb/hr	5.5516 tpy	5398.27% by weight	174 lb/hr
CO_2		7.83% by weight	0.0018 lb/hr	0.0081 tpy	7.83% by weight	0.2526 lb/hr
TOC (Total)		351.00% by weight	0.0824 lb/hr	0.3610 tpy	351.00% by weight	11.3160 lb/hr
Methane		215.62% by weight	0.0506 lb/hr	0.2217 tpy	215.62% by weight	6.9513 lb/hr
Ethane		35.39% by weight	0.0083 lb/hr	0.0364 tpy	35.39% by weight	1.1408 lb/hr
VOC (Total)		100.00% by weight	0.0235 lb/hr	0.1028 tpy	100.00% by weight	3.2239 lb/hr
HAP (Total)		6.23% by weight	0.0015 lb/hr	0.0064 tpy	6.23% by weight	0.2008 lb/hr
Benzene		1.5063% by weight	3.54E-04 lb/hr	1.55E-03 tpy	1.5063% by weight	4.86E-02 lb/hr
Ethylbenzene		0.0477% by weight	1.12E-05 lb/hr	4.90E-05 tpy	0.0477% by weight	1.54E-03 lb/hr
Hexane (n-)		2.8866% by weight	6.78E-04 lb/hr	2.97E-03 tpy	2.8866% by weight	9.31E-02 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	3.21E-04 lb/hr	1.41E-03 tpy	1.3668% by weight	4.41E-02 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	3.26E-06 lb/hr	1.43E-05 tpy	0.0139% by weight	4.48E-04 lb/hr
Xylenes		0.4073% by weight	9.56E-05 lb/hr	4.19E-04 tpy	0.4073% by weight	1.31E-02 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	10.00 ft	Shell/Roof Color	Gray/Medium or less solar
Diameter	4.00 ft	Shell Condition	Good absorptance
Capacity (estimated)	940 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	950 gal	Pressure Setting	0.03 psig

2. Stored Liquid Characteristics:

Basis: USEPA TANKS 4.09d — MET Station: Toledo, Ohio
Material: Gasoline (RVP 10) — Selection based on VOC vapor pressure (see TABLE F-1).
Liquid Molecular Weight: 92.00 lb/lb-mol — Vapor Molecular Weight: 66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.5928	4.0125	41.74	47.10	5.0433	5.3635	950
February	28	3.7908	4.3550	44.33	51.15	6.2211	5.6592	950
March	31	4.3224	5.1309	50.78	59.45	10.2834	6.4527	950
April	30	4.9749	6.1598	57.87	69.03	15.3188	7.4268	950
May	31	5.6532	7.1986	64.49	77.48	21.8942	8.4394	950
June	30	6.2211	8.0083	69.56	83.42	25.9486	9.2873	950
July	31	6.4052	8.1762	71.12	84.59	27.2006	9.5620	950
August	31	6.1405	7.6954	68.86	81.18	23.3180	9.1670	950
September	30	5.5821	6.8015	63.83	74.37	16.8178	8.3333	950
October	31	4.8396	5.7058	56.46	64.98	11.5723	7.2249	950
November	30	4.2150	4.7293	49.53	55.29	6.3196	6.2925	950
December	31	3.7246	4.1032	43.48	48.20	4.5957	5.5603	950
ALL	365	4.9552	8.1762	56.84	84.59	174.5332	88.7687	11,400

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-6
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		CLYD-SV-V4SD				
Service		Pipeline Liquids				
Capacity		43 gal			43 gal	
Temperature of Stored Liquid		56.84 °F			84.59 °F	
Vapor Pressure		4.9552 psia			8.1762 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		0.13 turnover/yr				
		6 gal/yr			43 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					4.3061 lbs/month	
		27.3530 lb/yr			0.0058 lb/hr	
Working Losses		**7.79E-03** lb/gal			**1.01E-02** lb/gal	
		0.0449 lb/yr	Average	Maximum	0.4362 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.0112 lb/hr	0.0491 tpy	358.84% by weight	0.0208 lb/hr
	Work		0.0000 lb/hr	0.0001 tpy		1.5651 lb/hr
	Total		0.0112 lb/hr	0.0492 tpy		1.5859 lb/hr
CO_{2-e}		5398.27% by weight	0.1688 lb/hr	0.7395 tpy	5398.27% by weight	24 lb/hr
CO_2		7.83% by weight	0.0002 lb/hr	0.0011 tpy	7.83% by weight	0.0346 lb/hr
TOC (Total)		351.00% by weight	0.0110 lb/hr	0.0481 tpy	351.00% by weight	1.5513 lb/hr
Methane		215.62% by weight	0.0067 lb/hr	0.0295 tpy	215.62% by weight	0.9529 lb/hr
Ethane		35.39% by weight	0.0011 lb/hr	0.0048 tpy	35.39% by weight	0.1564 lb/hr
VOC (Total)		100.00% by weight	0.0031 lb/hr	0.0137 tpy	100.00% by weight	0.4419 lb/hr
HAP (Total)		6.23% by weight	0.0002 lb/hr	0.0009 tpy	6.23% by weight	0.0275 lb/hr
Benzene		1.5063% by weight	4.71E-05 lb/hr	2.06E-04 tpy	1.5063% by weight	6.66E-03 lb/hr
Ethylbenzene		0.0477% by weight	1.49E-06 lb/hr	6.53E-06 tpy	0.0477% by weight	2.11E-04 lb/hr
Hexane (n-)		2.8866% by weight	9.03E-05 lb/hr	3.95E-04 tpy	2.8866% by weight	1.28E-02 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	4.27E-05 lb/hr	1.87E-04 tpy	1.3668% by weight	6.04E-03 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	4.34E-07 lb/hr	1.90E-06 tpy	0.0139% by weight	6.14E-05 lb/hr
Xylenes		0.4073% by weight	1.27E-05 lb/hr	5.58E-05 tpy	0.4073% by weight	1.80E-03 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank		Above Ground?	Yes	
Height/Length	8.00 ft		Shell/Roof Color	Gray/Medium	or less solar
Diameter	1.67 ft	1.67 ft	Shell Condition	Good	absorptance
Capacity (estimated)	131 gal		Vacuum Setting	-0.03 psig	
Capacity (nominal)	130 gal		Pressure Setting	0.03 psig	

2. Stored Liquid Characteristics:

Basis: USEPA TANKS 4.09d — MET Station: Toledo, Ohio
Material: Gasoline (RVP 10) — Selection based on VOC vapor pressure (see TABLE F-1).
Liquid Molecular Weight: 92.00 lb/lb-mol — Vapor Molecular Weight: 66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.5928	4.0125	41.74	47.10	0.7707	0.7340	130
February	28	3.7908	4.3550	44.33	51.15	0.9538	0.7744	130
March	31	4.3224	5.1309	50.78	59.45	1.5895	0.8830	130
April	30	4.9749	6.1598	57.87	69.03	2.3885	1.0163	130
May	31	5.6532	7.1986	64.49	77.48	3.4403	1.1549	130
June	30	6.2211	8.0083	69.56	83.42	4.1008	1.2709	130
July	31	6.4052	8.1762	71.12	84.59	4.3061	1.3085	130
August	31	6.1405	7.6954	68.86	81.18	3.6823	1.2544	130
September	30	5.5821	6.8015	63.83	74.37	2.6406	1.1403	130
October	31	4.8396	5.7058	56.46	64.98	1.8013	0.9887	130
November	30	4.2150	4.7293	49.53	55.29	0.9753	0.8611	130
December	31	3.7246	4.1032	43.48	48.20	0.7038	0.7609	130
ALL	365	4.9552	8.1762	56.84	84.59	27.3530	12.1473	1,560

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-7
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		CLYD-TK-V5				
Service		Pipeline Liquids				
Capacity		2,000 gal			2,000 gal	
Temperature of Stored Liquid		56.84 °F			84.59 °F	
Vapor Pressure		4.9552 psia			8.1762 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		2.00 turnover/yr				
		4,000 gal/yr			2,000 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					86.2423 lbs/month	
		541.1429 lb/yr			0.1159 lb/hr	
Working Losses		**7.79E-03** lb/gal			**1.01E-02** lb/gal	
		31.1469 lb/yr	Average	Maximum	20.1305 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.2217 lb/hr	0.9709 tpy	358.84% by weight	0.4160 lb/hr
	Work		0.0128 lb/hr	0.0559 tpy		72.2360 lb/hr
	Total		0.2344 lb/hr	1.0268 tpy		72.6520 lb/hr
CO_{2-e}		5398.27% by weight	3.5267 lb/hr	15.4469 tpy	5398.27% by weight	1,093 lb/hr
CO_2		7.83% by weight	0.0051 lb/hr	0.0224 tpy	7.83% by weight	1.5861 lb/hr
TOC (Total)		351.00% by weight	0.2293 lb/hr	1.0044 tpy	351.00% by weight	71.0659 lb/hr
Methane		215.62% by weight	0.1409 lb/hr	0.6170 tpy	215.62% by weight	43.6548 lb/hr
Ethane		35.39% by weight	0.0231 lb/hr	0.1013 tpy	35.39% by weight	7.1646 lb/hr
VOC (Total)		100.00% by weight	0.0653 lb/hr	0.2861 tpy	100.00% by weight	20.2464 lb/hr
HAP (Total)		6.23% by weight	0.0041 lb/hr	0.0178 tpy	6.23% by weight	1.2611 lb/hr
Benzene		1.5063% by weight	9.84E-04 lb/hr	4.31E-03 tpy	1.5063% by weight	3.05E-01 lb/hr
Ethylbenzene		0.0477% by weight	3.11E-05 lb/hr	1.36E-04 tpy	0.0477% by weight	9.65E-03 lb/hr
Hexane (n-)		2.8866% by weight	1.89E-03 lb/hr	8.26E-03 tpy	2.8866% by weight	5.84E-01 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	8.93E-04 lb/hr	3.91E-03 tpy	1.3668% by weight	2.77E-01 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	9.07E-06 lb/hr	3.97E-05 tpy	0.0139% by weight	2.81E-03 lb/hr
Xylenes		0.4073% by weight	2.66E-04 lb/hr	1.17E-03 tpy	0.4073% by weight	8.25E-02 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	5.00 ft	Shell/Roof Color	Gray/Medium
Diameter	8.00 ft	Shell Condition	Good
Capacity (estimated)	1,880 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	2,000 gal	Pressure Setting	0.03 psig

or less solar absorptance

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Toledo, Ohio
Material	Gasoline (RVP 10)	Selection based on VOC vapor pressure (see TABLE F-1).	
Liquid Molecular Weight	92.00 lb/lb-mol	Vapor Molecular Weight	66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.5928	4.0125	41.74	47.10	14.7876	11.2916	2,000
February	28	3.7908	4.3550	44.33	51.15	18.3728	11.9140	2,000
March	31	4.3224	5.1309	50.78	59.45	30.9144	13.5846	2,000
April	30	4.9749	6.1598	57.87	69.03	46.9418	15.6353	2,000
May	31	5.6532	7.1986	64.49	77.48	68.2645	17.7673	2,000
June	30	6.2211	8.0083	69.56	83.42	81.9533	19.5521	2,000
July	31	6.4052	8.1762	71.12	84.59	86.2423	20.1305	2,000
August	31	6.1405	7.6954	68.86	81.18	73.5167	19.2988	2,000
September	30	5.5821	6.8015	63.83	74.37	52.3471	17.5438	2,000
October	31	4.8396	5.7058	56.46	64.98	35.3285	15.2103	2,000
November	30	4.2150	4.7293	49.53	55.29	18.9336	13.2473	2,000
December	31	3.7246	4.1032	43.48	48.20	13.5403	11.7058	2,000
ALL	365	4.9552	8.1762	56.84	84.59	541.1429	186.8815	24,000

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01

4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-8
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		CLYD-TK-OIL1					
Service		Oil					
Capacity		570 gal			570 gal		
Temperature of Stored Liquid		56.84 °F			84.59 °F		
Vapor Pressure		0.0061 psia			0.0138 psia		
Pumping Rate		150 gal/min			150 gal/min		
Throughput		365.00 turnover/yr					
		208,050 gal/yr			570 gal/hr		
Standing Losses					**July**		
					744 hrs/month		
					0.0266 lbs/month		
		0.1648 lb/yr			0.00004 lb/hr		
Working Losses		**1.90E-05** lb/gal			**2.89E-05** lb/gal		
		3.9504 lb/yr	Average	Maximum	0.0165 lb/hr		Maximum
Liquid	Stand	100.00% by weight	0.0000 lb/hr	0.0001 tpy	100.00% by weight		0.0000 lb/hr
	Work		0.0005 lb/hr	0.0020 tpy			0.0165 lb/hr
	Total		0.0005 lb/hr	0.0021 tpy			0.0165 lb/hr
TOC (Total)		100.00% by weight	0.0005 lb/hr	0.0021 tpy	100.00% by weight		0.0165 lb/hr
Methane							
Ethane							
VOC (Total)		100.00% by weight	0.0005 lb/hr	0.0021 tpy	100.00% by weight		0.0165 lb/hr
HAP (Total)							
Benzene							
Ethylbenzene							
Hexane (n-)							
Methanol							
Naphthalene							
Toluene							
Trimethylpentane (2,2,4-)							
Xylenes							

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	6.00 ft	Shell/Roof Color	Gray/Medium or less solar
Diameter	4.00 ft	Shell Condition	Good absorptance
Capacity (estimated)	564 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	570 gal	Pressure Setting	0.03 psig

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Toledo, Ohio
Material	Distillate fuel oil no. 2	Selected purely for a worst-case scenario.	
Liquid Molecular Weight	188.00 lb/lb-mol	Vapor Molecular Weight	130.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	0.0033	0.0041	41.74	47.10	0.0040	0.0059	570
February	28	0.0037	0.0047	44.33	51.15	0.0051	0.0065	570
March	31	0.0047	0.0064	50.78	59.45	0.0090	0.0082	570
April	30	0.0061	0.0088	57.87	69.03	0.0144	0.0107	570
May	31	0.0076	0.0112	64.49	77.48	0.0214	0.0134	570
June	30	0.0089	0.0134	69.56	83.42	0.0254	0.0157	570
July	31	0.0093	0.0138	71.12	84.59	0.0266	0.0165	570
August	31	0.0087	0.0125	68.86	81.18	0.0228	0.0154	570
September	30	0.0075	0.0103	63.83	74.37	0.0163	0.0132	570
October	31	0.0058	0.0077	56.46	64.98	0.0107	0.0102	570
November	30	0.0044	0.0056	49.53	55.29	0.0054	0.0078	570
December	31	0.0036	0.0042	43.48	48.20	0.0037	0.0063	570
ALL	365	0.0061	0.0138	56.84	84.59	0.1648	0.1299	6,840

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. There is no basis for speciation of emissions.

TABLE F-9
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		CLYD-TK-OW1				
Service		Oily Water				
Capacity		3,000 gal			3,000 gal	
Temperature of Stored Liquid		56.84 °F			84.59 °F	
Vapor Pressure		0.0061 psia			0.0138 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		12.00 turnover/yr				
		36,000 gal/yr			3,000 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					0.1682 lbs/month	
		1.0442 lb/yr			0.00023 lb/hr	
Working Losses		**1.90E-05** lb/gal			**2.89E-05** lb/gal	
		0.6836 lb/yr	Average	Maximum	0.0867 lb/hr	Maximum
Liquid	Stand	100.00% by weight	0.0001 lb/hr	0.0005 tpy	100.00% by weight	0.0002 lb/hr
	Work		0.0001 lb/hr	0.0003 tpy		0.0867 lb/hr
	Total		0.0002 lb/hr	0.0009 tpy		0.0869 lb/hr
TOC (Total)		100.00% by weight	0.0002 lb/hr	0.0009 tpy	100.00% by weight	0.0869 lb/hr
Methane						
Ethane						
VOC (Total)		100.00% by weight	0.0002 lb/hr	0.0009 tpy	100.00% by weight	0.0869 lb/hr
HAP (Total)						
Benzene						
Ethylbenzene						
Hexane (n-)						
Methanol						
Naphthalene						
Toluene						
Trimethylpentane (2,2,4-)						
Xylenes						

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Horizontal Tank		Above Ground?	Yes	
Height/Length	18.00 ft		Shell/Roof Color	Gray/Medium	or less solar
Diameter	5.38 ft	5.38 ft	Shell Condition	Good	absorptance
Capacity (estimated)	3,055 gal		Vacuum Setting	-0.03 psig	
Capacity (nominal)	3,000 gal		Pressure Setting	0.03 psig	

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Toledo, Ohio
Material	Distillate fuel oil no. 2	Selected purely for a worst-case scenario.	
Liquid Molecular Weight	188.00 lb/lb-mol	Vapor Molecular Weight	130.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	0.0033	0.0041	41.74	47.10	0.0252	0.0310	3,000
February	28	0.0037	0.0047	44.33	51.15	0.0325	0.0344	3,000
March	31	0.0047	0.0064	50.78	59.45	0.0571	0.0432	3,000
April	30	0.0061	0.0088	57.87	69.03	0.0915	0.0564	3,000
May	31	0.0076	0.0112	64.49	77.48	0.1357	0.0708	3,000
June	30	0.0089	0.0134	69.56	83.42	0.1607	0.0825	3,000
July	31	0.0093	0.0138	71.12	84.59	0.1682	0.0867	3,000
August	31	0.0087	0.0125	68.86	81.18	0.1443	0.0809	3,000
September	30	0.0075	0.0103	63.83	74.37	0.1035	0.0692	3,000
October	31	0.0058	0.0077	56.46	64.98	0.0681	0.0538	3,000
November	30	0.0044	0.0056	49.53	55.29	0.0340	0.0412	3,000
December	31	0.0036	0.0042	43.48	48.20	0.0233	0.0333	3,000
ALL	365	0.0061	0.0138	56.84	84.59	1.0442	0.6836	36,000

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. There is no basis for speciation of emissions.

TABLE F-10
Volatile Organic Liquids Loading (Tanker Trucks)
Hourly and Annual Emission Estimates

Source	CLYD-TL-PL				
Supply Vessel	CLYD-TK-V5				
	Pipeline Liquids				
	2,000 gal			2,000 gal	
Tanker Truck Service	Dedicated Normal			Dedicated Normal	
Loading Method	Submerged			Submerged	
Saturation Factor	0.60 n.d.			0.60 n.d.	
Vapor Molecular Weight	66.00 lb/lb-mol			66.00 lb/lb-mol	
Bulk Liquid Temperature	56.84 °F			84.59 °F	
	516.84 R			544.59 R	
Vapor Pressure	4.9552 psia			8.1762 psia	
Loading Loss Factor	4.7306 lb/kgal			7.4079 lb/kgal	
Pumping Rate				150 gpm	
Throughput	2.00 turnover/yr				
	4,000 gal/yr			2,000 gal/hr	
Loading Losses	18.9226 lb/yr	Average	Maximum	14.8158 lb/hr	Maximum
Residual Liquid	358.84% by weight	0.0078 lb/hr	0.0340 tpy	358.84% by weight	53.1648 lb/hr
CO_{2-e}	5398.27% by weight	0.1166 lb/hr	0.5107 tpy	5398.27% by weight	799.7969 lb/hr
CO_2	7.83% by weight	0.0002 lb/hr	0.0007 tpy	7.83% by weight	1.1606 lb/hr
TOC (Total)	351.00% by weight	0.0076 lb/hr	0.0332 tpy	351.00% by weight	52.0041 lb/hr
Methane	215.62% by weight	0.0047 lb/hr	0.0204 tpy	215.62% by weight	31.9455 lb/hr
Ethane	35.39% by weight	0.0008 lb/hr	0.0033 tpy	35.39% by weight	5.2429 lb/hr
VOC (Total)	100.00% by weight	0.0022 lb/hr	0.0095 tpy	100.00% by weight	14.8158 lb/hr
HAP (Total)	6.23% by weight	0.0001 lb/hr	0.0006 tpy	6.23% by weight	0.9228 lb/hr
Benzene	1.5063% by weight	3.25E-05 lb/hr	1.43E-04 tpy	1.5063% by weight	2.23E-01 lb/hr
Ethylbenzene	0.0477% by weight	1.03E-06 lb/hr	4.51E-06 tpy	0.0477% by weight	7.06E-03 lb/hr
Hexane (n-)	2.8866% by weight	6.24E-05 lb/hr	2.73E-04 tpy	2.8866% by weight	4.28E-01 lb/hr
Methanol					
Naphthalene					
Toluene	1.3668% by weight	2.95E-05 lb/hr	1.29E-04 tpy	1.3668% by weight	2.03E-01 lb/hr
Trimethylpentane (2,2,4-)	0.0139% by weight	3.00E-07 lb/hr	1.31E-06 tpy	0.0139% by weight	2.06E-03 lb/hr
Xylenes	0.4073% by weight	8.80E-06 lb/hr	3.85E-05 tpy	0.4073% by weight	6.04E-02 lb/hr

NOTES

1. Emissions calculated using methods provided in USEPA, AP-42 Section 5.2 dated 1/95. $L_L = 12.46[(S)M_VP/T]$
2. Physical property, throughput and speciation data based data from supply vessel emission calculation spreadsheet.

TABLE F-11
Volatile Organic Liquids Loading (Tanker Trucks)
Hourly and Annual Emission Estimates

Source	CLYD-TL-OIL				
Supply Vessel	CLYD-TK-OIL1				
	Oil				
	570 gal			570 gal	
Tanker Truck Service	Dedicated Normal			Dedicated Normal	
Loading Method	Splash			Splash	
Saturation Factor	1.45 n.d.			1.45 n.d.	
Vapor Molecular Weight	130.00 lb/lb-mol			130.00 lb/lb-mol	
Bulk Liquid Temperature	56.84 °F			84.59 °F	
	516.84 R			544.59 R	
Vapor Pressure	0.0061 psia			0.0138 psia	
Loading Loss Factor	0.0279 lb/kgal			0.0597 lb/kgal	
Pumping Rate				150 gpm	
Throughput	12.00 turnover/yr				
	6,840 gal/yr			570 gal/hr	
Loading Losses	0.1907 lb/yr	Average	Maximum	0.0340 lb/hr	Maximum
Residual Liquid	100.00% by weight	0.00002 lb/hr	0.0001 tpy	100.00% by weight	0.0340 lb/hr
TOC (Total)	100.00% by weight	0.00002 lb/hr	0.0001 tpy	100.00% by weight	0.0340 lb/hr
Methane					
Ethane					
VOC (Total)	100.00% by weight	0.00002 lb/hr	0.0001 tpy	100.00% by weight	0.0340 lb/hr
HAP (Total)					
Benzene					
Ethylbenzene					
Hexane (n-)					
Methanol					
Naphthalene					
Toluene					
Trimethylpentane (2,2,4-)					
Xylenes					

NOTES

1. Emissions calculated using methods provided in USEPA, AP-42 Section 5.2 dated 1/95. $L_L = 12.46[(S)M_VP/T]$
2. Physical property, throughput and speciation data based data from supply vessel emission calculation spreadsheet.

TABLE F-12
Volatile Organic Liquids Loading (Tanker Trucks)
Hourly and Annual Emission Estimates

Source	CLYD-TL-OW				
Supply Vessel	CLYD-TK-OW1				
	Oily Water				
	3,000 gal			3,000 gal	
Tanker Truck Service	Dedicated Normal			Dedicated Normal	
Loading Method	Splash			Splash	
Saturation Factor	1.45 n.d.			1.45 n.d.	
Vapor Molecular Weight	130.00 lb/lb-mol			130.00 lb/lb-mol	
Bulk Liquid Temperature	56.84 °F			84.59 °F	
	516.84 R			544.59 R	
Vapor Pressure	0.0061 psia			0.0138 psia	
Loading Loss Factor	0.0279 lb/kgal			0.0597 lb/kgal	
Pumping Rate				150 gpm	
Throughput	12.00 turnover/yr				
	36,000 gal/yr			3,000 gal/hr	
Loading Losses	1.0036 lb/yr	Average	Maximum	0.1790 lb/hr	Maximum
Residual Liquid	100.00% by weight	0.00011 lb/hr	0.0005 tpy	100.00% by weight	0.1790 lb/hr
TOC (Total)	100.00% by weight	0.00011 lb/hr	0.0005 tpy	100.00% by weight	0.1790 lb/hr
Methane					
Ethane					
VOC (Total)	100.00% by weight	0.00011 lb/hr	0.0005 tpy	100.00% by weight	0.1790 lb/hr
HAP (Total)					
Benzene					
Ethylbenzene					
Hexane (n-)					
Methanol					
Naphthalene					
Toluene					
Trimethylpentane (2,2,4-)					
Xylenes					

NOTES

1. Emissions calculated using methods provided in USEPA, AP-42 Section 5.2 dated 1/95. $L_L = 12.46[(S)M_VP/T]$
2. Physical property, throughput and speciation data based data from supply vessel emission calculation spreadsheet.

TABLE G-1a
Gas Releases
Hourly and Annual Emission Estimates

Category	Station Operations					
Source	CLYD-GR-ST			CLYD-GR-PL		
	Avg. Hourly	Max. Annual	Max. Hourly	Avg. Hourly	Max. Annual	Max. Hourly
Gas Release	1,747 scfh	15,300,000 scf/yr	975,000 scfh	1,615 scfh	14,150,000 scf/yr	5,660,000 scfh
	81 lb/hr	709,230 lb/yr	46,369 lb/hr	75 lb/hr	655,922 lb/yr	269,181 lb/hr
NO_X						
CO						
SO_2						
$PM_{10/2.5}$						
CO_{2-e}	1,827 lb/hr	8,001 tpy	1,031,296 lb/hr	1,689 lb/hr	7,400 tpy	5,986,804 lb/hr
CO_2	1.0787 lb/hr	4.7248 tpy	617.8143 lb/hr	0.9976 lb/hr	4.3697 tpy	3,586.4912 lb/hr
N_2O						
TOC (Total)	79 lb/hr	346 tpy	45,268 lb/hr	73 lb/hr	320 tpy	262,784 lb/hr
Methane	73 lb/hr	320 tpy	41,227 lb/hr	68 lb/hr	296 tpy	239,329 lb/hr
Ethane	4 lb/hr	16 tpy	2,067 lb/hr	3 lb/hr	15 tpy	11,998 lb/hr
VOC (Total)	2.3509 lb/hr	10.2969 tpy	1,973.6004 lb/hr	2.1742 lb/hr	9.5229 tpy	11,457.0035 lb/hr
VOC (non-HAP)	2.1566 lb/hr	9.4457 tpy	1,810.4612 lb/hr	1.9945 lb/hr	8.7357 tpy	10,509.9594 lb/hr
HAP (Total)	0.1943 lb/hr	0.8511 tpy	163.1392 lb/hr	0.1797 lb/hr	0.7872 tpy	947.0441 lb/hr
Acetaldehyde						
Acrolein						
Benzene	0.0686 lb/hr	0.3003 tpy	57.5644 lb/hr	0.0634 lb/hr	0.2778 tpy	334.1689 lb/hr
Biphenyl						
Butadiene (1,3-)						
Carbon Tetrachloride						
Chlorobenzene						
Chloroform						
Dichloropropene (1,3-)						
Ethylbenzene	0.0017 lb/hr	0.0074 tpy	1.4148 lb/hr	0.0016 lb/hr	0.0068 tpy	8.2131 lb/hr
Ethylene Dibromide						
Formaldehyde						
Hexane (n-)	0.0684 lb/hr	0.2996 tpy	57.4203 lb/hr	0.0633 lb/hr	0.2771 tpy	333.3321 lb/hr
Methanol						
Methylene Chloride						
Methylnaphthalene (2-)						
Naphthalene						
PAH						
Phenol						
Propylene Oxide						
Styrene						
Tetrachloroethane (1,1,2,2-)						
Toluene	0.0439 lb/hr	0.1922 tpy	36.8361 lb/hr	0.0406 lb/hr	0.1777 tpy	213.8386 lb/hr
Trichloroethane (1,1,2-)						
Trimethylpentane (2,2,4-)						
Vinyl Chloride						
Xylenes	0.0118 lb/hr	0.0517 tpy	9.9036 lb/hr	0.0109 lb/hr	0.0478 tpy	57.4915 lb/hr

NOTES

1. Gas release estimates based on data for a similar compressor station.
2. Gas density is the value extracted from physical property estimation spreadsheets.

					Density:
Density (Lab):	0.0441 lb/scf				
Density (GC - Avg+):	0.0464 lb/scf	Safety Factor (GC):	103%	Average Plus:	0.0464 lb/scf
Density (GC - Max):	0.0476 lb/scf			Maximum:	0.0476 lb/scf

3. As it will be assumed that Gas Chromatograph (GC) is more representative, the following is used to scaled the extended analysis (Lab).

				Average Plus	Maximum	VOC Specie Scaling:	
VOC (Lab):	0.00128 lb/scf	VOC:	GC	0.00128 lb/scf	0.00188 lb/scf	Average Plus:	100%
	2.91% wt%		Use	2.90% wt%	4.26% wt%	Maximum:	146%
Methane (Lab):	90.19% wt%	Methane (Use):		90.20% wt%	88.91% wt%		
Ethane (Lab):	4.52% wt%	Ethane (Use):		4.52% wt%	4.46% wt%		

TABLE G-2
Natural Gas
Physical Property Estimations

Component				Molecular	Vapor	Stream		
Name (i)	Formula	Type	HAP	Weight M_i $(lb/lb\text{-}mol)_i$	Density ρ_i $(lb/scf)_i$	Mole Fraction $f_{n\text{-}i}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $f_{m\text{-}i}$ $(f_{n\text{-}i}M_i)/\Sigma(f_{n\text{-}i}M_i)$ (lb_i/lb_T)	Volume Fraction $f_{v\text{-}i}$ $f_{m\text{-}i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Nitrogen	N2			28.013	0.0727	0.632%	1.044%	0.633%
Carbon Dioxide	CO2	GHG		44.010	0.1143	0.514%	1.332%	0.514%
Methane	C01H04	GHG		16.042	0.0417	95.390%	90.193%	95.447%
Ethane	C02H06			30.069	0.0781	2.551%	4.522%	2.553%
Propane	C03H08	VOC		44.096	0.1145	0.449%	1.167%	0.449%
Butane (i-)	C04H10	VOC		58.122	0.1509	0.097%	0.333%	0.097%
Butane (n-)	C04H10	VOC		58.122	0.1509	0.114%	0.391%	0.114%
Cyclopentane	C05H10	VOC		70.133	0.1821	0.002%	0.007%	0.002%
Pentane (i-)	C05H12	VOC		72.149	0.1873			
Pentane (i-)	C05H12	VOC		72.149	0.1873			
Pentane (n-)	C05H12	VOC		72.149	0.1873	0.041%	0.176%	0.041%
Benzene	C06H06	VOC	X	78.112	0.2028	0.018%	0.085%	0.018%
Cyclohexane	C06H12	VOC		84.159	0.2185	0.007%	0.035%	0.007%
Methylcyclopentane	C06H12	VOC		84.159	0.2185	0.005%	0.026%	0.005%
Dimethylbutane (2,2-)	C06H14	VOC		86.175	0.2238	0.004%	0.019%	0.004%
Dimethylbutane (2,3-)	C06H14	VOC		86.175	0.2238	0.003%	0.014%	0.003%
Hexane (n-)	C06H14	VOC	X	86.175	0.2238	0.017%	0.085%	0.017%
Methylpentane (2-)	C06H14	VOC		86.175	0.2238	0.014%	0.073%	0.014%
Methylpentane (3-)	C06H14	VOC		86.175	0.2238	0.009%	0.044%	0.009%
Toluene	C07H08	VOC	X	92.138	0.2392	0.010%	0.054%	0.010%
Cycloheptane	C07H14	VOC		98.186	0.2549			
Dimethylcyclopentane (1,1-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Dimethylcyclopentane (1,c-2-)	C07H14	VOC		98.186	0.2549			
Dimethylcyclopentane (1,c-3-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Dimethylcyclopentane (1,t-2-)	C07H14	VOC		98.186	0.2549	0.001%	0.006%	0.001%
Dimethylcyclopentane (1,t-3-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Ethylcyclopentane	C07H14	VOC		98.186	0.2549	0.000%	0.002%	0.000%
Methylcyclohexane	C07H14	VOC		98.186	0.2549	0.007%	0.042%	0.007%
Dimethylpentane (2,2-)	C07H16	VOC		100.202	0.2602	0.001%	0.006%	0.001%
Dimethylpentane (2,3-)	C07H16	VOC		100.202	0.2602	0.002%	0.010%	0.002%
Dimethylpentane (2,4-)	C07H16	VOC		100.202	0.2602	0.001%	0.006%	0.001%
Dimethylpentane (3,3-)	C07H16	VOC		100.202	0.2602	0.001%	0.004%	0.001%
Ethylpentane (3-)	C07H16	VOC		100.202	0.2602	0.000%	0.002%	0.000%
Heptane (n-)	C07H16	VOC		100.202	0.2602	0.009%	0.055%	0.009%
Methylhexane (2-)	C07H16	VOC		100.202	0.2602	0.005%	0.031%	0.005%
Methylhexane (3-)	C07H16	VOC		100.202	0.2602	0.005%	0.030%	0.005%
Trimethylbutane (2,2,3-)	C07H16	VOC		100.202	0.2602	0.001%	0.004%	0.001%
Ethylbenzene	C08H10	VOC	X	106.165	0.2757	0.000%	0.002%	0.000%
Xylene (m-)	C08H10	VOC	X	106.165	0.2757	0.001%	0.006%	0.001%
Xylene (o-)	C08H10	VOC	X	106.165	0.2757	0.000%	0.002%	0.000%
Xylene (p-)	C08H10	VOC	X	106.165	0.2757	0.001%	0.006%	0.001%
Cyclooctane	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,1-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,c-2-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Dimethylcyclohexane (1,c-3-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Dimethylcyclohexane (1,c-4-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,t-2-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Dimethylcyclohexane (1,t-3-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,t-4-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Ethylcyclohexane	C08H16	VOC		112.213	0.2914			

TABLE G-2
Natural Gas
Physical Property Estimations

Component				Molecular	Vapor	Stream		
Name (i)	Formula	Type	HAP	Weight M_i $(lb/lb\text{-}mol)_i$	Density ρ_i $(lb/scf)_i$	Mole Fraction $f_{n\text{-}i}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $f_{m\text{-}i}$ $(f_{n\text{-}i}M_i)/\Sigma(f_{n\text{-}i}M_i)$ (lb_i/lb_T)	Volume Fraction $f_{v\text{-}i}$ $f_{m\text{-}i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Ethylcyclopentane (1-methyl-1-)	C08H16	VOC		112.213	0.2914			
Ethylcyclopentane (1-methyl-c-2-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	C08H16	VOC		112.213	0.2914			
Ethylcyclopentane (1-methyl-t-2-)	C08H16	VOC		112.213	0.2914			
Propylcyclopentane (i-)	C08H16	VOC		112.213	0.2914			
Propylcyclopentane (n-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,1,2-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,1,3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,c-3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,t-3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,t-4-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,t-2,c-3-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Trimethylcyclopentane (1,t-2,c-4-)	C08H16	VOC		112.213	0.2914			
Dimethylhexane (2,2-)	C08H18	VOC		114.229	0.2966			
Dimethylhexane (2,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (2,4-)	C08H18	VOC		114.229	0.2966			
Dimethylhexane (2,5-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (3,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (3,4-)	C08H18	VOC		114.229	0.2966	0.001%	0.004%	0.001%
Ethylhexane (3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Methylheptane (2-)	C08H18	VOC		114.229	0.2966	0.002%	0.013%	0.002%
Methylheptane (3-)	C08H18	VOC		114.229	0.2966	0.003%	0.018%	0.003%
Methylheptane (4-)	C08H18	VOC		114.229	0.2966			
Octane (n-)	C08H18	VOC		114.229	0.2966	0.005%	0.034%	0.005%
Trimethylpentane (1,1,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Trimethylpentane (2,2,3-)	C08H18	VOC		114.229	0.2966			
Trimethylpentane (2,2,4-)	C08H18	VOC	X	114.229	0.2966			
Trimethylpentane (2,3,4-)	C08H18	VOC		114.229	0.2966			
Ethyltoluene (m-)	C09H12	VOC		120.192	0.3121			
Ethyltoluene (o-)	C09H12	VOC		120.192	0.3121			
Ethyltoluene (p-)	C09H12	VOC		120.192	0.3121			
Propylbenzene (i-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Propylbenzene (n-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Trimethylbenzene (1,2,4-)	C09H12	VOC		120.192	0.3121			
Trimethylbenzene (1,3,5-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Butylcyclopentane (n-)	C09H18	VOC		126.239	0.3278			
Methylcyclooctane	C09H18	VOC		126.239	0.3278			
Propylcyclohexane (i-)	C09H18	VOC		126.239	0.3278			
Propylcyclohexane (n-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,2-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,c-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,c-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,t-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,c-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,c-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,t-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-3,c-5-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-3,t-5-)	C09H18	VOC		126.239	0.3278			

TABLE G-2
Natural Gas
Physical Property Estimations

Component				Molecular Weight	Vapor Density	Stream		
Name (i)	Formula	Type	HAP	M_i $(lb/lb\text{-}mol)_i$	ρ_i $(lb/scf)_i$	Mole Fraction $f_{n\text{-}i}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $f_{m\text{-}i}$ $(f_{n\text{-}i}M_i)/\Sigma(f_{n\text{-}i}M_i)$ (lb_i/lb_T)	Volume Fraction $f_{v\text{-}i}$ $f_{m\text{-}i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Dimethylheptane (2,2-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,3-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,5-)	C09H20	VOC		128.255	0.3330			
Dimethylheptane (2,6-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (3,3-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (3,4-)	C09H20	VOC		128.255	0.3330			
Dimethylheptane (3,5-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Methyloctane (2-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Methyloctane (3-)	C09H20	VOC		128.255	0.3330	0.001%	0.005%	0.001%
Methyloctane (4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Nonane (n-)	C09H20	VOC		128.255	0.3330	0.002%	0.018%	0.002%
Trimethylhexane (2,2,3-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,2,4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Trimethylhexane (2,2,5-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Trimethylhexane (2,3,3-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,3,4-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,3,5-)	C09H20	VOC		128.255	0.3330			
Butylbenzene (t-)	C10H14	VOC		134.218	0.3485			
Butylcyclohexane (i-)	C10H20	VOC		140.266	0.3642			
Butylcyclohexane (t-)	C10H20	VOC		140.266	0.3642			
Decane (n-)	C10H22	VOC		142.282	0.3694	0.001%	0.008%	0.001%
Dimethyloctane (2,2-)	C10H22	VOC		142.282	0.3694			
Dimethyloctane (2,3-)	C10H22	VOC		142.282	0.3694			
Dimethyloctane (3,3-)	C10H22	VOC		142.282	0.3694	0.000%	0.003%	0.000%
Ethyloctane (3-)	C10H22	VOC		142.282	0.3694			
Methylnonane (2-)	C10H22	VOC		142.282	0.3694	0.000%	0.003%	0.000%
Methylnonane (3-)	C10H22	VOC		142.282	0.3694			
Methylnonane (4-)	C10H22	VOC		142.282	0.3694			
Methylnonane (5-)	C10H22	VOC		142.282	0.3694			
Trimethylheptane (2,3,4-)	C10H22	VOC		142.282	0.3694			
Trimethylheptane (2,5,5-)	C10H22	VOC		142.282	0.3694			
Undecane (n-)	C11H24	VOC		156.308	0.4059	0.000%	0.003%	0.000%
Dodecane (n-)	C12H26	VOC		170.335	0.4423	0.000%	0.003%	0.000%
Tridecane (n-)	C13H28	VOC		184.361	0.4787			
Tetradecane (n-)	C14H30	VOC		198.388	0.5151			
Natural Gas				16.977	0.0441	99.940%	100.000%	100.000%
TOC (Total)				16.766	0.0435	98.794%	97.624%	98.853%
VOC (Total)				57.866	0.1503	0.853%	2.910%	0.854%
HAP (Total)				85.428	0.2218	0.048%	0.241%	0.048%
Xylenes				106.165	0.2757	0.002%	0.015%	0.002%

NOTES

1. Vapor density is estimated using the ideal gas law (PV = nRT = (m/M)RT OR ρ = RPT/M), where R = 10.73164 (psia ft^3)/(lb-mol °R).
2. Standard conditions 68 °F
   14.696 psia
3. Mole percentages from analysis on Various of sample collected at Meter Station Avg. Results (3 Most Representative Samples).
The sample is assumed to be representative of the actual gas composition at Clyde Compressor Station.

TABLE H-1a
Piping Components
Hourly and Annual Emission Estimates

Source			CLYD-PC-NG			
Service			Gas			
			Natural Gas			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	724 components			
		Emission Factor	4.50E-03 kg/hr/component			
	Connectors	Count	2,631 components			
		Emission Factor	2.00E-04 kg/hr/component			
	Flanges	Count	501 components			
		Emission Factor	3.90E-04 kg/hr/component			
	Open-Ended Lines	Count	9 components			
		Emission Factor	2.00E-03 kg/hr/component			
	Pump Seals	Count	0 components			
		Emission Factor	2.40E-03 kg/hr/component			
	Other	Count	66 components	**Emissions**		
		Emission Factor	8.80E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}		2256.29% by weight	227.7371 lb/hr	997.4885 tpy	273.2845 lb/hr
	CO_2		1.33% by weight	0.1345 lb/hr	0.5890 tpy	0.1614 lb/hr
	TOC (Total)		97.62% by weight	9.8536 lb/hr	43.1587 tpy	11.8243 lb/hr
	Methane		90.198% by weight	9.1041 lb/hr	39.8760 tpy	10.9249 lb/hr
	Ethane		4.522% by weight	0.4564 lb/hr	1.9991 tpy	0.5477 lb/hr
	VOC (Total)		2.904% by weight	0.2931 lb/hr	1.2837 tpy	0.3517 lb/hr
	HAP (Total)		0.240% by weight	0.0242 lb/hr	0.1061 tpy	0.0291 lb/hr
	Benzene		0.085% by weight	8.55E-03 lb/hr	3.74E-02 tpy	1.03E-02 lb/hr
	Ethylbenzene		0.002% by weight	2.10E-04 lb/hr	9.20E-04 tpy	2.52E-04 lb/hr
	Hexane (n-)		0.084% by weight	8.53E-03 lb/hr	3.73E-02 tpy	1.02E-02 lb/hr
	Methanol					
	Naphthalene					
	Toluene		0.054% by weight	5.47E-03 lb/hr	2.40E-02 tpy	6.56E-03 lb/hr
	Trimethylpentane (2,2,4-)					
	Xylenes		0.015% by weight	1.47E-03 lb/hr	6.44E-03 tpy	1.76E-03 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017).
The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings for a similar compressor station.
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on gas analysis used to estimate gas release annual emissions (TABLE G-1a).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.

TABLE H-2a
Piping Components
Hourly and Annual Emission Estimates

Source			CLYD-PC-PL			
Service			Light Oil			
			Pipeline Liquids			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	100 components			
		Emission Factor	2.50E-03 kg/hr/component			
	Connectors	Count	666 components			
		Emission Factor	2.10E-04 kg/hr/component			
	Flanges	Count	161 components			
		Emission Factor	1.10E-04 kg/hr/component			
	Open-Ended Lines	Count	11 components			
		Emission Factor	1.40E-03 kg/hr/component			
	Pump Seals	Count	2 components			
		Emission Factor	1.30E-02 kg/hr/component			
	Other	Count	2 components	**Emissions**		
		Emission Factor	7.50E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}		0.96% by weight	0.0098 lb/hr	0.0430 tpy	0.0118 lb/hr
	CO_2		0.01% by weight	0.0001 lb/hr	0.0006 tpy	0.0002 lb/hr
	TOC (Total)		99.99% by weight	1.0227 lb/hr	4.4795 tpy	1.2273 lb/hr
	Methane		0.04% by weight	0.0004 lb/hr	0.0017 tpy	0.0005 lb/hr
	Ethane		0.09% by weight	0.0009 lb/hr	0.0040 tpy	0.0011 lb/hr
	VOC (Total)		99.86% by weight	1.0214 lb/hr	4.4738 tpy	1.2257 lb/hr
	HAP (Total)		14.54% by weight	0.1487 lb/hr	0.6515 tpy	0.1785 lb/hr
	Benzene		1.44% by weight	1.47E-02 lb/hr	6.45E-02 tpy	1.77E-02 lb/hr
	Ethylbenzene		0.48% by weight	4.87E-03 lb/hr	2.13E-02 tpy	5.84E-03 lb/hr
	Hexane (n-)		1.69% by weight	1.73E-02 lb/hr	7.59E-02 tpy	2.08E-02 lb/hr
	Methanol					
	Naphthalene					
	Toluene		4.49% by weight	4.59E-02 lb/hr	2.01E-01 tpy	5.51E-02 lb/hr
	Trimethylpentane (2,2,4-)		0.03% by weight	2.64E-04 lb/hr	1.16E-03 tpy	3.17E-04 lb/hr
	Xylenes		6.42% by weight	6.56E-02 lb/hr	2.87E-01 tpy	7.88E-02 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017). The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings for a similar compressor station.
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on composition estimate (TABLE F-1).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.

TABLE H-3a
Piping Components
Hourly and Annual Emission Estimates

Source			CLYD-PC-OIL			
Service			Heavy Oil			
			Oil			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	59 components			
		Emission Factor	8.40E-06 kg/hr/component			
	Connectors	Count	278 components			
		Emission Factor	7.50E-06 kg/hr/component			
	Flanges	Count	94 components			
		Emission Factor	3.90E-07 kg/hr/component			
	Open-Ended Lines	Count	0 components			
		Emission Factor	1.40E-04 kg/hr/component			
	Pump Seals	Count	6 components			
		Emission Factor	8.62E-03 kg/hr/component			
	Other	Count	2 components	**Emissions**		
		Emission Factor	3.20E-05 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}					
	CO_2					
	TOC (Total)		100.00% by weight	0.1199 lb/hr	0.5252 tpy	0.1439 lb/hr
	Methane					
	Ethane					
	VOC (Total)		100.00% by weight	0.1199 lb/hr	0.5252 tpy	0.1439 lb/hr
	HAP (Total)					
	Benzene					
	Ethylbenzene					
	Hexane (n-)					
	Methanol					
	Naphthalene					
	Toluene					
	Trimethylpentane (2,2,4-)					
	Xylenes					

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017). The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings for a similar compressor station.
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based listed on MSDS.
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.

TABLE I-1
Parts Washer
Hourly and Annual Emission Estimates

Solvent			Eversol 143			
Solvent Density			6.84 lb/gal			
Potential	Hourly	Maximum	0.3288 gal/hr			
Make-up Solvent		Average	0.0137 gal/hr	**Emissions**		
Requirement	Annual		120.00 gal/yr	**Avg. Hourly**	**Max. Hourly**	**Max. Annual**
Speciation	TOC (Total)		100.00% by weight	0.0937 lb/hr	2.2484 lb/hr	0.4103 tpy
	Methane					
	Ethane					
	VOC (Total)		100.00% by weight	0.0937 lb/hr	2.2484 lb/hr	0.4103 tpy
	VOC (non-HAP)		100.00% by weight	0.0937 lb/hr	2.2484 lb/hr	0.4103 tpy
	HAP (Total)					
	Benzene					
	Ethylbenzene					
	Hexane (n-)					
	Naphthalene					
	Toluene					
	Trimethylpentane (2,2,4-)					
	Xylenes					

NOTES

1. Although emissions are estimated based on the physical properties and chemical speciation of Eversol 143, other solvents may be used as long as the represented solvent density and chemical species weight percents are not exceeded. MSDS indicate that the vapor pressure at 100°F is less than 5 mmHg (0.097 psia).
2. Potential maximum annual solvent make-up is based on past experience and a safety factor.
3. Potential maximum hourly solvent make-up is the potential maximum annual solvent make-up divided by 365 day/yr.
4. Potential average hourly solvent make-up is the potential maximum annual solvent make-up divided by 8,760 hrs/yr.

APPENDIX C

Traditional BAT Request Letter

July 1, 2015

Ms. Andrea Moore
Ohio EPA – Division of Air Pollution Control
Northwest District Office
347 N. Dunbridge Road
Bowling Green, Ohio 43402

RE: NEXUS Gas Transmission – Sandusky, OH
Request for Application of Historic BAT Format

Dear Ms. Moore:

NEXUS Gas Transmission (NGT) plans to construct a natural gas compressor station in Sandusky County, Ohio (Clyde Compressor Station). As part of the Clyde Compressor Station, NGT plans to install one (1) new natural gas-fired Solar Titan 250 combustion turbine sized to a nominal, NEMA-rated capacity of 26,000 horsepower (hp) and equipped with an oxidation catalyst.

Pursuant to the provisions added to Ohio Revised Code (ORC) 3704 as a result of Senate Bill 265, sources modified or constructed after August 3, 2009, are to have rule-based BAT limits established by Ohio EPA for specific source categories. However, Ohio EPA has yet to promulgate the rule based BAT limits. To address this regulatory gap, the Ohio EPA's Division of Air Pollution Control (DAPC) released a memo (February 2014 Memo) indicating that permits filed on or after August 3, 2009, must go through an interim case-by-case BAT procedure.[42]

As clarified in the February 2014 Memo,[43] Ohio EPA requires any entity establishing a synthetic minor restriction to do so in accordance with U.S. EPA's "Limiting Potential to Emit" guidance. The memo states Ohio EPA's belief that BAT established in the format of a source design/design efficiency can be used to limit potential to emit (PTE) for New Source Review (NSR) actions. The February 2014 Memo also asserts that PTE must still be calculated before controls for the purposes of assessing Title V applicability and establishes Ohio EPA's stance that limits established in accordance with the memo are legally and practically enforceable. U.S. EPA since sent a letter[44] to Ohio EPA stating concerns regarding the practical enforceability of the source design BAT format, noting that the format does not establish an expectation of ongoing compliance for the source.

---

[42] Ohio EPA Memo from Mike Hopkins, Assistant Chief, Permitting, DAPC, to Permit Writers and Reviewers "BAT Requirements for Permits Issued On or After February 7, 2014" dated February 7, 2014, which supersedes the BAT guidance issued on August 30, 2013. Ohio's BAT policy will be in place only until such time when the Ohio EPA develops and promulgates rules that define BAT in accordance with ORC 3704.03(T) requirements.

[43] Refer to Questions 26, 27, and 28 in the February 2014 Memo.

[44] Letter send from John Mooney (U.S. EPA, Region V, Air Programs Branch) to Mike Hopkins (Ohio EPA) on September 2, 2014.

Ohio EPA has recently issued guidance[45] clarifying that operators may request that BAT be administered in the traditional BAT format (i.e., the format in which BAT would have been administered prior to the implementation of Senate Bill 265). Specifically, the application of the traditional BAT format would result in a short-term (e.g., pound per hour [lb/hr]) limit, annual (e.g., ton per year [tpy]) limit, and associated parametric monitoring for the control device (as necessary). As U.S. EPA has historically approved such limits as an adequate means to limit PTE, no synthetic minor limit is required when BAT has been established in this format. NGT has proposed BAT for the combustion turbine in the application narrative in accordance with this request.

***

NGT respectfully requests that Ohio EPA establish BAT for the combustion turbine in accordance with this letter and the application narrative. Please contact Reagan Mayces at (713) 627-4790 with any questions regarding this request.

Sincerely,

NEXUS GAS TRANSMISSION

Thomas V. Wooden Jr.
Vice President – US Field Operations

[45] Per discussion between Amanda Adams (Trinity Consultants) and Mike Hopkins (Ohio EPA) on November 6, 2014.

APPENDIX D

PTIO APPLICATION FORMS

Application for Permit to Install (PTI) and Permit to Install/Operate (PTIO)

Ohio Environmental Protection Agency
Lazarus Government Center
50 West Town Street, Suite 700
P.O. Box 1049
Columbus, Ohio 43216-1049

For EPA Use Only

Application Number_____

Date Received _____

Facility Information

Note: Application is incomplete if all **bolded** questions throughout the application are not completed.

Legal Facility Name	Clyde Compressor Station			
Alternate Name (if any)				
Facility Physical Address	Pickle St			
City, ZIP code	Clyde			
County	Sandusky			
Facility ID				
Facility Description	Natural Gas Compressor Station			
NAICS Code	486210			
Facility Latitude	41	degrees 21	minutes 12.58	seconds
Facility Longitude	82	degrees 53	minutes 25.45	seconds
Core Place ID (if known)				
SCSC ID (if known)				

Portable? ☐ Yes ■ No

Portable Type ☐ Asphalt Plant ☐ Concrete Plant ☐ Generator ☐ Aggregate Processing ☐ Concrete Crusher ☐ Grinder ☐ Other

Initial Location County If "Other", describe:

Contact Information

☐ No change to information on file.

❶	☑ Billing	☐ Owner	☑ Primary	☐ Operator	☐ On-Site	☐ Responsible Official				
First Name	Reagan	Last Name	Mayces	Phone	713-627-4790	Fax		E-mail	rmmayces@spectraenergy.com	
Address 1	P.O. Box 1642	Address 2		City or Township	Houston	State	TX	Zip Code	77251-1642	

❷	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☑ Responsible Official				
First Name	Thomas	Last Name	Wooden Jr.	Phone	713-627-5400	Fax		E-mail	tvwooden@spectraenergy.com	
Address 1	P.O. Box 1642	Address 2		City or Township	Houston	State	TX	Zip Code	77251-1642	

❸	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☐ Responsible Official				
First Name		Last Name		Phone		Fax		E-mail		
Address 1		Address 2		City or Township		State		Zip Code		

❹	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☐ Responsible Official				
First Name		Last Name		Phone		Fax		E-mail		
Address 1		Address 2		City or Township		State		Zip Code		

❺	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☐ Responsible Official				
First Name		Last Name		Phone		Fax		E-mail		
Address 1		Address 2		City or Township		State		Zip Code		

❻	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☐ Responsible Official				
First Name		Last Name		Phone		Fax		E-mail		
Address 1		Address 2		City or Township		State		Zip Code		

Division of Air Pollution Control
Application for Permit-to-Install or Permit-to-Install and Operate

Section I – General Application Information

This section should be filled out for each permit to install (PTI) or Permit to Install and Operate (PTIO) application. A PTI is required for all air contaminant sources (emissions units) installed or modified after January 1, 1974 that are subject to OAC Chapter 3745-77. A PTIO is required for all air contaminant sources (emissions units) that are not subject to OAC Chapter 3745-77 (Title V). See the application instructions for additional information.

For OEPA use only:	☐ Installation	☐ Request Federally enforceable restrictions
	☐ Modification	☐ General Permit
	☐ Renewal	☐ Other

1. Is the purpose of this application to transition from OAC Chapter 3745-77 (Title V) to OAC Chapter 3745-31 (PTIO)?

   ☐ yes ☒ no

2. **Establish PER Due Date** - Select an annual Permit Evaluation Report (PER) due date for this facility (does not apply to facilities subject to Title V, OAC Chapter 3745-77). If the PER has previously been established and a change is now desired, a PER Change Request form must be filed instead of selecting a date here.

Due Date:	For Time Period:
☒ February 15	January 1 through December 31
☐ May 15	April 1 through March 31
☐ August 15	July 1 through June 30
☐ November 15	October 1 through September 30

   ☐ PER not applicable (Title V) or due date already established
   ☐ PER Request Permit Change form attached

3. **Federal Rules Applicability** - Please check all of the appropriate boxes below.

New Source Performance Standards (NSPS)
New Source Performance Standards are listed under 40 CFR 60 - Standards of Performance for New Stationary Sources.
☐ not affected ☒ subject to Subpart: JJJJ, KKKK
☐ unknown ☐ exempt - explain below

National Emission Standards for Hazardous Air Pollutants (NESHAP)
National Emissions Standards for Hazardous Air Pollutants are listed under 40 CFR 61. (These include asbestos, benzene, beryllium, mercury, and vinyl chloride).
☒ not affected ☐ subject to Subpart: _____
☐ unknown ☐ subject, but exempt - explain below

Maximum Achievable Control Technology (MACT)
The Maximum Achievable Control Technology standards are listed under 40 CFR 63 and OAC rule 3745-31-28.
☐ not affected ☒ subject to Subpart: ZZZZ
☐ unknown ☐ subject, but exempt - explain below

Prevention of Significant Deterioration (PSD)
These rules are found under OAC rule 3745-31-10 through OAC rule 3745-31-20.
☒ not affected ☐ subject to regulation
☐ unknown

Non-Attainment New Source Review
These rules are found under OAC rule 3745-31-21 through OAC rule 3745-31-27.
☒ not affected ☐ subject to regulation
☐ unknown

112 (r) - Risk Management Plan
These rules are found under 40 CFR 68.
☒ not affected ☐ subject to regulation
☐ unknown

Title IV (Acid Rain Requirements)
These rules are found under 40 CFR 72 and 40 CFR 73.
☒ not affected ☐ subject to regulation
☐ unknown

Please explain why you checked "exempt" in this question for one or more federal rules. Identify each exemption and whether the entire facility and/or the specific air contaminant sources included in this permit application is exempted. Attach an additional page if necessary.

_____

_____

4. Express PTI/PTIO - Do you qualify for express PTI or PTIO processing?

☐ yes ■ no

If yes, are you requesting express processing per OAC rule 3745-31-05?

☐ yes ■ no

5. **Air Contaminant Sources in this Application** - Identify the air contaminant source(s) for which you are applying below. Attach additional pages if necessary. Section II of this application and an EAC form should be completed for each air contaminant source.

Emissions Unit ID*	**Company Equipment ID** (company's name for air contaminant source)	**Equipment Description** (List all equipment that are a part of this air contaminant source)
	See Attached	See Attached

* This ID would have been created when a previous air permit was issued. If no previous permits have been issued for this air contaminant source, leave this field blank. If this air contaminant source was previously identified in STARShip applications as a "Z" source (e.g., Z001), please provide that identification and a new ID will be assigned when the PTI/PTIO is issued.

6. Trade Secret Information - Is any information included in this application being claimed as a trade secret per Ohio Revised Code (ORC) 3704.08?

☐ yes (A "non-confidential" version must also be submitted in order for this application to be deemed complete.)
■ no

7. Permit Application Contact - Person to contact for questions about this application:

Reagan Mayces	EHS Manager, US Operations
Name	Title
P.O. Box 1642, Houston, TX, 77251-1642	
Address (Street, City/Township, State and Zip Code)	
713-627-4790	rmmayces@spectraenergy.com
Phone Fax	E-mail

8. **Authorized Signature** – OAC rule 3745-31-04 states that applications for permits to install or permits to install and operate shall be signed:
   (1) In the case of a corporation, by a principal executive officer of at least the level of vice president, or his duly authorized representative, if such representative is responsible for the overall operation of the facility.
   (2) In the case of a partnership by a general partner.
   (3) In the case of sole proprietorship, by the proprietor, and
   (4) In the case of a municipal, state, federal or other governmental facility, by the principal executive officer, the ranking elected official, or other duly authorized employee.

   Under OAC rule 3745-31-04, this signature shall constitute personal affirmation that all statements or assertions of fact made in the application are true and complete, comply fully with applicable state requirements, and shall subject the signatory to liability under applicable state laws forbidding false or misleading statements.

Authorized Signature (for facility)	Date
Thomas V. Wooden Jr.	Vice President - US Field Operations
Print Name	Title

5. **Air Contaminant Sources in this Application** - Identify the air contaminant source(s) for which you are applying below. Attach additional pages if necessary. Section II of this application and an EAC form should be completed for each air contaminant source.

Emissions Unit ID*	**Company Equipment ID** (company's name for air contaminant source)	**Equipment Description** (List all equipment that are a part of this air contaminant source)
	Combustion Turbine	New natural gas-fired combustion turbine sized 26,000 hp, equipped with an oxidation catalyst
	Gas Release	Periodic Maintenance, routine operations, and pigging activities will occasionally necessitate the evacuation of equipment directly to atmosphere
	Equipment Leaks	Various equipment components will be located throughout the compressor station that may result in fugitive emissions due to equipment leaks
	Separator Vessel #1	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 530 gallons handling condensate liquids collected from the pipeline
	Separator Vessel #2	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 530 gallons handling condensate liquids collected from the pipeline
	Separator Vessel #3	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 400 gallons handling condensate liquids collected from the pipeline
	Separator Vessel #4	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 317 gallons handling condensate liquids collected from the pipeline
	Separator Vessel #5	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 43 gallons handling condensate liquids collected from the pipeline
	Loading Operation	NGT will periodically transfer the condensate liquids and the used lubricating oil collected on-site to tanker trucks for shipment off-site

* This ID would have been created when a previous air permit was issued. If no previous permits have been issued for this air contaminant source, leave this field blank. If this air contaminant source was previously identified in STARShip applications as a "Z" source (e.g., Z001), please provide that identification and a new ID will be assigned when the PTI/PTIO is issued.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: J001
Company Equipment ID: Loading Operation

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-001-50 _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.01
Volatile organic compounds (VOC)					0.01
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					6.00E-04
Highest single HAP: Hexane					2.73E-04
Toxic Air Contaminants (see instructions):					6.00E-04

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
J001	■ Area ☐ Volume	1,810 x 1,303	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)
Loading Operation			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude			Egress Point Longitude		
J001	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3107 - Loading Rack for Liquid Materials

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
LOADING RACK FOR LIQUID MATERIALS

This form is to be completed for each loading rack for liquid materials. State/Federal regulations which may apply to loading racks for liquid materials are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

   ☑ New Permit ☐ Renewal or Modification of Air Permit Number(s) (e.g. J001) J001 _____

2. Maximum Operating Schedule: 24 _____ hours per day; 365 _____ days per year

   If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. Complete the following table for each bay:

Bay Identification	Number of Loading Arms	Type of Vehicle Loaded (check one or more)	Loading Method (check one or more)
J001	N/A	☑ Tank Truck ❒ Barge ❒ RR Car ❒ Ship ❒ Other (describe):	❒ Top Load, Splash Fill ❒ Bottom Load ☑ Top Load, fully Submerged ❒ Top Load, Partial Submerged
		❒ Tank Truck ❒ Barge ❒ RR Car ❒ Ship ❒ Other (describe):	❒ Top Load, Splash Fill ❒ Bottom Load ❒ Top Load, fully Submerged ❒ Top Load, Partial Submerged
		❒ Tank Truck ❒ Barge ❒ RR Car ❒ Ship ❒ Other (describe):	❒ Top Load, Splash Fill ❒ Bottom Load ❒ Top Load, fully Submerged ❒ Top Load, Partial Submerged

4. Complete this section for each material loaded.

Liquid Material Loaded	Bay ID	Average Material Vapor Pressure at Loading Temperature (millimeters mercury)	Is liquid a photo-chemically reactive material?*	Maximum Daily Throughput (gallons)	Proposed Maximum Annual Throughput (gallons)
Pipeline Liquids	J001	256.26	❒Yes ☐ No	2,000	4,000
Lubricating Oil	J001	0.32	❒Yes ☐ No	570	6,840
Oily Water	J001	0.32	❒Yes ☐ No	3,000	36,000
			❒Yes ❒ No		

* Photochemically reactive material is defined in OAC rule 3745-21-01(C)(5).

5. Complete this section for each vapor control system.

Type of Vapor Control System (check one):	Minimum Control Efficiency (% by weight):	Maximum Controlled Mass Emissions Rate (pounds/1,000 gallons):	Basis for Mass Emissions Rate Data (check one):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ☑ None ❒ Other (describe):	N/A	N/A	❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ❒ None ❒ Other (describe):			❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ❒ None ❒ Other (describe):			❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ❒ None ❒ Other (describe):			❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P001
Company Equipment ID: Combustion Turbine

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P001
Company Equipment ID: Combustion Turbine

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

2-02-002-01 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)				1.58	6.25
PM • •10 microns in diameter (PE/PM_{10})				1.58	6.25
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)				1.58	6.25
Sulfur dioxide (SO_2)				0.81	3.22
Nitrogen oxides (NO_x)				7.78	31.13
Carbon monoxide (CO)				13.15	7.81
Organic compounds (OC)				1.65	3.32
Volatile organic compounds (VOC)				1.65	3.32
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					0.60
Highest single HAP: Toluene					0.21
Toxic Air Contaminants (see instructions):					0.60

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☒ Yes - fill out the applicable information below.
☐ No - proceed to Question 6.

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations
PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

■ Catalytic Converter
Manufacturer: Solar Year installed: Not Installed **Your ID for control equipment** P001
Describe this control equipment: Oxidation Catalyst
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ■ VOC ☐ SO_2 ☐ NO_x ■ CO ☐ Pb ■ Other HAPs
Estimated capture efficiency (%): _____ Basis for efficiency: Refer to Table B-1Aj for estimated efficiencies
Design control efficiency (%): _____ Basis for efficiency: Refer to Table B-1Aj for estimated efficiencies
Operating control efficiency (%): _____ Basis for efficiency: Refer to Table B-1Aj for estimated efficiencies
■ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: P001

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
P001	A	7.5 ft	50	897		
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
P001 Stack	Round	44.18	660	60	90	120

❷ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❷ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P001	41 deg 21 min 6.97 sec	82 deg 53 min 22.49 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3862 - Stationary Internal Combustion Engine

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STATIONARY INTERNAL COMBUSTION ENGINE

This form is to be completed for each stationary reciprocating or gas turbine engine. State/Federal regulations which may apply to stationary internal combustion engines are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

   ☑ New Permit ☐ Renewal or Modification of Air Permit Number (e.g. P001) P001

2. Maximum Operating Schedule: 24 hours per day; 365 days per year

   If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. Engine type: ☑ Gas turbine ☐ Reciprocating

4. Purpose of engine: ☑ Driving pump or compressor ☐ Driving electrical generator

5. Normal use of engine: ☐ Emergency only ☑ Non-emergency

6. Engine Manufacturer: Solar Model No: 250-30002S4

7. Engine exhaust configuration: (for turbines only)
   ☑ simple cycle *(no heat recovery)*
   ❒ regenerative cycle *(heat recovery to preheat combustion air)*
   ❒ cogeneration cycle *(heat recovered to produce steam)*
   ❒ combined cycle *(heat recovered to produce steam which drives generator)*

8. Input capacities (million BTU/hr): Rated: 196.51 Maximum: 196.51
   Normal: 196.51

   Supplemental burner (duct burner) input capacity, if equipped (million BTU/hr):

   Rated:_____ Maximum:_____ Normal:_____

9. Output capacities (Horsepower): Rated: 29,517 Maximum: 29,517 Normal: 29,517

   (Kilowatts): Rated:_____ Maximum:_____ Normal:_____

   (lbs steam/hr)*: Rated:_____ Maximum:_____ Normal:_____

   **required for cogeneration or combined cycle units only*

10. Type of ignition: ☐ non-spark (diesel) ☑ spark

11. Type of fuel fired (check all that apply):

☑ single fuel	❒ No. 2 oil, low-sulfur	☑ natural gas	❒ landfill gas
❒ dual fuel	❒ No. 2 oil, high-sulfur	❒ diesel	❒ digester gas
	❒ gasoline	❒ propane	
	❒ other, explain_____		

12. Complete the following table for all fuels identified in question 11 that are used for the engine and any supplemental (duct) burners, if equipped:

Fuel	HeatContent (BTU/unit)	wt.% Ash	wt.% Sulfur	Fuel Usage		
				Estimated Maximum Per Year	Normal Per Hour	Max. Per Hour
Nat. gas	939.2 BTU/cu ft		gr/scf	1,832,863,560 cu ft	209,231 cu ft	209,231 cu ft
No. 2 oil	BTU/gal			gal	gal	gal
Gasoline	BTU/gal			gal	gal	gal
Diesel	BTU/gal			gal	gal	gal
Landfill/digester gas	BTU/cu ft		ppm	cu ft	cu ft	cu ft
Other (show units)						
List supplemental (duct) burner fuel and information below (show units):						

13. Type of combustion cycle (check all that apply):

❒ 2-stroke	☐ 4-stroke
❒ rich-burn	☐ lean-burn
❒ carbureted	❒ fuel injected
❒ other, explain_____	

14. Emissions control techniques (check all that apply):

❒ prestratified charge	❒ nonselective catalytic reduction (NSCR)
☑ catalytic oxidation (CO)	❒ selective catalytic reduction (SCR)
❒ air/fuel ratio	❒ injection timing retard (ITR)
❒ 2-stage rich/lean combustion	❒ 2-stage lean/lean combustion
❒ water/steam injection	❒ preignition chamber combustion (PCC)
☐ other, explain_____	

For each emissions control technique checked above, explain what pollutants are controlled by each technique: CO, VOC, and HAPs

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P003
Company Equipment ID: Gas Releases

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

3-06-004-02 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					19.82
Volatile organic compounds (VOC)					19.82
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					1.64
Highest single HAP: Hexane					0.58
Toxic Air Contaminants (see instructions):					1.64

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P003
Company Equipment ID: Gas Releases

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P003	■ Area ☐ Volume	1,810 x 1,303	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Gas Releases			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P003	41 deg 21 min 12.58 sec	82 deg 53 min 25.45 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3100 - General Process Operation

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
GENERAL PROCESS OPERATION

This form is to be completed for each process operation when there is no specific emissions activity category (EAC) form applicable. If there is more than one end product for this process, copy and complete this form for each additional product (see instructions). Several State/Federal regulations which may apply to process operations are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. P001) P003

2. Maximum Operating Schedule: 24 hours per day; 365 days per year

If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. End product of this process: N/A - Natural Gas released during maintenance blowdown events

4. Hourly production rates (indicate appropriate units). Please see the instructions for clarification of "Maximum" and "Average" for new versus existing operations:

Hourly	Rate	Units (e.g., widgets)
Average production	N/A	N/A
Maximum production	N/A	N/A

5. Annual production rates (indicate appropriate units) Please see the instructions for clarification of "Maximum" and "Actual" for new versus existing operations:

Annual	Rate	Units (e.g., widgets)
Actual production	N/A	N/A
Maximum production	N/A	N/A

6. Type of operation (please check one):

❒ Continuous
❒ Batch (please complete items below)

Minimum cycle* time (minutes): _____
Minimum time between cycles (minutes): _____
Maximum number of cycles per daily 24 hour period: _____
(Note: include cycle time and set up/clean up time.)

*"Cycle" refers to the time the equipment is in operation.

7. Materials used in process at maximum hourly production rate (add rows/pages as needed):

Material	Physical State at Standard Conditions	Principle Use	Amount**
Pipeline Gas	Gas	Venting during planned gas release events	1,365,152 lb/yr

** Please indicate the amount **and** rate (e.g., lbs/hr, gallons/hr, lbs/cycle, etc.).

8. Please provide a narrative description of the process below (e.g., coating of metal parts using high VOC content coatings for the manufacture of widgets; emissions controlled by thermal oxidizer...):

Gas releases associated with routine operation and periodic pipeline maintenance activities.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P004
Company Equipment ID: Separator Vessel #1

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.14
Volatile organic compounds (VOC)					0.14
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					8.80E-03
Highest single HAP: Hexane					4.08E-03
Toxic Air Contaminants (see instructions):					8.80E-03

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P004-P008	■ Area ☐ Volume	1,810 x 1,303	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	41 deg 21 min 12.58 sec	82 deg 53 min 25.45 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P004-P005

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 1,590 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 530 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 10.83 ft.
Tank shell diameter or width: 5 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 56.84 °F and Maximum 84.59 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 4.9552 psia at average storage temperature
8.1762 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ °F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 530 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 71 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.67 ft

24. The average height of the liquid material stored within the tank during the year: 5.41 ft.

25. The maximum height of the liquid material stored within the tank during the year: 10.83 ft.

26. The average liquid surface temperature: 56.84 °F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area	❒ Gasketed	❒ Ungasketed	❒ Sock
_____ Adjustable, center area	❒ Gasketed	❒ Ungasketed	❒ Sock

_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)
_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)
_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P005
Company Equipment ID: Separator Vessel #2

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.14
Volatile organic compounds (VOC)					0.14
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					8.80E-03
Highest single HAP: Hexane					4.08E-03
Toxic Air Contaminants (see instructions):					8.80E-03

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
N/A						
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
N/A						

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P004-P008	■ Area ☐ Volume	1,810 x 1,303	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	41 deg 21 min 12.58 sec	82 deg 53 min 25.45 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P004-P005

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 1,590 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 530 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 10.83 ft.
Tank shell diameter or width: 5 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 56.84 °F and Maximum 84.59 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 4.9552 psia at average storage temperature
8.1762 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ °F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 530 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 71 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.67 ft

24. The average height of the liquid material stored within the tank during the year: 5.41 ft.

25. The maximum height of the liquid material stored within the tank during the year: 10.83 ft.

26. The average liquid surface temperature: 56.84 °F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area	❒ Gasketed	❒ Ungasketed	❒ Sock
_____ Adjustable, center area	❒ Gasketed	❒ Ungasketed	❒ Sock

_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)
_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)
_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P006
Company Equipment ID: Separator Vessel #3

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.11
Volatile organic compounds (VOC)					0.11
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					6.90E-03
Highest single HAP: Hexane					3.20E-03
Toxic Air Contaminants (see instructions):					6.90E-03

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
N/A						
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
N/A						

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P004-P008	■ Area ☐ Volume	1,810 x 1,303	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	41 deg 21 min 12.58 sec	82 deg 53 min 25.45 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P006

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 1,200 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 400 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 10 ft.
Tank shell diameter or width: 4.5 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 56.84 °F and Maximum 84.59 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 4.9552 psia at average storage temperature
8.1762 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ °F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 400 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 53 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.6 ft

24. The average height of the liquid material stored within the tank during the year: 5 ft.

25. The maximum height of the liquid material stored within the tank during the year: 10 ft.

26. The average liquid surface temperature: 56.84 °F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area	❒ Gasketed	❒ Ungasketed	❒ Sock
_____ Adjustable, center area	❒ Gasketed	❒ Ungasketed	❒ Sock

_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)
_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)
_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P007
Company Equipment ID: Separator Vessel #4

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.60
Volatile organic compounds (VOC)					0.60
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					0.04
Highest single HAP: Hexane					0.02
Toxic Air Contaminants (see instructions):					0.04

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
N/A						
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
N/A						

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P004-P008	■ Area ☐ Volume	1,810 x 1,303	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	41 deg 21 min 12.58 sec	82 deg 53 min 25.45 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P007

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 950 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 317 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 10 ft.
Tank shell diameter or width: 4 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 56.84 °F and Maximum 84.59 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 4.9552 psia at average storage temperature
8.1762 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ °F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 317 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 4,000 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.54 ft

24. The average height of the liquid material stored within the tank during the year: 5 ft.

25. The maximum height of the liquid material stored within the tank during the year: 10 ft.

26. The average liquid surface temperature: 56.84 °F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area	❒ Gasketed	❒ Ungasketed	❒ Sock
_____ Adjustable, center area	❒ Gasketed	❒ Ungasketed	❒ Sock

_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)
_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)
_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P008
Company Equipment ID: Separator Vessel #5

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.01
Volatile organic compounds (VOC)					0.01
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					9.00E-04
Highest single HAP: Hexane					3.95E-04
Toxic Air Contaminants (see instructions):					9.00E-04

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
N/A						
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
N/A						

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P004-P008	■ Area ☐ Volume	1,810 x 1,303	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	41 deg 21 min 12.58 sec	82 deg 53 min 25.45 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P008

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 130 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 43 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 8 ft.
Tank shell diameter or width: 1.67 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 56.84 °F and Maximum 84.59 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 4.9552 psia at average storage temperature
8.1762 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ °F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 43 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 6 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.22 ft

24. The average height of the liquid material stored within the tank during the year: 4 ft.

25. The maximum height of the liquid material stored within the tank during the year: 8 ft.

26. The average liquid surface temperature: 56.84 °F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area	❒ Gasketed	❒ Ungasketed	❒ Sock
_____ Adjustable, center area	❒ Gasketed	❒ Ungasketed	❒ Sock

_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)
_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)
_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P801
Company Equipment ID: Equipment Leaks

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

3-10-002-20 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					6.28
Volatile organic compounds (VOC)					6.28
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					0.76
Highest single HAP: Hexane					0.11
Toxic Air Contaminants (see instructions):					0.76

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
N/A						
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
N/A						

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P801	■ Area ☐ Volume	1,810 x 1,303	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Equipment Leaks			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P801	41 deg 21 min 12.58 sec	82 deg 53 min 25.45 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3100 - General Process Operation

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
GENERAL PROCESS OPERATION

This form is to be completed for each process operation when there is no specific emissions activity category (EAC) form applicable. If there is more than one end product for this process, copy and complete this form for each additional product (see instructions). Several State/Federal regulations which may apply to process operations are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. P001) P801

2. Maximum Operating Schedule: 24 hours per day; 365 days per year

If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. End product of this process: N/A - Fugitive Emissions from Equipment Leaks

4. Hourly production rates (indicate appropriate units). Please see the instructions for clarification of "Maximum" and "Average" for new versus existing operations:

Hourly	Rate	Units (e.g., widgets)
Average production	N/A	N/A
Maximum production	N/A	N/A

5. Annual production rates (indicate appropriate units) Please see the instructions for clarification of "Maximum" and "Actual" for new versus existing operations:

Annual	Rate	Units (e.g., widgets)
Actual production	N/A	N/A
Maximum production	N/A	N/A

6. Type of operation (please check one):

❒ Continuous
❒ Batch (please complete items below)

Minimum cycle* time (minutes): _____
Minimum time between cycles (minutes): _____
Maximum number of cycles per daily 24 hour period: _____
(Note: include cycle time and set up/clean up time.)

*"Cycle" refers to the time the equipment is in operation.

7. Materials used in process at maximum hourly production rate (add rows/pages as needed):

Material	Physical State at Standard Conditions	Principle Use	Amount**
N/A			

** Please indicate the amount **and** rate (e.g., lbs/hr, gallons/hr, lbs/cycle, etc.).

8. Please provide a narrative description of the process below (e.g., coating of metal parts using high VOC content coatings for the manufacture of widgets; emissions controlled by thermal oxidizer...):

Fugitive emissions from various equipment components, including valves, connectors, pump seals, and flanges.

PERMIT TO INSTALL AND OPERATE APPLICATION

NEXUS Gas Transmission > Lucas, OH

Waterville Compressor Station

Prepared By:

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(614) 443-0733

July 2015

Project 143601.0141

Trinity Consultants

Environmental solutions delivered uncommonly well

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APPENDIX A – PROCESS FLOW DIAGRAM

APPENDIX B – EMISSION CALCULATIONS DOCUMENTATION

APPENDIX C – TRADITIONAL BAT REQUEST LETTER

APPENDIX D – PTIO APPLICATION FORMS

NEXUS Gas Transmission (NGT) plans to construct a new natural gas pipeline to facilitate the delivery of natural gas from Appalachian supplies to supply markets in Ohio, Michigan, Chicago, and Ontario. NGT proposes to construct and operate a natural gas compressor station (Waterville Compressor Station) in Waterville, Lucas County, Ohio to support the transmission of gas through the new pipeline. With this Permit to Install and Operate (PTIO) application, NGT is requesting approval for the construction and operation of this natural gas compressor station.

The primary Standard Industrial Classification (SIC) code of the proposed Waterville Compressor Station is 4922 (Natural Gas Transmission).

1.1. FACILITY LOCATION

The Waterville Compressor Station will be located in Lucas County, near Waterville, Ohio. Figure 1-1 is an area map that shows the site location relative to predominant geographical features such as highways and railroads.

Fig. 1-1. NEXUS Gas Transmission
Waterville Compressor Station
Area Map

Coordinate System: NAD83 UTM Zone 17N

Scale

0 1,000 2,000 3,000 4,000

Feet

0 500 1,000 1,500

Meters

Trinity Consultants

1.2. PROJECT DESCRIPTION

The Waterville Compressor Station will facilitate the delivery of natural gas along the NEXUS Gas Transmission (NGT) pipeline. NGT plans to install the following emission units during the construction of the Waterville Compressor Station. Each of the following emission units is listed with the proposed Ohio Environmental Protection Agency (Ohio EPA) Emission Unit Identification Number (EUID). Refer to Figure 1-2 for a process flow diagram describing the organization of these emission units.

- Combustion Turbine (P001) – One (1) new natural gas-fired Solar Titan 250 combustion turbine sized to a nominal, NEMA-rated capacity of 26,000 horsepower (hp) and equipped with an oxidation catalyst.
- Emergency Generator (P002) – One (1) new natural gas-fired internal combustion engine rated at a maximum capacity of 880 hp intended to drive a generator to supply power to the facility during emergency situations. Because this engine qualifies for coverage under a Permit by Rule (PBR) in accordance with Ohio Administrative Code (OAC) 3745-31-03(A)(4)(b), the application described herein will not contain any application forms for this unit; rather, NGT will submit under separate cover a notification of intent to operate a new emergency engine under Ohio EPA's PBR program.
- Gas Releases (P003) – Periodic maintenance, routine operations, and pigging activities will occasionally necessitate the evacuation of equipment (e.g., turbine, piping components) directly to atmosphere.
- Equipment Leaks (P801) – Various equipment components, including valves, flanges, and connectors will be located throughout the compressor station that may result in fugitive emissions due to equipment leaks.
- Separator Vessel #1 (P004) – One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 530 gallons handling condensate liquids collected from the pipeline.
- Separator Vessel #2 (P005) - One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 530 gallons handling condensate liquids collected from the pipeline.
- Separator Vessel #3 (P006) - One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 400 gallons handling condensate liquids collected from the pipeline.
- Separator Vessel #4 (P007) - One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 317 gallons handling condensate liquids collected from the pipeline.
- Separator Vessel #5 (P008) - One (1) vessel modeled as a vertical fixed roof tank with an accumulation capacity of 43 gallons handling condensate liquids collected from the pipeline.
- Loading Operation (J001) – NGT will periodically transfer the condensate liquids collected in T001 and the used lubricating oil collected in T002 to tanker trucks for shipment off-site.

The Waterville Compression Station will also include the following additional *de minimis* sources under Ohio Administrative Code (OAC) 3745-15-05.

- Process Heater (B001) – One (1) new natural gas-fired catalytic heater rated at a heat input capacity of 1.125 MMBtu/hr intended to provide heat to various streams at the facility.
- Parts Washer (L001) – One parts washer expected to require 120 gallons of makeup organic solvent per year.
- Storage Tank #2 (T002) – One vertical fixed roof tank sized to a capacity of 570 gallons used to store lubricating oils for the turbine.

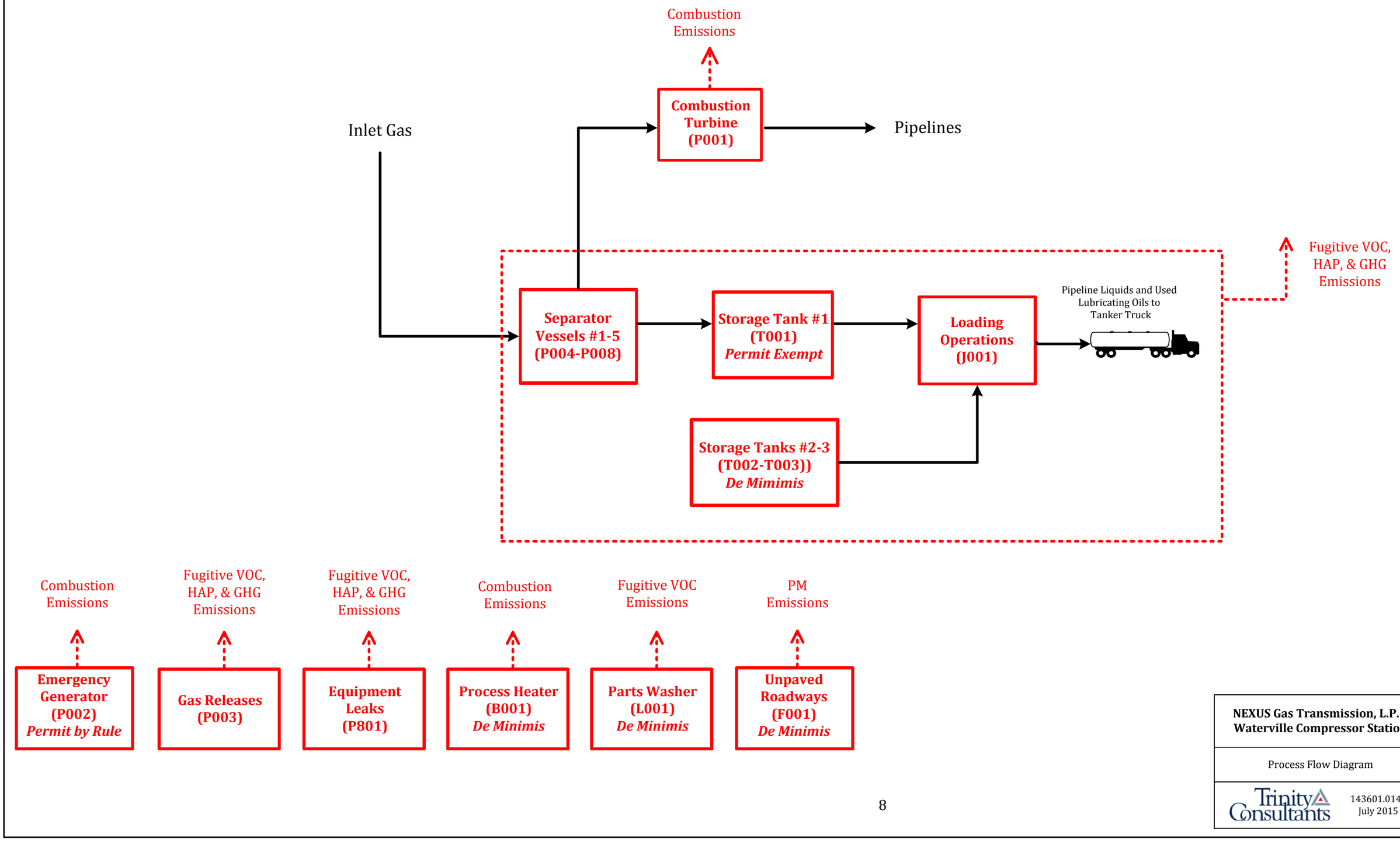
- Storage Tank #3 (T003) – One vertical fixed roof tank sized to a capacity of 3,000 gallons used to store oily water.
- Roadways (F001) – Vehicle traffic on facility roadways will result in fugitive emissions of particulate matter.

Additionally, the Waterville Compressor Station will include the following emissions sources considered exempt from permitting under OAC 3745-31-03(A)(1).

- Storage Tank #1 (T001) – One vertical fixed roof tank sized to a capacity of 2,000 gallons used to store condensate liquids collected from the pipeline and from station equipment. T001 will be equipped with submerged filling mechanisms and will be eligible for the permanent permitting exemption provided in OAC 3745-31-03(A)(1)(l)(iv).

NGT requests that the PTIO be issued for all non-exempt, non-*de minimis* emission units to be installed at the Waterville Compressor Station.

FIGURE 1-2. PROCESS FLOW DIAGRAM FOR THE WATERVILLE COMPRESSOR STATION



NEXUS Gas Transmission, L.P. – Waterville Compressor Station
Process Flow Diagram
Trinity Consultants 143601.0141 July 2015

1.3. PROJECT EMISSIONS

This section provides a summary of the calculation methodology used to estimate potential emissions for the turbine, emergency generator, heater, parts washer, piping components, gas releases, storage tanks and truck loading operations to be installed as part of the NEXUS project at the Waterville Compressor Station. Appendix B provides the detailed emission calculations for the project.

Table 1-1 provides a summary of the facility-wide potential annual emissions attributable to the installation of the Waterville Compressor Station, including particulate matter, particulate matter with an aerodynamic diameter of less than 10 microns, and particulate matter with an aerodynamic diameter of less than 2.5 microns ($PM/PM_{10}/PM_{2.5}$); nitrogen oxides (NO_X); sulfur dioxide (SO_2); carbon monoxide (CO); volatile organic compounds (VOC); greenhouse gases (i.e., carbon dioxide [CO_2], methane [CH_4], and nitrous oxide [N_2O]) expressed as carbon dioxide equivalents (CO_2e); total hazardous air pollutants (HAP); and hexane.

Table 1-1. Potential Emissions for the Waterville Compressor Station

EU ID	Emission Unit Description	Annual Emissions (tpy)							
		NO_X	CO	VOC	SO_2	$PM/PM_{10}/PM_{2.5}$	CO_2e [a]	Hexane	Total HAP
P001	Combustion Turbine	31.08	7.81	3.31	3.22	6.25	112,240	-	0.60
P002	Emergency Generator [b]	0.97	1.94	0.87	1.02E-03	0.02	432	0.01	0.53
P003	Gas Releases	-	-	19.82	-	-	15,401	0.58	1.64
P801	Equipment Leaks	-	-	6.28	-	-	997	0.11	0.76
P004	Separator Vessel #1	-	-	0.14	-	-	8	4.08E-03	8.80E-03
P005	Separator Vessel #2	-	-	0.14	-	-	8	4.08E-03	8.80E-03
P006	Separator Vessel #3	-	-	0.11	-	-	6	3.20E-03	6.90E-03
P007	Separator Vessel #4	-	-	0.60	-	-	18	0.02	0.04
P008	Separator Vessel #5	-	-	0.01	-	-	1	3.95E-04	9.00E-04
T001	Storage Tank #1[d]	-	-	0.29	-	-	15	8.26E-03	0.02
T002	Storage Tank #2[c]	-	-	2.10E-03	-	-	-	-	-
T003	Storage Tank #3[c]	-	-	9.00E-04	-	-	-	-	-
B001	Process Heater[c]	0.71	0.43	0.17	2.80E-03	0.04	554	3.66E-02	0.04
L001	Parts Washer[c]	-	-	0.41	-	-	-	-	-
J001	Loading Operation	-	-	0.01	-	-	1	2.73E-04	6.00E-04
Totals		32.76	10.18	32.17	3.22	6.30	129,680	0.78	3.64

a. Carbon dioxide equivalent (CO_2e) emissions. Represents the sum of carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4) emissions adjusted by each pollutant's global warming potential as identified in Table A-1 to 40 CFR 98, Subpart A.

b. This unit qualifies for coverage under a Permit by Rule pursuant to OAC 3745-31-03(A)(4)(b).

c. These units are classified as *de minimis* sources under OAC 3745-15-05.

d. This unit qualifies for permanent permit exemption pursuant to OAC 3745-31-03(A)(1)(l)(iv).

1.3.1. Turbine Emissions

Emissions are estimated for operation during normal steady-state operating conditions, and operation during startup and shutdown events as described in the following sections.[1]

1.3.1.1. Turbine Normal Steady-State Operation Hourly Emissions

One new Solar turbine is proposed as part of this project. The turbine will utilize an oxidation catalyst to reduce potential emissions of CO and organic emissions and will utilize SoLoNO$_X$™ technology to reduce emissions of NO$_X$. Table 1-2 provides a summary of the uncontrolled emission factors used for each pollutant during normal steady-state operation.

Table 1-2. Turbine Pre-Control Emission Factors – Normal Operations

Pollutant	Emission Factor [a]	Source
NO$_X$	9 ppmvd at 15% O$_2$ for Titan 250	Vendor guaranteed emission rate
CO	25 ppmvd at 15% O$_2$	Vendor guaranteed emission rate
VOC	25 ppmvd of TOC at 15% O$_2$	Based on vendor data for TOC, scaled to VOC based on ratio of TOC:VOC in Table 3.1-2a of AP-42 (April 2000)
CH$_4$	25 ppmvd of TOC at 15% O$_2$	Based on vendor data for TOC, scaled to CH$_4$ based on ratio of TOC:CH$_4$ in Table 3.1-2a of AP-42 (April 2000)
PM$_{10}$/PM$_{2.5}$	0.0066 lb/MMBtu (HHV)	Table 3.1-2a of AP-42 (April 2000)
SO$_2$	0.0034 lb/MMBtu (HHV)	Table 3.1-2a of AP-42 (April 2000)
CO$_2$	53.06 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-1 (effective January 2014)
N$_2$O	0.0001 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-2 (effective January 2014)
Total HAPs	Multiple HAP factors	Table 3.1-3 of AP-42 (April 2000). Organic HAPs were scaled using vendor data and AP-42 emission rates for TOC

a. The emission factors provided in this table represent uncontrolled emissions (excluding add-on controls not inherent to the equipment) at temperatures above 0 °F.

Although the general publically available manufacturer's guarantee information currently states that the NO$_X$ guarantee is 15 ppmvd, for this project Solar® has guaranteed NO$_X$ emissions for the new Titan 250 units at 9 ppmvd (15 percent O$_2$) during steady-state operation at 50-100 percent engine load for all ambient temperatures above 0°F.

[1] NGT also evaluated emissions during cold weather operation (temperatures below 0°F). Due to the location of the Waterville Compressor Station, NGT has assumed 29 hours of potential low temperature operation.

In order to calculate hourly emissions during normal operation, the emission factors provided in the table above are converted to factors in pounds per million standard cubic feet (lb/MMscf) as described in subsequent sections.

1.3.1.2. Turbine Emission Factors – NO_X, CO, and TOC

NO_X, CO, and Total Organic Carbon (TOC)[2] emitted by the combustion turbines during normal operation are calculated based on the vendor-supplied emission rates provided in Table 1-2. Although TOC is not a criteria pollutant, it is used to derive the emission factors for VOC, methane (CH_4 – a greenhouse gas), and organic HAPs. Vendor data for several ambient temperatures and vendor literature for emissions were compiled to develop the data listed below:

- Fuel: Lower Heating Value (939.2 BTU/scf);
- Turbine Performance: Net Output Power (30,381 hp at 48.49 °F), Heat Input at LHV (194.50 MMBtu/hr), Heat Rate at LHV (6,402 BTU/hp-hr);
- Exhaust Parameters: Exhaust Temperature (864 °F), Water Fraction (6.40 %), O_2 Content (15.36 %, dry), Molecular Weight (28.53 lb/lb-mol), Flowrate (548,329 lb/hr and 309,589 acfm); and
- Vendor Supplied Emission Rates for NO_X, CO and UHC (9 ppmvd, 25 ppmvd, and 25 ppmvd @ 15% O_2).

Operating and emissions data at other ambient temperatures are estimated by fitting the vendor-provided data to a curve that best represents the data and interpolating/extrapolating to the desired temperatures. Since the effectiveness of the emissions control inherent in the turbine's combustor design (e.g., SoLoNO$_X$™) is only guaranteed at temperatures above 0 °F, the ppm values provided in Table 1-2 do not apply to sub-zero operating conditions. Further, the rated output power and the mass emission rates of NO_X, CO, and TOC at a given percent load decrease with increasing ambient temperature conditions (i.e., fuel consumption at 100 percent load is highest at lower ambient temperatures). As such, short-term, maximum hourly emission rates are estimated based on operating and emissions data at 0.01 °F to provide a conservative estimate. Annual emissions estimates are based on the annual average ambient conditions at the Waterville Compressor Station. As such, for annual emissions estimates, the operating data (turbine performance and exhaust gas parameters) are interpolated to estimate emissions at the average annual ambient temperature at the station (i.e., 48.49 °F).[3] The emission factor at a given ambient temperature is calculated as illustrated in Equation 1-1 through Equation 1-3:

[2] TOC would be the same as UHC (As defined in Section 1.1.1.1).

[3] A weighted daily average ambient temperature is used in estimating annual emissions for the Waterville Compressor Station and is based on meteorological information in USEPA's TANKS 4.09d database. To determine ambient temperatures, the three meteorological stations in closest proximity to the station are reviewed, and the station with the lowest ambient temperatures is conservatively selected. The weighted daily average ambient temperature is also adjusted to account for the proposed utilization limit. NEXUS interpolates the performance and exhaust parameters using operating data provided by the manufacturer at the following ambient temperatures: 0, 20, 40, 60, 80, and 100 °F.

Equation 1-1:

$$NO_x, CO, TOC\ EF\ (ppmw) = ppmvd, 15\%\ O_2 \times nonwater\% \times \frac{20.9 - (\ vol\%\ O_2, dry\ \times 100)}{20.9 - 15} = ppmw$$

Equation 1-2:

$$NO_x, CO, TOC\ hourly\ emissions\ \left(\frac{lb}{hr}\right) @\ T = \frac{ppmw}{1{,}000{,}000} \times \left[\frac{lb\ exhaust}{hr}\right]_T \times \frac{\frac{lb\ pollutant}{lbmol}}{\left[\frac{lb\ exhaust}{lbmol}\right]_T}$$

$$= \left[\frac{lb\ pollutant}{hr}\right]_T$$

Equation 1-3:

$$NO_x, CO, TOC\ EF\ @\ T = \left[\frac{lb}{hr}\right]_T \times \frac{1{,}000{,}000\ \frac{scf}{MMscf}}{\left[\frac{scf\ fuel}{hr}\right]_T} = \left[\frac{lb}{MMscf}\right]_T$$

Where: *EF = Emission factor*
T = ambient temperature
Maximum hourly emissions estimated at T = 0.01 °F
Annual average hourly emissions estimated at T = 48.49 °F

1.3.1.3. Turbine Emission Factors – VOC, CH_4, and HAPs

VOC, CH_4, and HAP emitted by the combustion turbines are calculated using the vendor-guaranteed TOC emission rate and AP-42 emission factors, as VOC, CH_4, and HAP are constituents of TOC. The TOC emission factor in terms of lb/MMscf at a given ambient temperature is calculated as outlined above in Section 1.3.1.2.

Standard emission factors for VOC, CH_4, HAP, and TOC from stationary gas turbines are provided in Chapter 3.1 of EPA's Compilation of Air Pollutant Emission Factors (AP-42). Table 3.1-2a of AP-42 (version dated April 2000) provides emission factors of 0.0021 lb VOC per MMBtu, 0.0086 lb CH_4 per MMBtu, and 0.011 lb TOC per MMBtu from natural gas-fired turbines. Table 3.1-3 of AP-42 (version dated April 2000) provides emission factors for HAPs emitted from natural gas fired turbines. These HAPs include:

- 1,3-butadiene;
- Acetaldehyde;
- Acrolein;
- Benzene;

- Ethylbenzene;
- Formaldehyde;
- Naphthalene;
- Polycyclic aromatic hydrocarbons (PAH);
- Propylene oxide;
- Toluene; and
- Xylenes.

A total HAP emission factor is calculated as the sum of all individual HAP emission factors.

Ratios of VOC, CH_4, and HAP to TOC from the AP-42 factors are applied to the TOC factor derived from vendor information to obtain emission factors for VOC, CH_4, and HAP. For normal operation, the uncontrolled VOC, CH_4, and HAP factors are derived as follows:

Equation 1-4:

$$VOC, CH_4, HAP\ EF = \frac{lb\ TOC_{(vendor\ guarantee)}}{MMscf} \times \frac{\left(\frac{lb\ pollutant_{(AP-42)}}{MMBtu} \times 1{,}020\ \frac{MMBtu}{MMscf}\right)}{\left(0.011\frac{lb\ TOC_{(AP-42)}}{MMBtu} \times 1{,}020\ \frac{MMBtu}{MMscf}\right)} = \frac{lb}{MMscf}$$

The scaled emission factors were calculated as 0.0068 lb VOC/MMBtu and 0.0279 lb CH_4/MMBtu. Organic HAP emission factors are included in the emission calculations found in Appendix B.

1.3.1.4. Turbine Emission Factors – PM_{10}, $PM_{2.5}$, and SO_2

As indicated in Table 1-2, PM10, $PM_{2.5}$, and SO_2 emitted by the combustion turbine during normal operation are calculated based on the emission factors listed in Table 3.1-2a of AP-42 (version dated April 2000) for stationary gas turbines. The AP-42 emission factors are converted to lb/MMscf as follows:

Equation 1-5:

$$PM_{10}, PM_{2.5}, or\ SO_2\ EF = \frac{lb}{MMBtu} \times 1{,}020\ \frac{MMBtu}{MMscf} = \frac{lb}{MMscf}$$

It is conservatively assumed that PM = PM_{10} = $PM_{2.5}$.

1.3.1.5. Turbine Emission Factors – CO_2, N_2O, and CO_2e

Emission factors for CO_2 and nitrous oxides (N_2O) emitted by the combustion of natural gas are calculated based on the emission factors provided for pipeline natural gas combustion in 40 CFR 98, Subpart C, Tables C-1 and C-2 (effective January 2014), as follows:[4]

Equation 1-6:

$$CO_2\ EF = 53.06\frac{kg}{MMBtu} \times 2.2046\frac{lb}{kg} \times 1{,}026\frac{Btu}{scf} = 120{,}017.5\frac{lb\ CO_2}{MMscf}$$

A chemical reaction will occur as a result of the oxidation catalyst controlling CO emissions to produce CO_2. NGT quantified the additional CO_2 emissions using the following equation:

Equation 1-7:

$$CO_2\ Emissions\ \left(\frac{lb}{hr}\right) = CO_2\ EF\left(\frac{lb\ CO_2}{MMscf}\right) * Fuel\ Consumption\ \left(\frac{MMscf}{hr}\right) + [CO\ Emissions\left(\frac{lb\ CO}{hr}\right) * 95\%\ CO\ Control * \frac{Molecular\ Weight_{CO2}}{Molecular\ Weight_{CO}}]$$

Equation 1-8:

$$N_2O\ EF = 0.0001\frac{kg}{MMBtu} \times 2.2046\frac{lb}{kg} \times 1{,}026\frac{Btu}{scf} = 0.23\frac{lb\ N_2O}{MMscf}$$

Total GHG emissions in terms of CO_2 equivalents (CO_2e) are equal to the sum of all individual GHGs emitted by the turbine, accounting for the respective global warming potential of each GHG. The global warming potentials (GWPs) used to calculate CO_2e emissions for each pollutant emitted by the Project are contained in Table 1-3.

Table 1-3. Applicable Global Warming Potentials

Pollutant [a]	GWP [b]
CO_2	1
CH_4	25
N_2O	298

a. Only those GHGs for which quantifiable emissions increases are expected due to this project are listed.

[4] Note that emission factors utilized the corresponding natural gas heating value from the same subpart or reference (Part 98 for GHG, AP-42 for other factors). In this way, the factors and heating value are consistent with each other, although slightly different heating values were reference for different factors.

b. GWPs are based on a 100-year time horizon, as identified in Table A-1 to 40 CFR Part 98, Subpart A as amended on November 29, 2013, and effective January 1, 2014, to incorporate revised GWPs as published in the Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Report (AR4). See 78 Fed Reg 71903-71981.

As such, the CO_2e factor is derived as follows:

Equation 1-9:

$$CO_2e\ EF = \left(\frac{lb\ CO_2}{MMscf} \times 1\ GWP\right) + \left(\frac{lb\ CH_4}{MMscf} \times 25\ GWP\right) + \left(\frac{lb\ N_2O}{MMscf} \times 298\ GWP\right) = \frac{lb\ CO_2e}{MMscf}$$

1.3.2. Turbine Startup and Shutdown Operation Hourly Emissions

Emissions during startups and shutdowns are calculated based on vendor-specified transient operation profiles which are used to determine the maximum pound per startup or shutdown event as described in further detail in the following sections.

1.3.2.1. Turbine Startup Operation

The startup process for the turbine is estimated to take approximately nine minutes from the initiation of startup to normal operation (startup sequence ends at approximately 50 percent load for most Solar® turbines). This includes approximately three minutes of ignition-idle operation and six minutes of loading/thermal stabilization operation. [5]

Table 1-4 provides a summary of the emission factors used for each pollutant during the ignition-idle and loading/thermal stabilization phases of each startup event per turbine type. It is assumed that the oxidation catalyst will not yet have a measureable destruction or removal efficiency (DRE) during startup, as it is designed to meet control specifications only during normal operation. It is also assumed that the SoLoNO$_X$™ will not result in reduced NO$_X$ during startup.

[5] These are referred to as "Step 2" and "Step 3", respectively in the emissions calculations in Appendix B. Step 1 of turbine startup includes energizing the starter and observing the RPM until the ignition range is reached. During Step 1, ignition and combustion have not yet occurred in the turbine, and thus the turbine combustor is not yet a source of air emissions.

Table 1-4. Solar® Titan 250-30002S4 Pre-Control Emission Factors – Startup Operation

Pollutant	Ignition-Idle Phase Emission Factor from Source [a]	Loading/Thermal Stabilization Phase Emission Factor from Source [a]	Source
NO_X	50 ppmvd at 15% O_2	50 ppmvd at 15% O_2	Based on vendor data
CO	2,000 ppmvd at 15% O_2	1,013 ppmvd at 15% O_2	Based on vendor data
VOC	200 ppmvd TOC at 15% O_2 0.011 lb_{TOC}/MMBtu (HHV) : 0.0021 lb_{VOC}/MMBtu (HHV)	110 ppmvd TOC at 15% O_2 0.011 lb_{TOC}/MMBtu (HHV) : 0.0021 lb_{VOC}/MMBtu (HHV)	Based on vendor data for TOC, scaled to VOC based on ratio of TOC:VOC in Table 3.1-2a of AP-42 (April 2000)
CH_4	200 ppmvd TOC at 15% O_2 0.0086 lb/MMBtu (HHV) CH_4	110 ppmvd TOC at 15% O_2 0.0086 lb/MMBtu (HHV) CH_4	Based on vendor data for TOC, scaled to CH_4 based on ratio of TOC:CH_4 in Table 3.1-2a of AP-42 (April 2000)
$PM_{10}/PM_{2.5}$	Same as normal operation		
SO_2	Same as normal operation		
CO_2	Same as normal operation		
N_2O	Same as normal operation		
Total HAPs	200 ppmvd TOC at 15% O_2 Multiple HAP factors	110 ppmvd TOC at 15% O_2 Multiple HAP factors	Based on vendor data for TOC, scaled to HAP based on ratio of TOC:HAP in Table 3.1-2a of AP-42 (April 2000)

a. The emission factors provided in this table represent uncontrolled emissions. The Solar® Titan 250 turbine will be equipped with oxidation catalyst, however it is assumed that the catalyst does not have a DRE during startups.

All pollutants emitted by the combustion turbine during startup events are calculated based on the same methodology that is used to calculate emissions during normal operation (i.e., the techniques described in Section 1.3.1).[6] However, rather than calculate a lb/MMscf emission factor, pounds per startup event (lb/event) are calculated for each pollutant based on the fuel consumed during the 3-minute ignition-idle phase and during the 6-minute loading/thermal stabilization phase as follows:

[6] NEXUS will not operate any control device to reduce emissions of NO_X from the turbines; however, NO_X emission rates during startup events may nevertheless differ from the emission rates observed during normal operation given that the low-NO_X burners are designed to operate at optimal combustion temperatures which may not be achieved until the end of the startup sequence.

Equation 1-10:

$$EF\ during\ SU\ event = ppmvw_{S2-i} \times \frac{Exhaust\ Mass\ Flow}{10^6} \times \frac{MW_{pol}}{MW_{ex}} \times \frac{3\ min}{60\ min} + ppmvw_{S3-i} \times \frac{Exhaust\ Mass\ Flow}{10^6} \times \frac{MW_{pol}}{MW_{ex}} \times \frac{6\ min}{60\ min} = \frac{lb\ Pollutant\ i}{event}$$

Where: EF is the emission factor for pollutant "i"

For example:

$$CO\ EF\ during\ SU\ event = 1{,}137.25 \times \frac{273{,}420}{10^6} \times \frac{28.01}{28.66} \times \frac{3\ min}{60\ min} + 688.04 \times \frac{347{,}975}{10^6} \times \frac{28.01}{28.61} \times \frac{6\ min}{60\ min} = 38.63$$

1.3.2.2. Turbine Shutdown Operation

The shutdown process for each turbine is estimated to take approximately 8.5 minutes from normal operation to shutdown for a Solar® Titan 250. The shutdown event consists of loading/thermal stabilization operation. The calculation for shutdowns is similar to that for startups as shown in Table 1-4, utilizing the same emission rates identified during loading/thermal stabilization for startup.

1.3.3. Turbine Annual Potential Emissions

The emission factors described in the previous sections are multiplied by the following activity data to estimate annual potential emissions:

- **Normal, Steady State Operation:** Annual fuel consumption as estimated from vendor-provided turbine parameters at the annual average ambient temperature for the Waterville Compressor Station. Annual potential to emit (PTE) estimates assume 100% utilization (8,760 hours per year). CO, VOC, and HAP PTE estimates take the control efficiency of the proposed oxidation catalyst into account. Further, since an oxidation catalyst provides more complete conversion of CO to CO_2, the controlled portion of the CO emissions is added back to the CO_2 emissions rate. Note however, that this increase is a small fraction of the overall CO_2 emissions.

  NO_X PTE estimates are based on the project-specific emissions guarantee of the proposed SoLoNO$_X$™ combustion technology.
- **Startup/Shutdown Operation:** The number of startup and shutdown events is conservatively estimated at 260 startup events and 260 shutdown events per year for each turbine. No credit for control by the oxidation catalyst is accounted for in the estimation of startup emissions even though the oxidation catalyst inlet temperature should reach the effective temperature very quickly. However, it is assumed that the oxidation catalyst will be operational during shutdown since the oxidation catalyst inlet temperature would not be expected to drop below the effective temperature until the feed of fuel is discontinued.

- **Low Temperature Operation:** Fuel consumption during low temperature operation as estimated by extrapolating vendor-provided turbine parameters to an ambient temperature of 0°F. NGT has estimated emissions by assuming that the temperature will drop below 0°F for 29 hours per year.

For some pollutants (e.g., particulate matter), emission rates from the combustion turbine are higher during normal steady-state operation than they are during startup and shutdown. However, for other pollutants (e.g., CO), emission rates may be higher during startup and shutdown than during normal operation. Although emission concentration may be higher, load is typically lower during startup and shutdown such that short-term mass emission rate may still be lower. This varies, however, per pollutant. Therefore, for the sake of conservatism, maximum annual emissions for the turbine are the maximum of potential combinations of normal, startup (SU), and shutdown (SD) operation as summarized in the equations below.

Equation 1-11:

$$Normal\ \frac{ton}{yr} = Average\ Normal\ \frac{lb}{hr} \times \frac{8{,}760\ hr \times \%\ utilization}{yr} \times \frac{ton}{2{,}000\ lb}$$

Equation 1-12:

$$Normal\ with\ Startup\ (SU)\ and\ Shutdown(SD)\ \frac{ton}{yr} = \max[normal\ \frac{ton}{yr},$$
$$startup\ \frac{ton}{yr} + \ shutdown\ \frac{ton}{yr} + \left(normal\ \frac{ton}{yr} \times \left\{1 - \frac{startup\ hrs \mp shutdown\ hrs}{8{,}760\ \times\ \%\ utilization}\right\}\right)]$$

Equation 1-13:

$$Normal, SU, SD, and\ Low\ Temp(LT)\ \frac{ton}{yr}$$
$$= \ startup\ \frac{ton}{yr} + shutdown\ \frac{ton}{yr} + low\ temp\ \frac{ton}{yr}$$
$$+ \left(normal\ \frac{ton}{yr} \times \left\{1 - \frac{startup\ hrs \mp shutdown\ hrs \mp low\ temp\ hrs}{8760\ \times\ \%\ utilization}\right\}\right)]$$

Equation 1-14:

$$Normal\ \ and\ Low\ Temp(LT)\ \frac{ton}{yr} = low\ \frac{ton}{yr} + \ normal\ \frac{ton}{yr}\ x\ \left[1 - \left\{\frac{low\ temp\ hrs}{8{,}760\ \times\ \%\ utilization}\right\}\right]$$

Equation 1-15:

$$Annual\ PTE\ \left(\frac{ton}{yr}\right)_{Pollutant\ i}$$
$$= \text{MAX}\left[Normal\left(\frac{ton}{yr}\right), Normal\ with\ SU, SD\ \left(\frac{ton}{yr}\right), Normal\ with\ SU, SD, LT\ \left(\frac{ton}{yr}\right)\right]_i$$

1.3.4. Natural Gas Heater Emissions

NGT is proposing to install one (1) fuel gas heater rated at 0.750 MMBtu/hr. Table 1-5 provides information on the emission factors used to calculate emissions from the heaters.

Table 1-5. Cameron Heater Emission Factors

Pollutant	Emission Factor from Source	Source
NO_X	80 ppmvd at 3% O_2	Vendor specified emission rate
CO	200 ppmvd at 3% O_2	Vendor specified emission rate
TOC	140 ppmvd at 3% O_2	Vendor specified emission rate
VOC	0.035 lb/MMBtu	Table 1.4-3 of AP-42 (July 1998), scaled using the vendor guarantee and AP-42 emission rates for TOC
CH_4	0.00996 lb/MMBtu	Table 1.4-2 of AP-42 (July 1998), scaled using the vendor guarantee and AP-42 emission rates for TOC
$PM_{10}/PM_{2.5}$	7.60 lb/MMscf	Table 1.4-2 of AP-42 (July 1998)
SO_2	0.60 lb/MMscf	Table 1.4-2 of AP-42 (July 1998)
CO_2	53.06 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-1 (effective January 2014)
N_2O	0.0001 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-2 (effective January 2014)
Total HAPs	Multiple HAP factors	Table 1.4-3 of AP-42 (July 1998), scaled using the vendor guarantee and AP-42 emission rates for TOC

In order to calculate hourly emissions, the emission factors provided in Table 1-5 are converted to units of lb/MMscf. These converted factors are multiplied by each heater's hourly fuel consumption in scf/hr to obtain hourly emissions. Fuel consumption is calculated from the heat output of the heaters assuming a thermal efficiency of 70 percent and a natural gas heating value of 1,020 Btu/scf. Annual potential emissions are calculated based on average hourly fuel consumption. Maximum hourly potential emissions are calculated based on maximum hourly fuel consumption, assuming an overload capability of 105 percent. The following sections summarize the methods used to obtain lb/MMscf emission factors for each pollutant emitted from the new heaters.

1.3.4.1. Heater Emissions Factors – NO_X, CO, and TOC

NO_X, CO, and TOC emitted by the heaters are calculated based on vendor-specified emission rates and vendor-specified fuel consumption for the heaters. NO_X, CO, and TOC factors are derived as follows:

Equation 1-16:[7]

$$NO_x, CO, TOC\ EF = ppmvd, 3\%\ O_2 \times \frac{lb/MMBtu}{ppmvd, 3\%\ O_2} \times 1{,}020\ \frac{MMBtu}{MMscf} = \frac{lb}{MMscf}$$

1.3.4.2. Heater Emissions Factors – VOC, CH_4, and HAPs

VOC, CH_4, and HAP emissions are calculated using the TOC emission rate and AP-42 emission factors. Standard emission factors for TOC, VOC, CH_4, and HAP from natural gas fired heaters are provided in Chapter 1.4 of AP-42. Table 1.4-2 (version dated July 1998) provides a CH_4 emission factor for natural gas-fired external combustion sources. Instead, the TOC and VOC factors used in the calculations differ slightly from the factors provided in AP-42 Table 1.4-2. TOC and VOC factors are calculated as the sum of the factors for all speciated organic compounds listed in AP-42 Table 1.4-3 which are TOCs and VOCs, respectively. Table 1.4-3 of AP-42 (version dated July 1998) provides emission factors for the HAPs emitted from natural gas fired external combustion units.

Using the same ratio method used to calculate CH_4 and HAP emitted from turbines (detailed in Section 1.3.1.3), ratios for CH_4, HAP, and VOC emitted from heaters are based on the vendor-specified TOC emission rate.

1.3.4.3. Heater Emissions Factors – PM_{10}, $PM_{2.5}$, and SO_2

PM_{10} and $PM_{2.5}$ emitted by the heaters are calculated based on the emission factors listed in Table 1.4-2 of AP-42 (version dated July 1998) for natural gas fired external combustion sources. The total PM emission factor of 7.6 lb/MMscf, which includes filterable and condensable particulate, is used. It is assumed that all particulate emitted from natural gas combustion is less than 2.5 microns in diameters, so that PM equals PM_{10} and $PM_{2.5}$. The SO_2 emission factor of 0.6 lb/MMscf from Table 3.2-2 of AP-42 is used directly.

1.3.4.4. Heater Emission Factors – CO_2, N_2O, and CO_2e

CO_2 and N_2O emitted by the heaters are calculated based on the emission factors listed in 40 CFR 98, Subpart C, Tables C-1 and C-2. Equation 1-6 and Equation 1-8 show how factors in lb/MMscf are derived for these pollutants. GHGs emitted from the heaters include CO_2, CH_4, and N_2O. CO_2e emissions are calculated using the GWPs provided in Table 1-3.

1.3.5. Emergency Generator Emissions

NGT is proposing to install one new Waukesha (880 bhp) four stroke lean burn natural gas fired emergency generator or equivalent. The emergency generator potential emissions are calculated using 500 hours per year, which includes maintenance and testing, based on standard guidance from USEPA.[8] Table 1-6 provides information on the emission factors used to calculate emissions from the emergency generator.

[7] Conversion factors in units of lb/MMBtu over ppmvd, 3% O_2 are obtained from the North American Combustion Handbook.

[8] NGT will limit the operation of the emergency engine for maintenance checks and readiness testing to no more than 100 hr/yr as per 40 CFR 60.4243(d)(2), to be defined as an emergency engine under NSPS Subpart JJJJ.

Table 1-6: Waukesha Emergency Generator Emission Factors

Pollutant	Emission Factor from Source	Source
NO_X	2.0 g/bhp-hr	NSPS Subpart JJJJ
CO	4.0 g/bhp-hr	NSPS Subpart JJJJ
VOC	1.0 g/bhp-hr	VOC (without formaldehyde): NSPS Subpart JJJJ Table 3.2-2 of AP-42 (July 2000)
CH_4	1.0 g VOC/bhp-hr 1.25 lb/MMBtu (HHV)	VOC: NSPS Subpart JJJJ Table 3.2-2 of AP-42 (July 2000)
$PM_{10}/PM_{2.5}$	0.00999 lb/MMBtu (HHV)	Table 3.2-2 of AP-42 (July 2000)
SO_2	0.000588 lb/MMBtu (HHV)	Table 3.2-2 of AP-42 (July 2000)
CO_2	53.06 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-1 (effective January 2014)
N_2O	0.0001 kg/MMBtu (HHV)	40 CFR 98, Subpart C, Table C-2 (effective January 2014)
Total HAPs	1.0 g VOC/bhp-hr Multiple HAP factors	VOC: NSPS Subpart JJJJ Table 3.2-2 of AP-42 (July 2000)

In order to calculate hourly emissions, the emission factors provided in Table 1-6 are converted to factors in lb/MMscf. These converted factors are multiplied by the generator's hourly fuel consumption in scf/hr to obtain hourly emissions. The following sections summarize the methods used to obtain lb/MMscf emission factors for each pollutant emitted from the new emergency generator.

1.3.5.1. Emergency Generator Emission Factors – NO_X, CO, and VOC

NO_X, CO, and VOC emitted by the emergency generator are calculated based on the emission limits established under NSPS Subpart JJJJ in grams per brake horsepower-hour (g/bhp-hr) for emergency engines greater than 130 hp installed on and after January 1, 2009.[9]

The VOC emission limit of 1.0 g/bhp-hr in NSPS Subpart JJJJ excludes formaldehyde.[10] A VOC factor inclusive of formaldehyde is calculated using the relative emissions of formaldehyde and VOC provided in Table 3.2-2 of AP-42 (version dated July 2000). A VOC factor is calculated as the sum of the factors for all trace organic compounds listed in Table 3.2-2 which are VOCs. Formaldehyde emissions are proportional to VOC emissions, because formaldehyde is a constituent of VOC. The VOC factor is adjusted to account for formaldehyde as follows:

[9] Per Table 1 to Subpart JJJJ of Part 60.

[10] Per footnote "d" of Table 1 to Subpart JJJJ of Part 60.

Equation 1-17:

$$VOC\ EF = \frac{1.0\ g\ VOC\ (without\ formaldehyde)}{bhp-hr} \times \frac{\left(\frac{0.119\ lb\ VOC}{MMBtu}\right)}{\left(\frac{0.119\ lb\ VOC}{MMBtu} - \frac{0.0528\ lb\ formaldehyde}{MMBtu}\right)}$$
$$= 1.79\ \frac{g}{bhp-hr}$$

Vendor-specified power output and fuel consumption for the engine are used to convert the g/bhp-hr factors to a lb/MMBtu emission factor.

NO_X, CO, and VOC factors are derived as follows:

Equation 1-18:

$$NO_x, CO, VOC\ EF = \frac{g}{bhp-hr} \times \frac{lb}{453.6\ g} \times hp \times \frac{hr}{scf\ fuel} \times \frac{1{,}000{,}000\ scf}{MMscf} = \frac{lb}{MMscf}$$

1.3.5.2. Emergency Generator Emission Factors – CH_4 and HAP

CH_4 and HAP emissions are calculated using the VOC emission rate and AP-42 emission factors. Standard emission factors for VOC, CH_4, and HAP from natural gas fired engines are provided in Chapter 3.2 of AP-42. Table 3.2-2 (version dated July 2000) provides emission factors for VOC, CH_4, and HAPs from four stroke lean burn natural gas-fired engines.

Using the same ratio method used to calculate CH_4 and HAP emitted from turbines (detailed in 1.3.1.3), the ratio of CH_4 and HAP emitted from engines is based on the VOC emission rate from NSPS Subpart JJJJ.

1.3.5.3. Emergency Generator Emission Factors – PM_{10}, $PM_{2.5}$, and SO_2

PM_{10} and $PM_{2.5}$ emitted by the emergency generator are calculated based on the emission factors listed in Table 3.2-2 of AP-42 (version dated July 2000) for natural gas fired engines. PM_{10} and $PM_{2.5}$ emission factors are calculated as the sum of the filterable and condensable PM emission factors. The SO_2 emission factor utilized is also obtained from Table 3.2-2 of AP-42.

1.3.5.4. Emergency Generator Emission Factors – CO_2, N_2O, and CO_2e

CO_2 and N_2O emitted by the emergency generator are calculated based on the emission factors listed in 40 CFR 98, Subpart C, Tables C-1 and C-2 (effective January 1, 2014). GHGs emitted from the engine include CO_2, CH_4, and N_2O. CO_2e emissions are calculated using the GWPs provided in Table 1-3.

1.3.6. Miscellaneous Support Equipment

Fugitive emissions and gas releases at the Waterville Compressor Station will occur as a result of the proposed project. The methodologies used to calculate this potential increase are described in the following sections.

1.3.6.1. Emissions from Piping Components

Fugitive emissions from equipment leaks will occur during operation of the Waterville Compressor Station due to the installation of equipment and piping components. While the design is not yet final, component counts were estimated based on data from similar sized compressor stations. Components will include flanges, connectors, valves, open-ended lines, compressor seals, pump seals, etc.

Potential emissions are calculated from the piping components using emission factors from EPA's Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017), Table 2-4 (November 1995) which provides leak emission factors for oil and gas production operations. Gas service factors are used for components in natural gas service, light oil service factors are used for components in pipeline liquids service (e.g. condensate), and heavy oil service factors are used for components in oil service (e.g. oils on-site). Since an emission factor is not provided for leaks from pump seals in heavy oil service in Table 2-4, the average SOCMI without ethylene emission factor for pumps in heavy oil service from Table 2-1 is used to estimate emissions. Annual emissions are conservatively calculated assuming that the components are in continuous gas/liquid/oil service as follows:

Equation 1-19:

$$\text{Total Gas Emissions} = \#\ of\ components \times \frac{\frac{kg}{hr}}{component} \times \frac{8{,}760\ hrs}{yr} \times \frac{1{,}000\ g}{kg} \times \frac{lb}{453.6\ g} \times \frac{2{,}000\ ton}{lb}$$
$$= \frac{tons}{yr}$$

The equation above is used to calculate total fugitive gas emitted from the piping components at the Waterville Compressor Station. Emissions of individual VOCs, GHGs, and HAPs are calculated by multiplying the total fugitive gas emissions from piping components in gas, pipeline liquid, and oil service by the weight percent of each pollutant in gas, pipeline liquids, and oil. Gas, pipeline liquid, and oil compositions are engineering estimates based on available worst case data to be conservative.[11, 12]

1.3.6.2. Emissions from Gas Releases

Gas releases due to periodic blowdown of the new turbine-driven compressor units and other events occur with station operation. The majority of emissions from gas release events are associated with routine operations such as startup and shutdown, reduced pressure demand events, or maintenance activities. The potential volume of gas emitted was estimated in standard cubic feet per year based on the design data for other compressor stations. Emissions of individual VOCs, GHGs, and HAPs are calculated by multiplying the total gas emissions from gas releases by the weight percent of each pollutant in the natural gas compressed at the facility.[13]

[11] Oil is assumed to be 100 percent VOC and contain no GHGs or HAPs. Pipeline liquids composition is based on the composition of residual liquids following flashing, calculated based on a laboratory analysis of flashing from an operation in Atlanta, Texas in April 2009.

[12] Natural gas composition is conservatively estimated based on an extended gas analysis taken from a representative metering station.

[13] Ibid.

1.3.6.3. Emissions from Separator Vessels and Condensate Storage Tanks

Although stabilized condensate has no flashing losses, flashing losses do occur when the pressure of a liquid is decreased or the temperature is increased. At the Waterville Compressor Station, flashing losses occur at pipeline liquids storage tanks and include VOCs, GHGs, and HAPs. Total flashing losses are calculated based on a flash gas rate and a representative flash gas density. The flash gas rate is calculated based on a liquids input rate and a flash factor.[14] Emissions of individual VOCs, GHGs, and HAPs are calculated from total flashing losses using a representative pipeline liquids compositions.

Working and breathing losses occur at all tanks at the Waterville Compressor Station, including pipeline liquid tanks, lubricating oil tanks, and oil-water separators. Working and breathing losses include VOCs, GHGs, and HAPs and are calculated with EPA's TANKS 4.09d program using maximum potential throughputs for each tank.

1.3.6.4. Emissions from Truck Loading

Emissions occur during the loading of volatile organic liquids into tanker trucks and include VOCs, GHGs, and HAPs. Total loading losses are calculated based on calculation methods for submerged filling provided in AP-42 Section 5.2 (version dated January 1995). Emissions of individual VOCs, GHGs, and HAPs are calculated from total loading losses using representative pipeline liquids and lubricating oil compositions.

1.3.6.5. Parts Washer Emissions

NGT is proposing to install a new remote reservoir parts washer. Potential emissions from the parts washer are calculated based on the physical and chemical properties of a worst-case representative solvent used in the parts washer and the maximum throughput of the parts washer. In order to conservatively calculate potential emissions, it is assumed that all volatile organic compounds in the solvent are emitted to the atmosphere and that the VOC content is 100 percent. The maximum throughput of the parts washer will be 120 gallons of solvent per year, based on past experience and the addition of a safety factor. A worst-case specific gravity is assumed based on typical solvents used.

Potential VOC emissions from the parts washer are calculated as follows:

Equation 1-20:

$$VOC = 120\frac{gal\ solvent}{year} \times (0.82\ \times 8.34\frac{lb}{gal})\ \times 1\frac{lb\ VOC}{lb\ solvent} = 0.4103\frac{tons\ VOC}{yr}$$

[14] The liquids input rate is determined based on operator experience with the incorporation of a safety factor, and the flash factor in standard cubic foot per barrel (scf/bbl) was determined in a laboratory analysis of a gas sample taken from Atlanta, Texas.

This section of the permit application includes a discussion of potentially applicable federal and state air quality permitting and regulatory requirements.

2.1. FEDERAL REGULATORY APPLICABILITY

2.1.1. Prevention of Significant Deterioration Applicability

The applicability of the Prevention of Significant Deterioration (PSD) permitting program is evaluated for proposed construction, reconstruction, and modification projects that result in an emission increase of a regulated New Source Review (NSR) pollutant for which the area is in attainment with the National Ambient Air Quality Standards (NAAQS). Lucas County has been designated as "attainment" or "unclassifiable" for all regulated NSR pollutants.[15] Natural gas compressor stations are not among the 28 listed source categories in OAC 3745-31-01(NNN)(2)(a); therefore the facility is subject to the PSD major source threshold of 250 tpy provided in OAC 3745-31-01(NNN)(2)(b). As shown in Table 1-1, the proposed Waterville Compressor Station will be a minor source of criteria pollutants with respect to the PSD permitting program.

2.1.2. GHG Tailoring Rule Applicability

Additionally, the final PSD and Title V Greenhouse Gas (GHG) Tailoring Rule was published in the Federal Register on June 3, 2010 (75 FR 31514) but was ultimately overturned on June 23, 2014 by the US Supreme Court.[16] Under the formerly effective rule, GHGs could, as of July 1, 2011, become "subject to regulation" under the PSD program for construction projects that would result in potential GHG emissions of 100,000 tpy carbon dioxide equivalents (CO_2e) or more. However, the June 23, 2014 Supreme Court Decision clarifies that construction projects cannot trigger major NSR for GHGs unless major NSR is otherwise triggered for criteria pollutants.[17] Furthermore, in accordance with OAC 3745-31-34(C)(2), Ohio EPA's permit to install permitting requirements for GHGs cease to be effective if a federal court issues a ruling limiting the administrator's authority to regulate GHGs under the Clean Air Act.

[15] Attainment designations for Ohio counties are established in 40 CFR 81.336.

[16] As defined in 40 CFR 98.6, regulated GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).

[17] On June 23, 2014, the U.S. Supreme Court issued its decision in *Utility Air Regulatory Group v. EPA* (No. 12-1146). The Court said that EPA may not treat greenhouse gases as an air pollutant for purposes of determining whether a source is a major source required to obtain a PSD or Title V permit. The Court also said that PSD permits that are otherwise required (based on emissions of other pollutants) may continue to require limitations on greenhouse gases emissions based on the application of Best Available Control Technology (BACT). EPA is currently evaluating the implications of the Court's decision and awaiting further action by the U.S. Courts. [adapted from 7/24/14 letter from Janet G. McCabe, U.S. EPA, Acting Administrator, to Regional Administrators, "Next Steps and Preliminary Views on the Application of Clean Air Act Permitting Programs to Greenhouse Gases Following the Supreme Court's Decision in *Utility Air Regulatory Group v. Environmental Protection Agency*].

2.1.2.1. Ohio EPA GHG Permitting Status

On June 23, 2014, the U.S. Supreme Court issued a decision addressing stationary source permitting requirements for greenhouse gases (GHGs).[18] Subsequently, on July 24, 2014, Janet McCabe, Acting Assistant Administrator, Office of Air and Radiation, U.S. EPA issued preliminary guidance concerning the impact of the decision on various aspects of the court decision.[19] The Supreme Court decision and subsequent U.S. EPA guidance changes how Ohio EPA permits GHG sources. Ohio EPA has issued Engineering Guide #85 that discusses the revised approach Ohio EPA will use to regulate GHGs through the air pollution permitting program.[20] Therefore, emission of GHGs do not trigger permitting for the proposed project.

2.1.3. Title V Operating Permit Program Applicability

The Title V operating permit program consolidates state and federal requirements applicable to major sources into a single comprehensive operating permit for the purposes of facilitating ongoing compliance. In accordance with OAC 3745-77, sources with a PTE of 100 tpy or more for criteria pollutants, 25 tpy or more for total HAP, or 10 tpy or more for individual HAP are considered major sources for which applicants must obtain a Title V operating permit.

As mentioned previously, the final PSD and Title V Greenhouse Gas (GHG) Tailoring Rule was published in the Federal Register on June 3, 2010 (75 FR 31514) but was ultimately overturned on June 23, 2014 by the U.S. Supreme Court. Under the formerly effective rule, GHGs could, as of July 1, 2011, become "subject to regulation" under the Title V program for facilities that have a GHG potential to emit of 100,000 tpy CO_2e or more.

U.S. EPA has since issued guidance following the U.S. Supreme Court ruling indicating that, "EPA will no longer apply or enforce federal regulatory provisions or provisions of the EPA-approved Title V programs that require a stationary source to obtain a Title V permit solely because the source emits or has the potential to emit greenhouse gases above the major source thresholds." EPA also clarifies in this guidance that, "The EPA also does not intend to continue applying regulations that would require Title V programs submitted for approval by the EPA to require that such sources obtain Title V permits."[21]

Furthermore, in accordance with OAC 3745-77-11(D)(2), Ohio EPA's Title V permitting requirements for greenhouse gases cease to be effective if a federal court issues a ruling limiting the administrator's authority to regulate greenhouse gases under the Clean Air Act. **As a result, the GHG PTE for Waterville Compressor Station cannot trigger major source applicability under the Title V permitting program.**

Finally, Table 1-1 shows that facility-wide emissions will not exceed Title V thresholds for criteria pollutants or HAP; therefore, NGT is not required to obtain a Title V operating permit for the Waterville Compressor Station.

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[18] http://www.supremecourt.gov/opinions/13pdf/12-1146_4g18.pdf

[19] http://www.epa.gov/nsr/documents/20140724memo.pdf

[20] A copy of this guidance can be found on the web at: http://epa.ohio.gov/dapc/engineer/eguides.aspx.

[21] U.S. EPA memorandum from Ms. Janet G. McCabe to U.S. EPA Regional Administrators dated July 24, 2014.

2.1.4. New Source Performance Standards

NSPS require new, modified, or reconstructed sources in specified source categories to control emissions to the level achievable by the best demonstrated technology as specified in the applicable provisions. Any source subject to an NSPS is also subject to the general provisions of NSPS Subpart A, except as noted.

2.1.4.1. 40 CFR 60, Subpart A - General Provisions – Applicable

All affected sources subject to source specific NSPS are subject to the general provisions of NSPS Subpart A unless specifically excluded by the source-specific NSPS. Subpart A requires initial notification, performance testing, recordkeeping and monitoring, provides reference methods, and mandates general control device requirements for all other subparts as applicable.

2.1.4.2. 40 CFR 60, Subpart D – Fossil-Fuel-Fired Steam Generators – Not Applicable

NSPS Subpart D applies to fossil fuel-fired steam generating units with a heat input capacity greater than or equal to 250 MMBtu/hr that have been constructed or modified since August 17, 1971. The rule defines a fossil fuel-fired steam generating unit as:[22]

> *A furnace or boiler used in the process of burning fossil fuel for the purpose of producing steam by heat transfer.*

The combustion turbine will not be subject to Subpart D, because:

1. The turbine has a heat input capacity less than 250 MMBtu/hr;
2. The turbine does not burn fossil fuel for the purpose of producing steam; and

Per 40 CFR 60.40(e), units that are subject to 40 CFR 60 Subpart KKKK, which includes the Waterville Compressor Station's combustion turbines, are not subject to 40 CFR 60 Subpart D.

2.1.4.3. 40 CFR 60, Subpart Da – Electrical Utility Steam Generating Units – Not Applicable

This regulation applies to electric utility steam generating units with a heat input capacity greater than 250 MMBtu/hr for which construction, reconstruction, or modification commenced after September 18, 1978. Since the NEXUS Gas Transmission combustion turbine will neither generate steam nor produce electricity for sale to the grid, and since each turbine will have a heat input capacity less than 250 MMBtu/hr, the unit is not subject to Subpart Da. Furthermore, per 40 CFR 60.40Da(e)(1) units that meet the applicability requirements of and are subject to 40 CFR 60 Subpart KKKK, which includes the Waterville Compressor Station combustion turbine, are not subject to 40 CFR 60 Subpart Da.

[22] 40 CFR 60.41

2.1.4.4. 40 CFR 60, Subpart Db - Industrial Commercial – Institutional Steam Generating Units – Not Applicable

NSPS Subpart Db provides standards for steam generating units with a heat input capacity greater than 100 MMBtu/hr that commenced construction, reconstruction, or modification after June 19, 1984. The term "steam generating unit" is defined under this regulation as:[23]

> *A device that combusts any fuel and produces steam or heats water or any other heat transfer medium.*

The combustion turbine will have a heat input capacity greater than 100 MMBtu/hr; however, as previously stated, the units are not steam generating units. Furthermore, per 40 CFR 60.40b(i) units that meet the applicability requirements of 40 CFR 60 Subpart KKKK, which includes the Waterville Compressor Station's combustion turbines, are not subject to 40 CFR 60 Subpart Db.

2.1.4.5. 40 CFR 60, Subpart Dc – Small Industrial-Commercial-Institutional Steam Generating Units – Not Applicable

NSPS Subpart Dc applies to steam generating units for which construction, modification, or reconstruction is commenced after June 9, 1989 and that have a maximum design heat input capacity of greater than or equal to 10 MMBtu/hr and less than or equal to 100 MMBtu/hr. The Process Heater (B001) is sized to a maximum heat input capacity less than 10 MMBtu/hr. As such, Subpart Dc is not applicable.

2.1.4.6. 40 CFR 60, Subpart Kb – Volatile Organic Liquid Storage Vessels Constructed, Reconstructed, or Modified after July 23, 1984 – Not Applicable

Affected sources under 40 CFR 60, Subpart Kb (NSPS Kb) include all storage vessels with capacities of at least 75 cubic meters (m^3) (19,813 gallons) storing volatile organic liquids (VOL) constructed, reconstructed, or modified after July 23, 1984.

The Separator Vessels #1-5 (P004-P008) and the Storage Vessels #1-3 (T001-T003) are each sized to a nominal storage capacity less than 19,813 gallons; therefore, Subpart Kb is not applicable.

2.1.4.7. 40 CFR 60, Subpart GG – Stationary Gas Turbines – Not Applicable

NSPS Subpart GG applies to combustion turbines constructed or modified after October 3, 1977 with heat input equal to or greater than 10 MMBtu/hr based on lower heating value. However, NSPS Subpart GG has been superseded by a newer subpart (KKKK) that exempts subject units from NSPS Subpart GG [40 CFR 60.4305(b)]. The proposed combustion turbine at the Waterville Compressor Station is subject to the requirements of NSPS KKKK (refer to the discussion in Section 2.1.4.11 below) and is, therefore, exempt from NSPS Subpart GG.

[23] 40 CFR 60.41b

2.1.4.8. 40 CFR 60, Subpart KKK – Equipment Leaks of VOC from Onshore Natural Gas Processing Plants – Not Applicable

NSPS Subpart KKK applies to equipment leaks from natural gas processing plants that were constructed after June 20, 1984 but before August 23, 2011. The facility is not a natural gas processing plant (as defined in 40 CFR 60.631). Therefore, this subpart does not apply.

2.1.4.9. 40 CFR 60, Subpart LLL – SO_2 Emissions from Onshore Natural Gas Processing Plants – Not Applicable

NSPS Subpart LLL applies to onshore natural gas processing facilities that contain sweetening units that commence construction or modification after January 20, 1984. The Waterville Compressor Station is not a natural gas processing plant and will not contain any sweetening units, as defined in 40 CFR 60.641, and therefore is not subject to this subpart.

2.1.4.10. 40 CFR 60, Subpart JJJJ – Spark Ignition Internal Combustion Engines – Applicable

NSPS Subpart JJJJ establishes requirements for owners or operators of spark ignition internal combustion engines that commence construction, modification, or reconstruction after June 12, 2006 (the date the engine is ordered constitutes construction). The spark ignition internal combustion engine (P002) used at this facility will be considered an emergency stationary internal combustion engine, as defined by 40 CFR 60.4248, and will be constructed and manufactured after the dates mentioned above; therefore, it is subject to the provisions of NSPS Subpart JJJJ.

Per 40 CFR 60.4233(e) the unit will meet the emission standards specified in Table 1 of Subpart JJJJ. NGT will ensure that the engine satisfies the monitoring requirements specified in 40 CFR 60.4237(a) by installing a non-resettable hour meter. NGT will also ensure that the Emergency Generator (P002) satisfies the compliance requirements for periodic testing and maintenance specified in 40 CFR 60.4243(b)(2), the operational restrictions for emergency engines in 40 CFR 60.4243(d), and the notification, reporting and recordkeeping requirements specified in 40 CFR 60.4245.

2.1.4.10.1. *Emission Limits*

The emergency generator will be subject to the following emissions standards from Table 1 of Subpart JJJJ (emergency engines greater than 130 hp):[24]

- NO_X: 2.0 g/hp-hr or 160 ppmvd @15% O_2
- CO: 4.0 g/hp-hr or 540 ppmvd @15% O_2
- VOC: 1.0 g/hp-hr or 86 ppmvd @15% O_2

2.1.4.10.2. *Testing*

NGT will comply with the requirements for a non-certified generator pursuant to 40 CFR 60.4243(a)(2)(iii), including conducting an initial performance test within one year of startup and subsequent tests every 8,760 hours or three (3) years, whichever comes first. 40 CFR 60.4245(d) requires the submittal of a copy of the performance test within 60 days of its completion.

[24] 40 CFR 60.4233(e) Emission standards for operators of stationary SI ICE with a maximum engine power greater than 100 HP

2.1.4.10.3. *Monitoring, Recordkeeping, and Reporting*

Since the engine will be used as an emergency generator, a non-resettable hour meter is required.[25] Per 40 CFR 60.4243(d), emergency engines are allowed to be operated according to the following time constraints:

There is no time limit on use in emergency situations.
The emergency ICE can operate for up to 100 hours per year total for the following reasons:

- Maintenance checks and readiness testing, provided that the tests are recommended by federal, state, or local government, the manufacturer, the vendor, the regional transmission organization or equivalent balancing authority and transmission operator, or the insurance company associated with the engine;
- Emergency demand response for periods specified in 40 CFR 60.4243(d)(2)(ii); and
- Periods where there is a deviation of voltage or frequency of 4 percent or greater below standard voltage or frequency.

The emergency ICE can operate for up to 50 hours per year in non-emergency situations. The 50 hours of operation in non-emergency situations are counted as part of the 100 hours per year for maintenance and testing and emergency demand response described in the previous bullet point.

NGT will track the engine's run time and the reason for use in order to demonstrate compliance with the run time requirements.[26]

Initial notification is required for this engine, which is a non-certified RICE greater than 500 hp[27]. Since performance testing is required, advanced notification and results reporting are required, in addition to semiannual compliance reports.

2.1.4.11. 40 CFR 60, Subpart KKKK – Stationary Combustion Turbines – Applicable

NSPS Subpart KKKK applies to combustion turbines constructed, modified, or reconstructed after February 18, 2005 with heat input equal to or greater than 10 MMBtu/hr based on the higher heating value of the fuel [40 CFR 60.4305(a)]. The proposed combustion turbine for the Waterville Compressor Station has a heat input greater than 10 MMBtu/hr. Therefore, the combustion turbine is subject to NSPS Subpart KKKK. As provided in 40 CFR 60.4305(b), the combustion turbine is exempt from NSPS Subpart GG. The applicable requirements for each pollutant are outlined in the following subsections.

2.1.4.11.1. *NO_X Emission Limits*

Units subject to the requirements of Subpart KKKK must meet the emissions standards listed in Table 1 of the subpart [40 CFR 60.4320(a)]. New turbines firing natural gas with a heat input capacity greater than 50 MMBtu/hr and less than 850 MMBtu/hr are required to limit NO_X emissions to less than 25 ppm at 15 percent (%) O_2 [Table 1 to Subpart KKKK of Part 60]. The proposed combustion turbine at the Waterville

[25] 40 CFR 60.4237(a)

[26] 40 CFR 60.4245(b)

[27] 40 CFR 60.4245(c)

Compressor Station is designed with maximum NO_X emissions of 9 ppm at 15% O_2, which is lower than the applicable NSPS emission limits.

- NO_X Emissions:[28,29]
  - 25 ppm at 15% O_2; OR
  - 150 ng/J (1.2 lb/MWh) of useful output

2.1.4.11.2. *SO_2 Emission Limits*

In accordance with 40 CFR 60.4330(a), each combustion turbine must comply with one of the following:

1. Limit emissions to less than 110 nanograms per Joule (ng/J) of SO_2 (0.90 lb/MWh) gross output; or
2. Burn fuel which contains total potential sulfur emissions equal to or less than 26 ng/J of SO_2 (0.060 lb/MMBtu HHV) heat input.

The SO_2 limits will be met by firing only pipeline quality natural gas in the combustion turbine, which will satisfy the requirements of 40 CFR 60.4330(a)(2).

2.1.4.11.3. *Monitoring and Testing Requirements*

Pursuant to 40 CFR 60.4333(a), the new turbine, the air pollution control equipment, and the monitoring equipment will be maintained in a manner that is consistent with good air pollution control practices for minimizing emissions. This requirement applies at all times including during startup, shutdown, and malfunction.

Since the turbines will not be equipped with water or steam injection, NGT will perform the required initial and annual performance testing to demonstrate compliance with the NO_X emission limit.[30] If the results of a NO_X performance test are under 75% of the NO_X emissions limits, then the Waterville Compressor Station will only be required to perform the performance tests for that turbine every two years (no more than 26 calendar months following the previous performance test), provided that subsequent performance test results are less than 75% of the emission limit. If the results of subsequent performance tests indicate NO_X emissions greater than 75% of the limit, then annual performance testing for NO_X will resume.[31] The Waterville Compressor Station may also choose to install, calibrate, and maintain continuous emissions monitoring systems (CEMS) for NO_X on the turbines and operate them in accordance with NSPS Subpart A and Subpart KKKK, in which case NO_X performance testing will not be required.[32] However, at this time the Waterville Compressor Station elects not to install CEMS and plans to verify compliance using stack tests.

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[28] 40 CFR 60.4320(a) and Table 1 to Subpart KKKK

[29] Subpart KKKK, Table 1 also includes a NO_X limit of 150 ppmvd at 15% O_2 or 8.7 lb/MWh for turbine operation at temperatures less than 0°F and turbine operation at loads less than 75% of peak load which the new turbine will meet.

[30] Per 40 CFR 60.8(a), the initial NO_X performance tests for the new/modified turbines are required to be conducted within 60 days after achieving the maximum production rate (i.e. the turbine's maximum rated heat output), but no later than 180 days after initial startup.

[31] 40 CFR 60.4340(a)

[32] 40 CFR 60.4340(b)(1)

For compliance with the SO_2 emission limit, facilities are required to perform regular determinations of the total sulfur content of the combustion fuel and to conduct initial and annual compliance demonstrations. The total sulfur content of gaseous fuel combusted in the turbines must be determined and recorded once per operating day or using a custom schedule as approved by Ohio EPA;[33] however, the Waterville Compressor Station can elect to opt out of this provision of the rule by using a fuel that is demonstrated not to exceed potential sulfur emissions of 0.060 lb/MMBtu SO_2.[34] This demonstration can be made using one of the following methods:

1. By using a purchase contract specifying that the fuel sulfur content for the natural gas is less than or equal to 20 grains of sulfur per 100 standard cubic feet and results in potential emissions not exceeding 0.060 lb/MMBtu.
2. By using representative fuel sampling data which show that the sulfur content of the fuel does not exceed 0.060 lb SO_2/MMBtu heat input. At a minimum, the amount of fuel sampling data specified in Section 2.3.1.4 or 2.3.2.4 of Appendix D to Part 75 is this chapter is required.

Pursuant to 40 CFR 60.4365(a), in order to demonstrate continuous compliance with the applicable 0.060 lb/MMBtu potential SO_2 emissions limit, the Waterville Compressor Station, will obtain a current tariff sheet for the fuel specifying that the maximum total sulfur content for natural gas use is 20 grains of sulfur or less per 100 scf and potential sulfur emissions are less than 26 ng SO_2/J (0.060 lb SO_2/MMBtu) heat input for continental areas.

2.1.4.11.4. *Reporting Requirements*

Pursuant to 40 CFR 60.4375(b), since the Waterville Compressor Station will be conducting annual performance testing in accordance with 40 CFR 60.4340(a), a written report of the results of each performance test will be submitted to Ohio EPA and the USEPA before the close of business on the 60th day following the completion of the performance test.

Per 40 CFR 60.7(a)(1), the Waterville Compressor Station will submit notification of the date construction of each new turbines commenced. The submittal will be postmarked by no later than 30 days after the commencement of construction date. Per 40 CFR 60.7(a)(3), the submittal of the notification of the actual date of initial startup of each new turbine will be postmarked by no later than 15 days after the initial startup date.

2.1.4.12. 40 CFR 60, Subpart KKKK – Stationary Combustion Turbines – Proposed Amendments - Applicable

On August 29, 2012, U.S. EPA published proposed amendments to the Standards of Performance for Stationary Combustion Turbines established in 40 CFR 60, Subpart KKKK (NSPS KKKK).[35] These proposed amendments have yet to be finalized and are not currently effective, but because the effective date will be established as the proposal date (i.e., August 29, 2012) once finalized, the following section evaluates the applicability of the amended standards of NSPS KKKK. NGT requests that the PTIO for the Waterville Compressor Station include language acknowledging the proposed amendments to NSPS KKKK and

[33] 40 CFR 60.4370(b) and (c)

[34] 40 CFR 60.4365

[35] 77 FR 52564

clarifying that the affected combustion turbine will comply with the final effective requirements of NSPS KKKK upon promulgation.

According to the amended provisions of 40 CFR 60.4305(a), affected sources under NSPS KKKK include stationary combustion turbines constructed, modified, or reconstructed after February 18, 2005, rated at a heat input of at least 10 MMBtu/hr. The proposed combustion turbine for the Waterville Compressor Station will have a heat input greater than 10 MMBtu/hr. Therefore, the combustion turbine is subject to NSPS Subpart KKKK. The applicable requirements for each pollutant are outlined in the following subsections.

2.1.4.12.1. *NO_X Emission Limits*

In accordance with the amended standards of 40 CFR 60.4320(a) and (c), NGT must identify for each hour of operation the NO_X emission standard applicable to new mechanical drive turbines firing only natural gas with a heat input capacity greater than 50 MMBtu/hr as provided in Table 2-1. These NO_X limits are applicable to the combustion turbine during all periods of operation including startups, shutdowns, and malfunctions as specified in 40 CFR 60.4320(e).

Table 2-1. NO_X Emission Standards for Various Operating Scenarios

Operating Scenario	Heat Input Limit (lb/MMBtu)	NO_X Conc. Limit (ppmvd)
At least 75% of base load	0.093	25
Less than 75% of base load or during Startup or Shutdown	0.59	150

a. These limits are established in Table 1 of the proposed amendments to NSPS KKKK.

NGT will not use water injection, steam injection, or post-combustion controls to reduce NO_X emissions from the combustion turbine. Therefore, in accordance with 40 CFR 60.4333(c)(2) and 4340(a)(1), NGT will demonstrate compliance with the applicable emissions limitation by conducting stack tests pursuant to the requirements of 40 CFR 60.4333(b) and 4400. The required frequency of stack tests will depend on the result of the initial test.

2.1.4.12.2. *SO_2 Emission Limits*

In accordance with 40 CFR 60.4330(a) and (g), the combustion turbine must comply with one of the following:

1. Limit emissions to less than 110 ng/J of SO_2 (0.90 lb/MWh) gross output; or
2. Burn fuel which contains total potential sulfur emissions equal to or less than 26 ng/J of SO_2 (0.060 lb/MMBtu HHV) heat input.

NGT may establish compliance by either monitoring the total sulfur content of the fuel in accordance with 40 CFR 60.4360 and 60.4365 or demonstrate that the natural gas does not exceed 0.060 lb SO_2/MMBtu heat input using one of the methods identified in 40 CFR 60.4370.

If NGT elects to demonstrate compliance with the SO_2 limitations using the procedures in 40 CFR 60.4370, personnel at the Waterville Compressor Station must maintain on-site records (e.g., purchase contracts, tariff sheets, or transportation contracts) documenting that the total sulfur content of the natural gas combusted in the turbines does not exceed 0.060 lb/MMBtu or must maintain representative fuel sampling data collected in accordance with Section 2.3.1.4 or 2.3.2.4 in Appendix D to 40 CFR 75 documenting that the fuel meets the requirements to be considered either pipeline natural gas or natural gas.

2.1.4.13. 40 CFR 60, Subpart OOOO – Crude Oil and Natural Gas Production, Transmission, and Distribution – Not Applicable

NSPS Subpart OOOO establishes emission standards and compliance schedules for the control of VOC and SO_2 emissions from affected facilities that commence construction, modification or reconstruction after August 23, 2011. Affected facilities include certain units and operations located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment. "Custody transfer" is defined under 40 CFR 60.5430 as the transfer of natural gas after processing and/or treatment in the producing operations, or from storage vessels or automatic transfer facilities or other such equipment, including product loading racks, to pipelines or any other forms of transportation. "Natural gas transmission" is defined under 40 CFR 60.5430 as the pipelines used for long distance transport of natural gas (excluding processing). Specific equipment used in natural gas transmission includes the land, mains, valves, meters, boosters, regulators, storage vessels, dehydrators, compressors, and their driving units and appurtenances, and equipment used for transporting gas from a production plant, delivery point of purchased gas, gathering system, storage area, or other wholesale source of gas to one or more distribution area(s). NGT will gain custody of natural gas from production operations, or at "the point of custody transfer." NGT and its operations, including the Waterville Compressor Station, will be located in the natural gas transmission segment.[36]

Affected facilities include storage vessels located in the natural gas transmission and storage segment that have the potential for VOC emissions equal to or greater than 6 tpy per 40 CFR 60.5365(e). This requirement specifies that,

> *"The potential for VOC emissions must be calculated using a generally accepted model or calculation methodology, based on the maximum average daily throughput determined for a 30-day period of production prior to the applicable emission determination deadline specified in this section. The determination may take into account requirements under a legally and practically enforceable limit in an operating permit or other requirement established under a Federal, State, local or tribal authority."*

The Separator Vessels #1-5 (P004-P008) and the Storage Vessels #1-3 (T001-T003) each will have an annual potential to emit VOC that is less than 6 tpy, and are therefore not subject to the requirements of this subpart.

2.1.4.14. Non-Applicability of All Other NSPS

NSPS standards are developed for particular industrial source categories and the applicability of a particular NSPS to a facility can be readily ascertained based on the industrial source category covered. All other NSPS are categorically not applicable to the proposed project.

2.1.5. National Emission Standards for Hazardous Air Pollutants

NESHAPs, located in 40 CFR 63, are typically applicable to specific categories of sources that have the potential to emit HAP in levels greater than 10 tpy for any individual HAP or 25 tpy for any combination of HAP (i.e., major HAP sources). Emissions and operational limitations provided in the NESHAPs are established on the basis of a Maximum Achievable Control Technology (MACT) determination for a particular major source category.

Furthermore, generally available control technology (GACT)-based NESHAPs (located in 40 CFR 63) require area (i.e., non-major) sources to control emissions to the level achievable by the use of generally available control technologies or management practices to reduce emissions of HAP.

The Waterville Compressor Station will operate as an area (i.e., non-major) source of HAP as demonstrated in Table 1-1. Each potentially applicable subpart of 40 CFR Part 63 is discussed in the subsections below.

2.1.5.1. 40 CFR 63, Subpart A – General Provisions - Applicable

NESHAP Subpart A, *General Provisions*, contains national emission standards for HAP defined in Section 112(b) of the Clean Air Act. All affected sources, which are subject to another NESHAP, are subject to the general provisions of NESHAP Subpart A, unless specifically excluded by the source-specific NESHAP.

2.1.5.2. 40 CFR 63, Subpart T – Halogenated Solvent Cleaning – Not Applicable

NESHAP Subpart T is applicable to the use of halogenated solvent cleaners at both major and area sources of HAP. The parts washer will not use solvent cleaners containing halogens. Therefore, NESHAP Subpart T does not apply.

2.1.5.3. 40 CFR 63, Subpart HH – Oil and Natural Gas Production Facilities – Not Applicable

MACT Subpart HH applies to emission points at oil and natural gas production facilities that are HAP major or HAP area sources and that process, upgrade, or store either hydrocarbon liquids or natural gas prior to the point of custody transfer. For area sources, the affected source includes each triethylene glycol (TEG) dehydration unit located at a facility that meets the criteria specified in paragraph (a) of the regulation. Also, the natural gas production facility to which the rule applies ends at the point that the natural gas enters a facility in the natural gas transmission and storage category per 63.760(a)(3). The Waterville Compressor Station will not operate a TEG dehydration unit and the station is considered a natural gas transmission and storage facility; therefore, NESHAP Subpart HH does not apply.

2.1.5.4. 40 CFR 63, Subpart HHH – Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities – Not Applicable

MACT Subpart HHH applies to natural gas transmission and storage facilities that transport or store natural gas prior to entering the pipeline to a local distribution company or to a final end user and are major

sources of HAP emissions. The proposed Waterville Compressor Station is an area source for HAP; therefore this subpart is not applicable.

2.1.5.5. 40 CFR 63, Subpart YYYY – Stationary Combustion Turbines – Not Applicable

MACT Subpart YYYY establishes emission limitations and operating limits for HAP emissions from stationary combustion turbines located at major sources of HAP. The proposed Waterville Compressor Station is not a major source of HAP; therefore the combustion turbine at the Waterville Compressor Station is not subject to Subpart YYYY.

2.1.5.6. 40 CFR 63, Subpart ZZZZ – Reciprocating Internal Combustion Engines (RICE) – Applicable

The NESHAP found in 40 CFR 63, Subpart ZZZZ (RICE NESHAP) was designed to regulate emissions from stationary reciprocating internal combustion engines at both major and area sources of hazardous air pollutants. The proposed emergency generator engine is classified as a new RICE because it will be constructed after June 12, 2006 and located at an area source of HAP [40 CFR 63.6590(a)(2)(iii)]. Subpart ZZZZ requires all new spark-ignition RICE located at an area source of HAP to comply with NSPS Subpart JJJJ with no additional applicable requirements under the RICE NESHAP [40 CFR 63.6590(c)(1)]. The Emergency Generator (P002) will meet the requirements under the RICE NESHAP by complying with NSPS Subpart JJJJ for spark ignition RICE (refer to the discussion in Section 2.1.4.10).

2.1.5.7. 40 CFR 63, Subpart DDDDD – Industrial, Commercial, and Institutional Boilers and Process Heaters at Major Sources of HAP Emissions – Not Applicable

MACT Subpart DDDDD establishes emission limits, operational standards, and compliance demonstration requirements for HAP emissions from industrial, commercial, and institutional boilers and process heaters at major sources of HAP emissions. The Waterville Compressor Station is not a major source of HAP emissions; therefore, this regulation is not applicable.

2.1.5.8. 40 CFR 63, Subpart JJJJJJ – Industrial, Commercial, and Institutional Boilers at Area Sources of HAP Emissions – Not Applicable

The provisions of 40 CFR 63, Subpart JJJJJJ establish emission limits, operational standards, and energy assessment requirements for HAP emissions from industrial, commercial, and institutional boilers at area sources of HAP emissions. According to 40 CFR 63.11194(a)(2), affected sources include the collection of all new industrial, commercial, and institutional boilers within a subcategory (e.g., coal, biomass, oil). Furthermore, Subpart JJJJJJ specifically excludes natural gas fired boilers [40 CFR 63.11195(e)]. The proposed Process Heater (B001) is a natural gas fired catalytic style heater and does not meet the definition of industrial, commercial, or institutional boilers as defined in 40 CFR 63.11237; therefore, this regulation is not applicable.

2.1.5.9. Non-Applicability of All Other NESHAP

NESHAP standards are developed for particular industrial source categories, and the applicability of a particular NESHAP to a facility can be readily ascertained based on the industrial source covered. All other NESHAP are categorically not applicable to the proposed project.

2.2. STATE REGULATORY APPLICABILITY

2.2.1. OAC 3745-17-07 – Control of Visible Particulate Emissions from Stationary Sources - *Applicable*

OAC 3745-17-07(A) limits visible particulate emissions from all stacks to less than 20 percent opacity, as a 6-minute average, except during periods of startup, shutdown, and malfunction. However, visible emissions may exceed 20 percent opacity, as a 6-minute average, but not for more than 6 consecutive minutes in any 1-hour period. Visible emissions may not exceed 60 percent opacity, as a 6-minute average, at any time. The exhaust stacks associated with the Combustion Turbine (P001) and Emergency Generator (P002) will be subject to this visible emissions standards.

2.2.2. OAC 3745-17-10 – Restrictions on Particulate Emissions from Fuel Burning Equipment – *Not Applicable*

Pursuant to OAC 3745-17-10(A), OAC 3745-17-10 applies to facilities in which fuel, including any product or by-product of a manufacturing process, is burned for the primary purpose of producing heat or power by indirect heat transfer. The proposed Combustion Turbine (P001) and Emergency Generator (P002) will not be subject to the requirements of this rule given that these units do not produce heat or power by indirect heat transfer.

2.2.3. OAC 3745-17-11 – Restrictions of Particulate Emissions from Industrial Processes - *Applicable*

The emission limits of OAC 3745-17-11 apply to any operation, process, or activity that releases or may release particulate emissions into the ambient air. Pursuant to OAC 3745-17-11(B)(4), particulate emission from any stationary gas turbine shall not exceed 0.04 pounds per million British thermal units (lb/MMBtu) of actual heat input. Combustion Turbine (P001) will be subject to this emissions standard.

Additionally, OAC 3745-17-11(B)(5)(b) limits particulate emissions from large (i.e., greater than 600 hp) stationary internal combustion engines to 0.062 lb/MMBtu of heat input. The Emergency Generator (P002) will be subject to this emissions standard.

2.2.4. OAC 3745-18-06 – General SO_2 Emission Limit Provisions – *Not Applicable*

The emission limits of OAC 3745-18-06 apply to any operation, process, or activity that releases or may release SO_2 emissions into the ambient air. Per OAC 3745-18-06(A), stationary gas turbines and stationary IC engines are exempt from OAC 3745-18-06(D), (F), and (G) during any calendar day in which natural gas is the only fuel burned. The proposed Combustion Turbine (P001) and Emergency Generator (P002) will burn pipeline quality natural gas only, and are therefore exempt from the requirements of OAC 3745-18-06.

2.2.5. OAC 3745-21-09(L) – Storage of Petroleum Liquids in Fixed Roof Tanks – *Not Applicable*

The provisions of OAC 3745-21-09(L) prohibit the storage of any petroleum liquid with a true vapor pressure (TVP) greater than 1.52 actual pounds per square inch (psia) in fixed roof tanks unless such tanks meet the specified design requirements. Fixed roof tanks with capacities less than 40,000 gallons are exempt from the requirements of OAC 3745-21-09(L)(1) pursuant to OAC 3745-21-09(L)(2)(a). The Separator Vessels #1-5 (P004-P008) and the Storage Vessels #1-3 (T001-T003) are each sized to a nominal storage capacity less than 40,000 gallons. Therefore, OAC 3741-21-09(L) is not applicable.

2.2.6. OAC 3745-21-21 – Storage of Volatile Organic Liquids in Fixed Roof Tanks and External Floating Roof Tanks – *Not Applicable*

The Waterville Compressor Station is not located in any of the counties affected by this rule; therefore, the storage vessel is not subject to the standards of OAC 3745–21–21.

2.2.7. OAC 3745-110-03 – RACT Requirements and/or Limitations for Emissions of NO_X from Stationary Sources - *Applicable*

The emission limitations in OAC 3745-110-03 apply to any new stationary source of NO_X emissions that meets the conditions in OAC 3745-110-02(A)(2). The Combustion Turbine (P001) and Emergency Generator (P002) will be new stationary sources that meet the conditions in OAC 3745-110-02(A)(2).

In accordance with OAC 3745-110-03(K)(2), the Emergency Generator (P002) will be exempt from the emission standards of OAC 3745-110-03 given that NGT will maintain a monthly log of emergency and non-emergency operating hours per month.

Additionally, the emission limitation applicable to the Combustion Turbine (P001) under standards of NSPS KKKK is more stringent than the limit established in OAC 3745-110-03(E)(1)(c). Therefore, NGT will comply with the requirements of NSPS KKKK applicable to P001 rather than the standards of OAC 3745-110-03 pursuant to OAC 3745-110-02(A)(2)(b).

Pursuant to the provisions added to Ohio Revised Code (ORC) 3704 as a result of Senate Bill 265, sources modified or constructed after August 3, 2009, are to have rule-based best available technology (BAT) limits established by Ohio EPA for specific source categories. However, Ohio EPA has yet to promulgate the rule-based BAT limits. To address this regulatory gap, the Ohio EPA's Division of Air Pollution Control (DAPC) released a memo (February 2014 Memo) indicating that permits filed on or after August 3, 2009, must go through an interim case-by-case BAT procedure.[37]

The first step in determining BAT, according to the February 2014 Memo, is to review MACT, GACT, BACT, and LAER applicability. The next step is to determine whether the operations are of the type and size that are regulated by Reasonable Available Control Technology (RACT) requirements for VOC emissions.

The third step in the BAT analysis is to determine BAT on a case-by-case basis by: 1) reviewing past BAT determinations, and 2) determining the format for the BAT limit, which should be expressed in one of the following ways:

(1) Work practices;
(2) Source design characteristics or design efficiency of applicable air contaminant control devices;
(3) Raw material specifications or throughput limitations averaged over a 12-month rolling period; or
(4) Monthly allowable emissions averaged over a 12-month rolling period.

Furthermore, the existing "less than 10 tpy" BAT exemption pursuant to OAC 3745-31-05(A)(3)(a)(ii) is not currently approved as part of Ohio's State Implementation Plan (SIP). Ohio EPA is currently in the process of revising the procedures for specifying BAT for sources that have potential emissions less than 10 tpy. In the interim, Ohio EPA is establishing BAT for these sources based on the guidance presented in the February 2014 memo.[38]

3.1. COMBUSTION TURBINES BAT

The Combustion Turbine (P001) is expected to generate emissions of gaseous pollutants (e.g., CO, VOC, NO_X, and SO_2) and particulate matter through the combustion of natural gas. **NGT is requesting that the use of the oxidation catalyst as a control device on the combustion turbine be considered as BAT**. Section 2.1.4.11 describes the emission limitations that apply to the turbine under NSPS KKKK including a NO_X limitation of 25 ppm at 15% O_2. In accordance with footnote 5 of the February 2014 memo, applicants may evaluate NSPS limitations when identifying and requesting appropriate limits as BAT. Therefore, NGT proposes that compliance with NSPS KKKK satisfies the requirement to establish BAT for emissions of NO_X from the Combustion Turbine (P001).

[37] Ohio EPA Memo from Mike Hopkins, Assistant Chief, Permitting, DAPC, to Permit Writers and Reviewers "BAT Requirements for Permits Issued On or After February 7, 2014" dated February 7, 2014, which supersedes the BAT guidance issued on August 30, 2013. Ohio's BAT policy will be in place only until such time when the Ohio EPA develops and promulgates rules that define BAT in accordance with Ohio Revised Code (ORC) 3704.03(T) requirements.

[38] Question 34 of the February 2014 Memo.

Notwithstanding the guidance presented in the February 2014 Memo, NGT is proposing the use of the control device be accompanied by short-term and annual emissions limits of controlled pollutants (CO and VOC), as shown in Table 3-1. Refer to Appendix C for a formal request of the establishment of BAT in this format. Additionally, NGT is requesting as BAT for the remaining uncontrolled pollutants (SO_2 and PM) monthly limits as rolling, 12-month averages as specified in Table 3-2.

3.2. GAS RELEASES BAT

The evacuation of piping during maintenance and routine operations results in the release of gases directly to the atmosphere. In accordance with Item 4.f of the February 2014 memo, NGT requests as BAT for gas releases a monthly VOC limit as a rolling, 12-month average as specified in Table 3-2.

3.3. EQUIPMENT LEAKS BAT

Various piping components, including valves, connectors, flanges, and open-ended lines may result in fugitive emissions due to leaks. In accordance with Item 4.f of the February 2014 memo, NGT requests as BAT for the equipment leaks a monthly VOC limit as a rolling, 12-month average as specified in Table 3-2.

3.4. SEPARATOR VESSELS BAT

Separator Vessels #1 through 5 (P004-P008) will generate emissions of VOC through flashing, working, and standing losses. In accordance with Item 4.f of the February 2014 memo, NGT requests as BAT for each storage vessel a monthly VOC limit as a rolling, 12-month average as specified in Table 3-2.

3.5. TRUCK LOADING OPERATION BAT

The loading of pipeline liquids and used lubricating oils into tank trucks via the truck loading operation will generate emissions of VOC. In accordance with Item 4.f of the February 2014 memo, NGT requests as BAT for the truck loading operation a monthly VOC limit as a rolling, 12-month average as specified in Table 3-2. As described in Item 4.f of the February 2014 Memo, monitoring, recordkeeping, and reporting requirements will not be necessary to support this BAT limit given that potential VOC emissions will not exceed 1 tpy.

3.6. SUMMARY OF SELECTED BAT EMISSION LIMITS

Table 3-1 summarizes the requested BAT limits for each emission unit at the Waterville Compressor Station.

Table 3-1. Summary of Proposed Historical Format BAT Limits

EU ID	Emission Unit Description	CO		VOC	
		(lb/hr)	(tpy)	(lb/hr)	(tpy)
P001	Combustion Turbine	13.15	7.81	1.65	3.31

Table 3-2. Summary of Proposed BAT Limits

EU ID	Emission Unit Description	Emission Limits (ton/month, averaged over 12-month rolling period)			
		VOC	NO_X	SO_2	PM
P001	Combustion Turbine		2.59	0.27	0.52
P003	Gas Releases	1.65			
P801	Equipment Leaks	0.52			
P004	Separator Vessel #1	1.18E-02			
P005	Separator Vessel #2	1.18E-02			
P006	Separator Vessel #3	9.24E-03			
P007	Separator Vessel #4	0.05			
P008	Separator Vessel #5	1.14E-03			
J001	Loading Operation	8.42E-04			

Air dispersion modeling is sometimes necessary to demonstrate that a source will not: 1) violate Ohio EPA's policy whereby no new source exceeds the Ohio Acceptable Incremental Impact (AII) levels (i.e., consumes more than half of the available PSD increments), or 2) causes ground-level concentrations that exceed Ohio EPA's Maximum Allowable Ground Level Concentrations (MAGLCs) for toxic air pollutants.[39] This section of the PTIO application describes the analysis that was conducted to address Ohio modeling requirements for the installation of the Waterville Compressor Station.

4.1. REGULATED NSR POLLUTANT MODELING ANALYSIS

Engineering Guide #69: Air Dispersion Modeling Guidance (Engineering Guide #69) requires that increases in allowable emissions of regulated NSR pollutants from all new or modified sources be evaluated to determine whether the increases in allowable emissions exceed the Ohio modeling significant emission rates (SERs). For each regulated NSR pollutant for which the increase in allowable emissions exceeds the applicable SER, an air dispersion modeling analysis is required to demonstrate that the ambient incremental impact (AII) is less than the Ohio AII levels (one half of any PSD increment). Table 4-1 lists the Ohio modeling SERs and the corresponding Ohio AII levels.

Table 4-1. Ohio Modeling Significant Emission Rates

Pollutant	Ohio Modeling SER (tpy)	Project Increase (tpy)	Modeling Required? (Y/N)	Ohio Acceptable Incremental Impact ($\mu g/m^3$)
PM_{10}	15	6.30	N	8.5 – Annual
				15 – 24-hr
$PM_{2.5}$	10	6.30	N	2 – Annual
				4.5 – 24-hr
NO_2	40	32.76	N	12.5 – Annual
				188 – 1-hr
SO_2	40	3.22	N	10 – Annual
				45.5 – 24-hr
				256 – 3-hr
				196 – 1-hr
CO	100	10.18	N	2,500 – 8-hr
				10,000 – 1-hr

As demonstrated in Table 1-1, the installation of the Waterville Compressor Station will not result in emissions of any NSR regulated pollutant exceeding the Ohio modeling SERs, and NGT will not be required to conduct an air dispersion modeling analysis as part of this application.

[39] Engineering Guide #69: Air Dispersion Modeling Guidance, Ohio EPA Air Quality Modeling and Planning Section, 2014, Pg. 4.

4.2. AIR TOXICS MODELING ANALYSIS

Item 1 of Ohio EPA's Engineering Guide #69 requires air dispersion modeling for each toxic pollutant for which the increase in allowable emissions exceeds one (1) tpy.[40] The air dispersion modeling must demonstrate that the ambient incremental impact is less than the Maximum Allowable Ground Level Concentrations (MAGLCs) established in accordance with Ohio EPA guidance as required by ORC 3704.03(F)(4)(b).[41]

Table 1-1 and Appendix B demonstrate that the project will not result in emissions of any toxic pollutant exceeding one (1) tpy. Therefore, NGT is not required to perform an air toxics dispersion modeling analysis as part of this application.

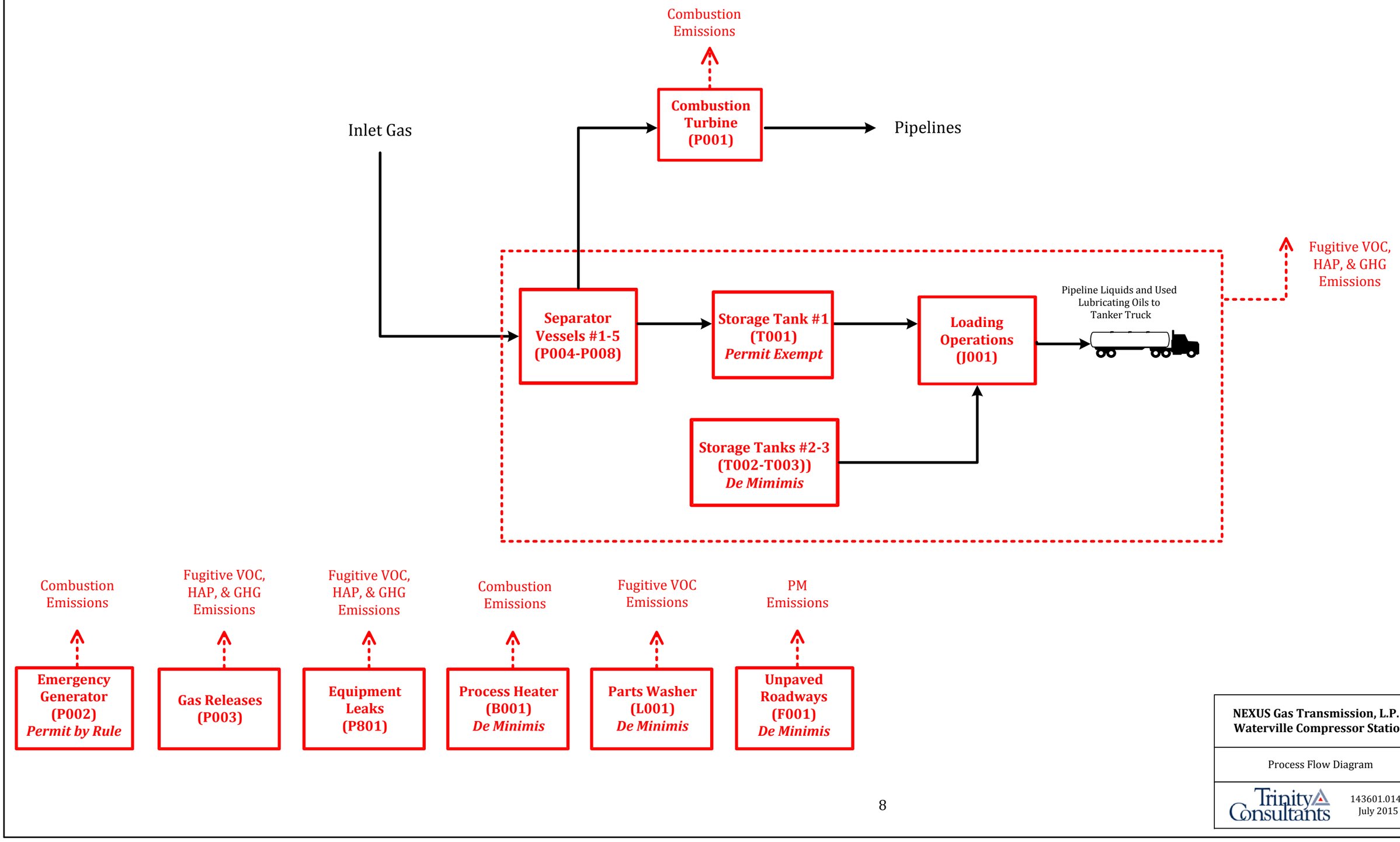
[40] Air toxic pollutants include any pollutant listed in OAC 3745-114-01.

[41] ORC 3704.03(F)(4)(b) requires that applicable MAGLCs be determined in accordance with Option A: Review of New Sources of Air Toxic Emissions, Ohio EPA Air Quality Modeling and Planning Section (May 1986).

APPENDIX A

Process Flow Diagram

FIGURE 1-2. PROCESS FLOW DIAGRAM FOR THE WATERVILLE COMPRESSOR STATION



NEXUS Gas Transmission, L.P. – Waterville Compressor Station
Process Flow Diagram
Trinity Consultants 143601.0141 July 2015

APPENDIX B

Emission Calculations Documentation

TABLE A-1
Potential to Emit
Basis
After Permitting Activity

Emission Source				Rated Capacity	Operational Limits								Data Sources
ID	FIN	EPN	Description		Short-Term -- Material Flow		Short-Term -- Capacity		Annual Material Flow		Annual Utilization		
WATE TBC 01	WATE TBC 01	WATE TBC 01	Turbine	26,000 bhp (NEMA)	Natural Gas	234,728 scfh	Power Output	33,900 bhp	Natural Gas	1,856,974,563 scf/yr	Runtime	8,760 hrs/yr	TABLE B-1Ac
WATE ENGEN 01	WATE ENGEN 01	WATE ENGEN 01	IC Engine	880 bhp	Natural Gas	6,820 scfh	Power Output	880 bhp	Natural Gas	3,409,760 scf/yr	Runtime	500 hrs/yr	TABLE C-1A
WATE FHTR 01	WATE FHTR 01	WATE FHTR 01	Boilers/Heaters	0.750 MMBTU/hr (output)	Natural Gas	1,050 scfh	Heat Input	1.071 MMBTU/hr	Natural Gas	9,201,681 scf/yr	Runtime	8,760 hrs/yr	TABLE D-1A
WATE SV V1S	WATE SV V1S	WATE SV V1S	Separator Vessel	530 gal (accumulation)	Pipeline Liquids	530 gal/hr			Pipeline Liquids	71 gal/yr	Runtime	N/A	TABLE F-2
WATE SV V1D	WATE SV V1D	WATE SV V1D	Separator Vessel	530 gal (accumulation)	Pipeline Liquids	530 gal/hr			Pipeline Liquids	71 gal/yr	Runtime	N/A	TABLE F-3
WATE SV V1C1	WATE SV V1C1	WATE SV V1C1	Separator Vessel	400 gal (accumulation)	Pipeline Liquids	400 gal/hr			Pipeline Liquids	53 gal/yr	Runtime	N/A	TABLE F-4
WATE SV V2	WATE SV V2	WATE SV V2	Separator Vessel	317 gal (accumulation)	Pipeline Liquids	317 gal/hr			Pipeline Liquids	4,000 gal/yr	Runtime	N/A	TABLE F-5
WATE SV V4SD	WATE SV V4SD	WATE SV V4SD	Separator Vessel	43 gal (accumulation)	Pipeline Liquids	43 gal/hr			Pipeline Liquids	6 gal/yr	Runtime	N/A	TABLE F-6
WATE TK V5	WATE TK V5	WATE TK V5	Storage Tank	2,000 gal	Pipeline Liquids	2,000 gal/hr			Pipeline Liquids	4,000 gal/yr	Runtime	N/A	TABLE F-7
WATE TK OIL1	WATE TK OIL1	WATE TK OIL1	Storage Tank	570 gal	Oil	570 gal/hr			Oil	208,050 gal/yr	Runtime	N/A	TABLE F-8
WATE TK OW1	WATE TK OW1	WATE TK OW1	Storage Tank	3,000 gal	Oily Water	3,000 gal/hr			Oily Water	36,000 gal/yr	Runtime	N/A	TABLE F-9
WATE TL PL	WATE TL PL	WATE TL PL	Truck Loading	150 gal/min	Pipeline Liquids	2,000 gal/hr			Pipeline Liquids	4,000 gal/yr	Runtime	N/A	TABLE F-10
WATE TL OIL	WATE TL OIL	WATE TL OIL	Truck Loading	150 gal/min	Oil	570 gal/hr			Oil	6,840 gal/yr	Runtime	N/A	TABLE F-11
WATE TL OW	WATE TL OW	WATE TL OW	Truck Loading	150 gal/min	Oily Water	3,000 gal/hr			Oily Water	36,000 gal/yr	Runtime	N/A	TABLE F-12
WATE GR	WATE GR ST	WATE GR ST	Gas Release Events	Natural Gas	Natural Gas	6,635,000 scfh			Natural Gas	29,450,000 scf/yr	Runtime	N/A	TABLE G-1a
	WATE GR PL	WATE GR PL	Gas Release Events	Natural Gas									
WATE PC	WATE PC NG	WATE PC NG	Piping Components	Natural Gas	Valves: 724; Connectors: 2,631; Flanges: 501; Open-Ended Lines: 9; Pump Seals: 0; Other (blowdown valves, relief valves, and compressor seals): 66								TABLE H-1a
	WATE PC PL	WATE PC PL	Piping Components	Pipeline Liquids	Valves: 100; Connectors: 666; Flanges: 161; Open-Ended Lines: 11; Pump Seals: 2; Other (blowdown valves, relief valves, and compressor seals): 2								TABLE H-2a
	WATE PC OIL	WATE PC OIL	Piping Components	Oil	Valves: 59; Connectors: 278; Flanges: 94; Open-Ended Lines: 0; Pump Seals: 6; Other (blowdown valves, relief valves, and compressor seals): 2								TABLE H-3a
WATE PW	WATE PW	WATE PW	Parts Washer	Remote Reservoir	Solvent	N/A	Solvent Make-up	0.329 gal/hr	Solvent Make-up	120 gal/yr	Runtime	N/A	TABLE I-1

TABLE A-1
Potential to Emit
Emissions
After Permitting Activity

Emission Source				Rated Capacity	Potential to Emit (tpy)										Data
ID	FIN	EPN	Description		CO_{2-e}	NO_X	CO	$PM_{10/2.5}$	SO_2	VOC (Total)	HAP (Total)	Benzene	Formaldehyde	Hexane (n-)	Sources
WATE TBC 01	WATE TBC 01	WATE TBC 01	Turbine	26,000 bhp (NEMA)	112,240	31.0809	7.8086	6.2506	3.2200	3.3144	0.5959	0.0189	0.1322		TABLE B-1Aj
WATE ENGEN 01	WATE ENGEN 01	WATE ENGEN 01	IC Engine	880 bhp	432	0.9700	1.9400	0.0174	0.0010	0.8695	0.5257	0.0032	0.3845	0.0081	TABLE C-1A
WATE FHTR 01	WATE FHTR 01	WATE FHTR 01	Boilers/Heaters	0.750 MMBTU/hr (output)	554	0.7076	0.4313	0.0350	0.0028	0.1663	0.0383	0.0000	0.0015	0	TABLE D-1A
WATE SV V1S	WATE SV V1S	WATE SV V1S	Separator Vessel	530 gal (accumulation)	8					0.1414	0.0088	0.0021		0	TABLE F-2
WATE SV V1D	WATE SV V1D	WATE SV V1D	Separator Vessel	530 gal (accumulation)	8					0.1414	0.0088	0.0021		0	TABLE F-3
WATE SV V1C1	WATE SV V1C1	WATE SV V1C1	Separator Vessel	400 gal (accumulation)	6					0.1109	0.0069	0.0017		0	TABLE F-4
WATE SV V2	WATE SV V2	WATE SV V2	Separator Vessel	317 gal (accumulation)	18					0.6039	0.0364	0.0077		0	TABLE E-4a & TABLE F-5
WATE SV V4SD	WATE SV V4SD	WATE SV V4SD	Separator Vessel	43 gal (accumulation)	1					0.0137	0.0009	0.0002		0	TABLE F-6
WATE TK V5	WATE TK V5	WATE TK V5	Storage Tank	2,000 gal	15					0.2861	0.0178	0.0043		0	TABLE F-7
WATE TK OIL1	WATE TK OIL1	WATE TK OIL1	Storage Tank	570 gal						0.0021					TABLE F-8
WATE TK OW1	WATE TK OW1	WATE TK OW1	Storage Tank	3,000 gal						0.0009					TABLE F-9
WATE TL PL	WATE TL PL	WATE TL PL	Truck Loading	150 gal/min	1					0.0095	0.0006	0.0001		0	TABLE F-10
WATE TL OIL	WATE TL OIL	WATE TL OIL	Truck Loading	150 gal/min						0.0001					TABLE F-11
WATE TL OW	WATE TL OW	WATE TL OW	Truck Loading	150 gal/min						0.0005					TABLE F-12
WATE GR	WATE GR ST	WATE GR ST	Gas Release Events	Natural Gas	15,401					19.8198	1.6383	0.5781		0.5766	TABLE G-1a
	WATE GR PL	WATE GR PL	Gas Release Events	Natural Gas											
WATE PC	WATE PC NG	WATE PC NG	Piping Components	Natural Gas	997					1.2837	0.1061	0.0374		0.0373	TABLE H-1a
	WATE PC PL	WATE PC PL	Piping Components	Pipeline Liquids	0					4.4738	0.6515	0.0645		0.0759	TABLE H-2a
	WATE PC OIL	WATE PC OIL	Piping Components	Oil						0.5252					TABLE H-3a
WATE PW	WATE PW	WATE PW	Parts Washer	Remote Reservoir						0.4103					TABLE I-1
TOTAL					129,680	32.7585	10.1799	6.3029	3.2238	32.1735	3.6360	0.7205	0.5182	0.7793	

TABLE B-1Aa
Ambient Temperature, Start Model, and Utilization Data
PTE - 100% Fuel Utilization at 100% Power Output

Month	#Days	Daily Average	Weighted Daily Average
JAN	31.00	22.55	1.91
FEB	28.50	25.20	1.96
MAR	31.00	36.15	3.07
APR	30.00	47.60	3.91
MAY	31.00	58.60	4.97
JUN	30.00	67.90	5.57
JUL	31.00	72.00	6.11
AUG	31.00	69.85	5.92
SEP	30.00	62.95	5.17
OCT	31.00	51.20	4.34
NOV	30.00	40.00	3.28
DEC	31.00	27.85	2.36
Annual	365.50	48.49	**48.58**

Low Temperature Data	
Below 0˚F Hours	29 hrs/yr
Below -20˚F Hours	0 hrs/yr

NOTES
1. Please refer to TABLE B-0.

Start Model and Utilization	
Utilization	100.00%
Start Model	TET - High
Starts	260.00 starts/yr

TABLE B-1Ab
Manufacturer's Operating and Emissions Data
Normal Operations
PTE - 100% Fuel Utilization at 100% Power Output

Parameters			Curve Fitting			Vendor Data						
Ambient	Temperature	°F	-20.00	-20.00	48.49	-0.01	0.01	20.00	40.00	60.00	80.00	100.00
	Altitude	ft	0	0	0	0	0	0	0	0	0	0
	Pressure	psia	14.702	14.702	14.702	14.702	14.702	14.702	14.702	14.702	14.702	14.702
	Relative Humidity	%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$	0.0003	0.0003	0.0038	0.0006	0.0006	0.0013	0.0028	0.0058	0.0124	0.0262
Fuel	Lower Heating Value (LHV)	BTU/scf	939.2	939.2	939.2	939.2	939.2	939.2	939.2	939.2	939.2	939.2
	Higher Heating Value (HHV)	BTU/scf	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6
Turbine	Net Output Power	hp	35,209	35,209	30,381	33,900	33,900	32,592	31,146	29,151	26,280	23,613
	Fuel Consumption	scf/hr	238,158	238,158	207,096	229,429	229,429	220,709	211,595	200,266	185,977	173,041
	Heat Input at LHV	MMBTU/hr	223.68	223.68	194.50	215.48	215.48	207.29	198.73	188.09	174.67	162.52
	Heat Input at HHV	MMBTU/hr	248.53	248.53	216.12	239.42	239.42	230.32	220.81	208.99	194.08	180.58
	Heat Rate at LHV	BTU/hp-hr	6,353	6,353	6,402	6,356	6,356	6,360	6,381	6,452	6,646	6,883
	Heat Rate at HHV	BTU/hp-hr	7,059	7,059	7,113	7,063	7,063	7,067	7,090	7,169	7,385	7,647
Exhaust	Temperature	°F	830	830	864	839	839	848	858	873	897	924
	Water Fraction	%, by vol	5.94%	5.94%	6.40%	6.00%	6.00%	6.06%	6.25%	6.70%	7.61%	9.28%
	Non-Water Fraction	%, by vol	94.06%	94.06%	93.60%	94.00%	94.00%	93.94%	93.75%	93.30%	92.39%	90.72%
	O_2 Content	%, by vol (dry)	15.13%	15.13%	15.36%	15.20%	15.20%	15.27%	15.33%	15.39%	15.43%	15.44%
	Molecular Weight	lb/lb-mol	28.60	28.60	28.53	28.59	28.59	28.58	28.55	28.50	28.39	28.21
	Flow Rate	lb/hr	607,028	607,028	548,329	591,246	591,246	575,480	557,800	533,101	498,286	464,319
		scfm (1 atm, 68°F)	136,511	136,511	123,547	132,949	132,949	129,440	125,614	120,237	112,851	105,846
		acfm	333,391	333,391	309,589	326,960	326,960	320,535	313,439	303,438	289,926	277,339
NO_X Emissions		lb/lb-mol	46.01	46.01	46.01	46.01	46.01	46.01	46.01	46.01	46.01	46.01
		ppmvd, 15% O_2	120	9	9	9	9	9	9	9	9	9
		ppmvw	110.39	8.28	7.91	8.17	8.17	8.07	7.97	7.84	7.71	7.56
		lb/hr	107.80	8.08	7.00	7.78	7.78	7.47	7.16	6.75	6.23	5.72
CO Emissions		lb/lb-mol	28.01	28.01	28.01	28.01	28.01	28.01	28.01	28.01	28.01	28.01
		ppmvd, 15% O_2	150	25	25	25	25	25	25	25	25	25
		ppmvw	137.98	23.00	21.99	22.70	22.70	22.41	22.13	21.78	21.41	20.99
		lb/hr	82.03	13.67	11.83	13.15	13.15	12.64	12.11	11.41	10.53	9.68
UHC Emissions		lb/lb-mol	18.37	18.37	18.37	18.37	18.37	18.37	18.37	18.37	18.37	18.37
		ppmvd, 15% O_2	75	25	25	25	25	25	25	25	25	25
		ppmvw	68.99	23.00	21.99	22.70	22.70	22.41	22.13	21.78	21.41	20.99
		lb/hr	26.90	8.97	7.76	8.63	8.63	8.29	7.94	7.49	6.91	6.35

NOTES

1. Operating and emissions data was provided by the manufacturer for the following ambient temperatures: 0°F, 20°F, 40°F, 60°F, 80°F, and 100°F.
   Specific Humidity is estimate using curve fitting equation: $6.15E\text{-}04e^{3.75E\text{-}02T}$
   All other parameter values estimated using cubic spline.
2. Pollutant concentrations (ppmvd at 15% O2) for 0°F and -20°F based on information provided in a document published by the manufacturer.
3. Ambient pressure and humidity will vary. However, it is believed that any variation would not affect compliance with the proposed emission representations.
4. The heating value of the natural gas used to fuel the turbine will vary. However, it is believed that any variation would not affect compliance with the proposed emission representations.

TABLE B-1Ab
Manufacturer's Operating and Emissions Data
Normal Operations
PTE - 100% Fuel Utilization at 100% Power Output

Vendor Data												
Make:	Solar											
Model:	250-30002S4											
Rate	30,000 hp (ISO)											
Capacity:	26,000 hp (NEMA)											
Load:	100%											
Ambient	Temperature	°F				-0.01	0.01	20.00	40.00	60.00	80.00	100.00
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$				0.0006	0.0006	0.0014	0.0031	0.0066	0.0133	0.0253
Fuel	Lower Heating Value (LHV)	BTU/scf				939.2	939.2	939.2	939.2	939.2	939.2	939.2
Turbine	Net Output Power	hp				33,900	33,900	32,592	31,146	29,151	26,280	23,613
	Heat Input at LHV	MMBTU/hr				215.48	215.48	207.29	198.73	188.09	174.67	162.52
Exhaust	Temperature	°F				839	839	848	858	873	897	924
	Water Fraction	%				6.00%	6.00%	6.06%	6.25%	6.70%	7.61%	9.28%
	O_2 Content	% (dry)				15.20%	15.20%	15.27%	15.33%	15.39%	15.43%	15.44%
	Molecular Weight	lb/lb-mol				28.59	28.59	28.58	28.55	28.50	28.39	28.21
	Flow Rate	lb/hr				591,246	591,246	575,480	557,800	533,101	498,286	464,319
		acfm				326,960	326,960	320,535	313,439	303,438	289,926	277,339
Guaranteed	NO_X	ppmvd, 15% O_2	120	9		9	9	9	9	9	9	9
Emissions	CO	ppmvd, 15% O_2	150	25		25	25	25	25	25	25	25
	UHC	ppmvd, 15% O_2	75	25		25	25	25	25	25	25	25

TABLE B-1Ac
Gas-Fired Turbines
Emission Estimates
Normal Operations
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar				
Model	250-30002S4				
Normal Operating Load	100%				
Fuel	Natural Gas				
Fuel Higher Heating Value (HHV)	1,020 BTU/scf			1,020 BTU/scf	
Ambient Temperature	48.49 °F			0.01 °F	
Power Output	30,381 bhp (mech.)			33,900 bhp (mech.)	
	22,656 kW (elec.)			25,280 kW (elec.)	
Heat Rate at HHV	7,113 BTU/hp-hr			7,063 BTU/hp-hr	
Operating Hours	8,760 hrs/yr				
Fuel Consumption	211,878 scfh			234,728 scfh	
	1,856.053 MMscf/yr				
Heat Input at HHV	216.12 MMBTU/hr			239.42 MMBTU/hr	
	1,893,174 MMBTU/yr	Average	Maximum		Maximum
NO_X	33.03 lb/MMscf	6.9983 lb/hr	30.6524 tpy	33.13 lb/MMscf	7.7768 lb/hr
CO	55.86 lb/MMscf	11.8345 lb/hr	51.8350 tpy	56.03 lb/MMscf	13.1510 lb/hr
SO_2	3.47 lb/MMscf	0.7348 lb/hr	3.2184 tpy	3.47 lb/MMscf	0.8140 lb/hr
$PM_{10/2.5}$	6.73 lb/MMscf	1.4264 lb/hr	6.2475 tpy	6.73 lb/MMscf	1.5802 lb/hr
$CO_{2\text{-}e}$	120,801 lb/MMscf	25,595 lb/hr	112,106 tpy	120,803 lb/MMscf	28,356 lb/hr
CO_2	120,017 lb/MMscf	25,429 lb/hr	111,379 tpy	120,017 lb/MMscf	28,171 lb/hr
N_2O	0.23 lb/MMscf	0.0479 lb/hr	0.2099 tpy	0.23 lb/MMscf	0.0531 lb/hr
TOC (Total)	36.64 lb/MMscf	7.7622 lb/hr	33.9986 tpy	36.75 lb/MMscf	8.6257 lb/hr
Methane	28.64 lb/MMscf	6.0687 lb/hr	26.5807 tpy	28.73 lb/MMscf	6.7438 lb/hr
Ethane	1.00 lb/MMscf	0.2117 lb/hr	0.9272 tpy	1.00 lb/MMscf	0.2352 lb/hr
VOC (Total)	6.99 lb/MMscf	1.4819 lb/hr	6.4906 tpy	7.02 lb/MMscf	1.6467 lb/hr
VOC (non-HAP)	3.57 lb/MMscf	0.7569 lb/hr	3.3154 tpy	3.58 lb/MMscf	0.8411 lb/hr
HAP (Total)	3.42 lb/MMscf	0.7249 lb/hr	3.1753 tpy	3.43 lb/MMscf	0.8056 lb/hr
Acetaldehyde	1.33E-01 lb/MMscf	0.0282 lb/hr	0.1236 tpy	1.34E-01 lb/MMscf	0.0314 lb/hr
Acrolein	2.13E-02 lb/MMscf	0.0045 lb/hr	0.0198 tpy	2.14E-02 lb/MMscf	0.0050 lb/hr
Benzene	4.00E-02 lb/MMscf	0.0085 lb/hr	0.0371 tpy	4.01E-02 lb/MMscf	0.0094 lb/hr
Biphenyl					
Butadiene (1,3-)	1.43E-03 lb/MMscf	0.0003 lb/hr	0.0013 tpy	1.44E-03 lb/MMscf	0.0003 lb/hr
Carbon Tetrachloride					
Chlorobenzene					
Chloroform					
Dichloropropene (1,3-)					
Ethylbenzene	1.07E-01 lb/MMscf	0.0226 lb/hr	0.0989 tpy	1.07E-01 lb/MMscf	0.0251 lb/hr
Ethylene Dibromide					
Formaldehyde	2.36E+00 lb/MMscf	0.5010 lb/hr	2.1945 tpy	2.37E+00 lb/MMscf	0.5568 lb/hr
Hexane (n-)					
Methanol					
Methylene Chloride					
Methylnaphthalene (2-)					
Naphthalene	4.33E-03 lb/MMscf	0.0009 lb/hr	0.0040 tpy	4.34E-03 lb/MMscf	0.0010 lb/hr
PAH	7.33E-03 lb/MMscf	0.0016 lb/hr	0.0068 tpy	7.35E-03 lb/MMscf	0.0017 lb/hr
Phenol					
Propylene Oxide	9.66E-02 lb/MMscf	0.0205 lb/hr	0.0896 tpy	9.69E-02 lb/MMscf	0.0227 lb/hr
Styrene					
Tetrachloroethane (1,1,2,2-)					
Toluene	4.33E-01 lb/MMscf	0.0917 lb/hr	0.4018 tpy	4.34E-01 lb/MMscf	0.1019 lb/hr
Trichloroethane (1,1,2-)					
Trimethylpentane (2,2,4-)					
Vinyl Chloride					
Xylenes	2.13E-01 lb/MMscf	0.0452 lb/hr	0.1978 tpy	2.14E-01 lb/MMscf	0.0502 lb/hr

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Manufacturer provided operating and emissions data (TABLE B-1Ab).
3. The annual emissions are based on a representative annual average ambient temperature (TABLE B-1Aa).
   Maximum hourly emissions are based on an ambient temperature of 0°F.
4. NOX, CO, and TOC (Total) emission factor based on Vendor Guarantee.
5. CO2 and N2O emission factors based on 40 CFR 98, Subpart C, Table C-1 and 40 CFR 98, Subpart C, Table C-2, respectively.
6. SO2 emission factor based on AP-42, Section 3.1 (Revised 4/00), Table 3.1-2a.
7. PM10/2.5 emission factor based on AP-42, Section 3.1 (Revised 4/00), Table 3.1-2a, not Solar's PIL 171 dated 06/01/2012 (173% greater).
8. Methane, Ethane, and VOC (Total) emissions based on scaling of AP-42, Section 3.1 (Revised 4/00), Table 3.1-2a using Vendor Guarantee.
   Speciated VOC (non-HAP) emissions based on scaling of AP-42, Section 3.1 (Revised 4/00), Table 3.1-2a using Vendor Guarantee.
   $EF_{Scaled} = (EF_{AP42})(EF_{TOC}/EF_{TOC\text{-}AP42})$

TABLE B-1Ad
Manufacturer's Operating and Emissions Data
Startup/Shutdown Step 2: Iginition-Idle
PTE - 100% Fuel Utilization at 100% Power Output

Parameters			Interpolated	Vendor Data					
Ambient	Temperature	°F	48.49	0.01	20.00	40.00	60.00	80.00	100.00
	Altitude	ft	0	0	0	0	0	0	0
	Pressure	psia	14.702	14.702	14.702	14.702	14.702	14.702	14.702
	Relative Humidity	%	60%	60%	60%	60%	60%	60%	60%
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$	0.0038	0.0006	0.0013	0.0028	0.0058	0.0124	0.0262
Fuel	Lower Heating Value (LHV)	BTU/scf	939.2	939.2	939.2	939.2	939.2	939.2	939.2
	Higher Heating Value (HHV)	BTU/scf	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6
Turbine	Net Output Power	hp	3,041	3,390	3,259	3,115	2,915	2,628	2,361
	Fuel Consumption	scf/hr	66,421	68,761	67,920	66,983	65,503	63,511	60,796
	Heat Input at LHV	MMBTU/hr	62.38	64.58	63.79	62.91	61.52	59.65	57.10
	Heat Input at HHV	MMBTU/hr	69.31	71.76	70.88	69.90	68.36	66.28	63.44
	Heat Rate at LHV	BTU/hp-hr	20,514	19,050	19,573	20,196	21,105	22,698	24,185
	Heat Rate at HHV	BTU/hp-hr	22,793	21,167	21,748	22,440	23,450	25,220	26,872
Exhaust	Temperature	°F	838	737	779	821	861	900	935
	Water Fraction	%, by vol	4.40%	3.58%	3.81%	4.18%	4.80%	5.91%	7.72%
	Non-Water Fraction	%, by vol	95.60%	96.42%	96.19%	95.82%	95.20%	94.09%	92.28%
	O_2 Content	%, by vol (dry)	17.39%	17.64%	17.53%	17.43%	17.33%	17.20%	17.11%
	Molecular Weight	lb/lb-mol	28.66	28.74	28.72	28.68	28.62	28.50	28.30
	Flow Rate	lb/hr	273,420	301,815	289,208	277,244	263,781	230,080	214,821
		scfm (1 atm, 68°F)	61,324	67,517	64,740	62,117	59,234	51,881	48,805
		acfm	150,713	153,006	151,860	150,647	148,141	133,583	128,897
NO_X Emissions		lb/lb-mol	46.01	46.01	46.01	46.01	46.01	46.01	46.01
		ppmvd, 15% O_2	50	50	50	50	50	50	50
		ppmvw	28.43	26.64	27.47	28.18	28.80	29.50	29.64
		lb/hr	12.48	12.87	12.73	12.53	12.21	10.96	10.35
CO Emissions		lb/lb-mol	28.01	28.01	28.01	28.01	28.01	28.01	28.01
		ppmvd, 15% O_2	2,000	2,000	2,000	2,000	2,000	2,000	2,000
		ppmvw	1,137.25	1,065.52	1,098.85	1,127.10	1,152.08	1,180.11	1,185.56
		lb/hr	303.91	313.42	309.94	305.18	297.42	266.85	252.07
UHC Emissions		lb/lb-mol	18.37	18.37	18.37	18.37	18.37	18.37	18.37
		ppmvd, 15% O_2	200	200	200	200	200	200	200
		ppmvw	113.73	106.55	109.88	112.71	115.21	118.01	118.56
		lb/hr	19.93	20.56	20.33	20.02	19.51	17.50	16.53

NOTES

1. Footnotes 1 thru 4 of TABLE B-1Ab.

TABLE B-1Ad
Manufacturer's Operating and Emissions Data
Startup/Shutdown Step 2: Iginition-Idle
PTE - 100% Fuel Utilization at 100% Power Output

Vendor Data									
Make:	Solar								
Model:	250-30002S4								
Rate Capacity:	30,000 hp (ISO)								
	26,000 hp (NEMA)								
Load:	10%								
Ambient	Temperature	°F		0.01	20.00	40.00	60.00	80.00	100.00
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$		0.0006	0.0014	0.0031	0.0066	0.0133	0.0253
Fuel	Lower Heating Value (LHV)	BTU/scf		939.2	939.2	939.2	939.2	939.2	939.2
Turbine	Net Output Power	hp		3,390	3,259	3,115	2,915	2,628	2,361
	Heat Input at LHV	MMBTU/hr		64.58	63.79	62.91	61.52	59.65	57.10
Exhaust	Temperature	°F		737	779	821	861	900	935
	Water Fraction	%		3.58%	3.81%	4.18%	4.80%	5.91%	7.72%
	O_2 Content	% (dry)		17.64%	17.53%	17.43%	17.33%	17.20%	17.11%
	Molecular Weight	lb/lb-mol		28.74	28.72	28.68	28.62	28.50	28.30
	Flow Rate	lb/hr		301,815	289,208	277,244	263,781	230,080	214,821
		acfm		153,006	151,860	150,647	148,141	133,583	128,897
Estimated Emissions	NO_X	ppmvd, 15% O_2		50	50	50	50	50	50
	CO	ppmvd, 15% O_2		2,000	2,000	2,000	2,000	2,000	2,000
	UHC	ppmvd, 15% O_2		200	200	200	200	200	200

TABLE B-1Ae
Manufacturer's Operating and Emissions Data
Startup/Shutdown Step 3: Loading/Thermal Stabilization
PTE - 100% Fuel Utilization at 100% Power Output

Parameters			Interpolated	Vendor Data					
Ambient	Temperature	°F	48.49	0.01	20.00	40.00	60.00	80.00	100.00
	Altitude	ft	0	0	0	0	0	0	0
	Pressure	psia	14.702	14.702	14.702	14.702	14.702	14.702	14.702
	Relative Humidity	%	60%	60%	60%	60%	60%	60%	60%
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$	0.0038	0.0006	0.0013	0.0028	0.0058	0.0124	0.0262
Fuel	Lower Heating Value (LHV)	BTU/scf	939.2	939.2	939.2	939.2	939.2	939.2	939.2
	Higher Heating Value (HHV)	BTU/scf	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6	1,043.6
Turbine	Net Output Power	hp	7,602	8,475	8,148	7,787	7,288	6,570	5,903
	Fuel Consumption	scf/hr	101,589	106,846	104,546	102,609	99,872	95,848	90,503
	Heat Input at LHV	MMBTU/hr	95.41	100.35	98.19	96.37	93.80	90.02	85.00
	Heat Input at HHV	MMBTU/hr	106.01	111.50	109.10	107.08	104.22	100.02	94.44
	Heat Rate at LHV	BTU/hp-hr	12,550	11,841	12,051	12,376	12,870	13,702	14,399
	Heat Rate at HHV	BTU/hp-hr	13,945	13,156	13,390	13,751	14,301	15,224	15,999
Exhaust	Temperature	°F	897	796	838	880	921	960	984
	Water Fraction	%, by vol	5.12%	4.28%	4.52%	4.90%	5.51%	6.55%	8.28%
	Non-Water Fraction	%, by vol	94.88%	95.72%	95.48%	95.10%	94.49%	93.45%	91.72%
	O_2 Content	%, by vol (dry)	16.68%	16.94%	16.83%	16.72%	16.62%	16.54%	16.51%
	Molecular Weight	lb/lb-mol	28.61	28.69	28.67	28.64	28.57	28.46	28.27
	Flow Rate	lb/hr	347,975	389,910	370,850	354,836	338,013	318,919	299,026
		scfm (1 atm, 68°F)	78,175	87,321	83,036	79,645	76,029	72,024	68,003
		acfm	200,891	207,638	204,052	202,052	198,781	193,628	185,907
NO_X Emissions		lb/lb-mol	46.01	46.01	46.01	46.01	46.01	46.01	46.01
		ppmvd, 15% O_2	50	50	50	50	50	50	50
		ppmvw	33.96	32.12	32.93	33.69	34.27	34.53	34.12
		lb/hr	19.00	20.09	19.60	19.20	18.66	17.80	16.61
CO Emissions		lb/lb-mol	28.01	28.01	28.01	28.01	28.01	28.01	28.01
		ppmvd, 15% O_2	1,013	1,013	1,013	1,013	1,013	1,013	1,013
		ppmvw	688.04	650.81	667.21	682.52	694.36	699.56	691.33
		lb/hr	234.36	247.74	241.74	236.85	230.10	219.57	204.82
UHC Emissions		lb/lb-mol	18.37	18.37	18.37	18.37	18.37	18.37	18.37
		ppmvd, 15% O_2	110	110	110	110	110	110	110
		ppmvw	74.71	70.67	72.45	74.11	75.40	75.96	75.07
		lb/hr	16.69	17.65	17.22	16.87	16.39	15.64	14.59

NOTES

1. Footnotes 1 thru 4 of TABLE B-1Ab.

TABLE B-1Ae
Manufacturer's Operating and Emissions Data
Startup/Shutdown Step 3: Loading/Thermal Stabilization
PTE - 100% Fuel Utilization at 100% Power Output

Vendor Data									
Make:	Solar								
Model:	250-30002S4								
Rate Capacity:	30,000 hp (ISO)								
	26,000 hp (NEMA)								
Load:	24%								
Ambient	Temperature	°F		0.01	20.00	40.00	60.00	80.00	100.00
	Specific Humidity	$lb_{H2O}/lb_{Dry\ Air}$		0.0006	0.0014	0.0031	0.0066	0.0133	0.0253
Fuel	Lower Heating Value (LHV)	BTU/scf		939.2	939.2	939.2	939.2	939.2	939.2
Turbine	Net Output Power	hp		8,475	8,148	7,787	7,288	6,570	5,903
	Heat Input at LHV	MMBTU/hr		100.35	98.19	96.37	93.80	90.02	85.00
Exhaust	Temperature	°F		796	838	880	921	960	984
	Water Fraction	%		4.28%	4.52%	4.90%	5.51%	6.55%	8.28%
	O_2 Content	% (dry)		16.94%	16.83%	16.72%	16.62%	16.54%	16.51%
	Molecular Weight	lb/lb-mol		28.69	28.67	28.64	28.57	28.46	28.27
	Flow Rate	lb/hr		389,910	370,850	354,836	338,013	318,919	299,026
		acfm		207,638	204,052	202,052	198,781	193,628	185,907
Estimated Emissions	NO_X	ppmvd, 15% O_2		50	50	50	50	50	50
	CO	ppmvd, 15% O_2		1,013	1,013	1,013	1,013	1,013	1,013
	UHC	ppmvd, 15% O_2		110	110	110	110	110	110

TABLE B-1Af
Gas-Fired Turbines
Emission Estimates
Startup
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar				
Model	250-30002S4				
Fuel	Natural Gas				
Ambient Temperature	48.49 °F			0.01 °F	
Maximum Event Frequency		2 events/hr	260 events/yr		2 events/hr
Maximum Startup Time		18.00 min/hr	39 hrs/yr		18.00 min/hr
Fuel Consumption		26,960 scf/hr	3.50 MMscf/yr		28,245 scf/hr
		Average	Maximum		Maximum
NO_X	2.5241 lbs/event	5.0483 lb/hr	0.3281 tpy	2.6522 lbs/event	5.3044 lb/hr
CO	38.6316 lbs/event	77.2631 lb/hr	5.0221 tpy	40.4455 lbs/event	80.8909 lb/hr
SO_2	0.0467 lbs/event	0.0935 lb/hr	0.0061 tpy	0.0490 lbs/event	0.0980 lb/hr
$PM_{10/2.5}$	0.0907 lbs/event	0.1815 lb/hr	0.0118 tpy	0.0951 lbs/event	0.1901 lb/hr
CO_{2-e}	1,671 lbs/event	3,342 lb/hr	217 tpy	1,750 lbs/event	3,501 lb/hr
CO_2	1,618 lbs/event	3,236 lb/hr	210 tpy	1,695 lbs/event	3,390 lb/hr
N_2O	0.0030 lbs/event	0.0061 lb/hr	0.0004 tpy	0.0032 lbs/event	0.0064 lb/hr
TOC (Total)	2.6659 lbs/event	5.3317 lb/hr	0.3466 tpy	2.7924 lbs/event	5.5848 lb/hr
Methane	2.0842 lbs/event	4.1684 lb/hr	0.2709 tpy	2.1831 lbs/event	4.3663 lb/hr
Ethane	0.0727 lbs/event	0.1454 lb/hr	0.0095 tpy	0.0762 lbs/event	0.1523 lb/hr
VOC (Total)	0.5089 lbs/event	1.0179 lb/hr	0.0662 tpy	0.5331 lbs/event	1.0662 lb/hr
VOC (non-HAP)	0.2600 lbs/event	0.5199 lb/hr	0.0338 tpy	0.2723 lbs/event	0.5446 lb/hr
HAP (Total)	0.2490 lbs/event	0.4979 lb/hr	0.0324 tpy	0.2608 lbs/event	0.5216 lb/hr
Acetaldehyde	9.69E-03 lbs/event	0.0194 lb/hr	0.0013 tpy	1.02E-02 lbs/event	0.0203 lb/hr
Acrolein	1.55E-03 lbs/event	0.0031 lb/hr	0.0002 tpy	1.62E-03 lbs/event	0.0032 lb/hr
Benzene	2.91E-03 lbs/event	0.0058 lb/hr	0.0004 tpy	3.05E-03 lbs/event	0.0061 lb/hr
Biphenyl					
Butadiene (1,3-)	1.04E-04 lbs/event	0.0002 lb/hr	0.0000 tpy	1.09E-04 lbs/event	0.0002 lb/hr
Carbon Tetrachloride					
Chlorobenzene					
Chloroform					
Dichloropropene (1,3-)					
Ethylbenzene	7.76E-03 lbs/event	0.0155 lb/hr	0.0010 tpy	8.12E-03 lbs/event	0.0162 lb/hr
Ethylene Dibromide					
Formaldehyde	1.72E-01 lbs/event	0.3441 lb/hr	0.0224 tpy	1.80E-01 lbs/event	0.3605 lb/hr
Hexane (n-)					
Methanol					
Methylene Chloride					
Methylnaphthalene (2-)					
Naphthalene	3.15E-04 lbs/event	0.0006 lb/hr	0.0000 tpy	3.30E-04 lbs/event	0.0007 lb/hr
PAH	5.33E-04 lbs/event	0.0011 lb/hr	0.0001 tpy	5.58E-04 lbs/event	0.0011 lb/hr
Phenol					
Propylene Oxide	7.03E-03 lbs/event	0.0141 lb/hr	0.0009 tpy	7.36E-03 lbs/event	0.0147 lb/hr
Styrene					
Tetrachloroethane (1,1,2,2-)					
Toluene	3.15E-02 lbs/event	0.0630 lb/hr	0.0041 tpy	3.30E-02 lbs/event	0.0660 lb/hr
Trichloroethane (1,1,2-)					
Trimethylpentane (2,2,4-)					
Vinyl Chloride					
Xylenes	1.55E-02 lbs/event	0.0310 lb/hr	0.0020 tpy	1.62E-02 lbs/event	0.0325 lb/hr

NOTES

1. Emissions of NOx, CO, and UHC are estimated using information provided in TABLE B-1Ad and TABLE B-1Ae.

	48.49 °F		0.01 °F	
	Step 2	Step 3	Step 2	Step 3
Duration	3.00 min/event	6.00 min/event	3.00 min/event	6.00 min/event
NO_X	0.6240 lb/event	1.9001 lb/event	0.6435 lb/event	2.0086 lb/event
CO	15.1955 lb/event	23.4361 lb/event	15.6711 lb/event	24.7743 lb/event
UHC	0.9967 lb/event	1.6692 lb/event	1.0279 lb/event	1.7645 lb/event
Fuel	3,321 scf/event	10,159 scf/event	3,438 scf/event	10,685 scf/event

2. Footnotes 4 thru 8 of TABLE B-1Ac.
3. The frequency of startup events was provided by Technical Services.

TABLE B-1Ag
Gas-Fired Turbines
Emission Estimates
Shutdown
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar				
Model	250-30002S4				
Fuel	Natural Gas				
Ambient Temperature	48.49 °F			0.01 °F	
Maximum Event Frequency		2 events/hr	260 events/yr		2 events/hr
Maximum Startup Time		17.00 min/hr	36.83 hrs/yr		17.00 min/hr
Fuel Consumption		28,784 scf/hr	3.74 MMscf/yr		30,273 scf/hr
		Average	Maximum		Maximum
NO_X	2.6919 lbs/event	5.3837 lb/hr	0.3499 tpy	2.8456 lbs/event	5.6911 lb/hr
CO	33.2011 lbs/event	66.4022 lb/hr	4.3161 tpy	35.0970 lbs/event	70.1940 lb/hr
SO_2	0.0499 lbs/event	0.0998 lb/hr	0.0065 tpy	0.0525 lbs/event	0.1050 lb/hr
$PM_{10/2.5}$	0.0969 lbs/event	0.1938 lb/hr	0.0126 tpy	0.1019 lbs/event	0.2038 lb/hr
CO_{2-e}	1,774 lbs/event	3,549 lb/hr	231 tpy	1,867 lbs/event	3,733 lb/hr
CO_2	1,727 lbs/event	3,455 lb/hr	225 tpy	1,817 lbs/event	3,633 lb/hr
N_2O	0.0033 lbs/event	0.0065 lb/hr	0.0004 tpy	0.0034 lbs/event	0.0068 lb/hr
TOC (Total)	2.3647 lbs/event	4.7294 lb/hr	0.3074 tpy	2.4997 lbs/event	4.9994 lb/hr
Methane	1.8488 lbs/event	3.6975 lb/hr	0.2403 tpy	1.9543 lbs/event	3.9087 lb/hr
Ethane	0.0645 lbs/event	0.1290 lb/hr	0.0084 tpy	0.0682 lbs/event	0.1363 lb/hr
VOC (Total)	0.4514 lbs/event	0.9029 lb/hr	0.0587 tpy	0.4772 lbs/event	0.9544 lb/hr
VOC (non-HAP)	0.2306 lbs/event	0.4612 lb/hr	0.0300 tpy	0.2438 lbs/event	0.4875 lb/hr
HAP (Total)	0.2208 lbs/event	0.4417 lb/hr	0.0287 tpy	0.2335 lbs/event	0.4669 lb/hr
Acetaldehyde	8.60E-03 lbs/event	0.0172 lb/hr	0.0011 tpy	9.09E-03 lbs/event	0.0182 lb/hr
Acrolein	1.38E-03 lbs/event	0.0028 lb/hr	0.0002 tpy	1.45E-03 lbs/event	0.0029 lb/hr
Benzene	2.58E-03 lbs/event	0.0052 lb/hr	0.0003 tpy	2.73E-03 lbs/event	0.0055 lb/hr
Biphenyl					
Butadiene (1,3-)	9.24E-05 lbs/event	0.0002 lb/hr	0.0000 tpy	9.77E-05 lbs/event	0.0002 lb/hr
Carbon Tetrachloride					
Chlorobenzene					
Chloroform					
Dichloropropene (1,3-)					
Ethylbenzene	6.88E-03 lbs/event	0.0138 lb/hr	0.0009 tpy	7.27E-03 lbs/event	0.0145 lb/hr
Ethylene Dibromide					
Formaldehyde	1.53E-01 lbs/event	0.3053 lb/hr	0.0198 tpy	1.61E-01 lbs/event	0.3227 lb/hr
Hexane (n-)					
Methanol					
Methylene Chloride					
Methylnaphthalene (2-)					
Naphthalene	2.79E-04 lbs/event	0.0006 lb/hr	0.0000 tpy	2.95E-04 lbs/event	0.0006 lb/hr
PAH	4.73E-04 lbs/event	0.0009 lb/hr	0.0001 tpy	5.00E-04 lbs/event	0.0010 lb/hr
Phenol					
Propylene Oxide	6.23E-03 lbs/event	0.0125 lb/hr	0.0008 tpy	6.59E-03 lbs/event	0.0132 lb/hr
Styrene					
Tetrachloroethane (1,1,2,2-)					
Toluene	2.79E-02 lbs/event	0.0559 lb/hr	0.0036 tpy	2.95E-02 lbs/event	0.0591 lb/hr
Trichloroethane (1,1,2-)					
Trimethylpentane (2,2,4-)					
Vinyl Chloride					
Xylenes	1.38E-02 lbs/event	0.0275 lb/hr	0.0018 tpy	1.45E-02 lbs/event	0.0291 lb/hr

NOTES

1. Emissions of NOx, CO, and UHC are estimated using information provided in TABLE B-1Ad and TABLE B-1Ae.

	48.49 °F		0.01 °F	
	Step 2	Step 3	Step 2	Step 3
Duration	0.00 min/event	8.50 min/event	0.00 min/event	8.50 min/event
NO_X	0.0000 lb/event	2.6919 lb/event	0.0000 lb/event	2.8456 lb/event
CO	0.0000 lb/event	33.2011 lb/event	0.0000 lb/event	35.0970 lb/event
UHC	0.0000 lb/event	2.3647 lb/event	0.0000 lb/event	2.4997 lb/event
Fuel	0 scf/event	14,392 scf/event	0 scf/event	15,137 scf/event

2. Footnotes 4 thru 8 of TABLE B-1Ac.
3. The frequency of startup events was provided by Technical Services.

TABLE B-1Ah
Gas-Fired Turbines
Emission Estimates
Low Temperatures
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar					
Model	250-30002S4					
Normal Operating Load	100%					
Fuel	Natural Gas					
Fuel Higher Heating Value (HHV)	1,020 BTU/scf			1,020 BTU/scf		
Ambient Temperature	-20.00 °F			-20.00 °F		
Power Output	35,209 bhp (mech.)			35,209 bhp (mech.)		
	26,256 kW (elec.)			26,256 kW (elec.)		
Heat Rate at HHV	7,059 BTU/hp-hr			7,059 BTU/hp-hr		
Operating Hours	29 hrs/yr			0 hrs/yr		
Fuel Consumption	243,658 scfh			243,658 scfh		
	7.066 MMscf/yr			0.000 MMscf/yr		
Heat Input at HHV	248.53 MMBTU/hr	0°F ≥ T > -20°F		248.53 MMBTU/hr	T ≤ -20°F	
	7,207 MMBTU/yr	Hourly	Annual	0 MMBTU/yr	Hourly	Annual
NO_X	33.18 lb/MMscf	8.0848 lb/hr	0.1172 tpy	442.41 lb/MMscf	107.7979 lb/hr	0.0000 tpy
CO	56.11 lb/MMscf	13.6719 lb/hr	0.1982 tpy	336.67 lb/MMscf	82.0316 lb/hr	0.0000 tpy
SO_2	3.47 lb/MMscf	0.8450 lb/hr	0.0123 tpy	3.47 lb/MMscf	0.8450 lb/hr	0.0000 tpy
$PM_{10/2.5}$	6.73 lb/MMscf	1.6403 lb/hr	0.0238 tpy	6.73 lb/MMscf	1.6403 lb/hr	0.0000 tpy
CO_{2-e}	120,804 lb/MMscf	29,435 lb/hr	427 tpy	122,243 lb/MMscf	29,785 lb/hr	0 tpy
CO_2	120,017 lb/MMscf	29,243 lb/hr	424 tpy	120,017 lb/MMscf	29,243 lb/hr	0 tpy
N_2O	0.23 lb/MMscf	0.0551 lb/hr	0.0008 tpy	0.23 lb/MMscf	0.0551 lb/hr	0.0000 tpy
TOC (Total)	36.80 lb/MMscf	8.9674 lb/hr	0.1300 tpy	110.41 lb/MMscf	26.9023 lb/hr	0.0000 tpy
Methane	28.77 lb/MMscf	7.0109 lb/hr	0.1017 tpy	86.32 lb/MMscf	21.0327 lb/hr	0.0000 tpy
Ethane	1.00 lb/MMscf	0.2446 lb/hr	0.0035 tpy	3.01 lb/MMscf	0.7337 lb/hr	0.0000 tpy
VOC (Total)	7.03 lb/MMscf	1.7120 lb/hr	0.0248 tpy	21.08 lb/MMscf	5.1359 lb/hr	0.0000 tpy
VOC (non-HAP)	3.59 lb/MMscf	0.8745 lb/hr	0.0127 tpy	10.77 lb/MMscf	2.6234 lb/hr	0.0000 tpy
HAP (Total)	3.44 lb/MMscf	0.8375 lb/hr	0.0121 tpy	10.31 lb/MMscf	2.5125 lb/hr	0.0000 tpy
Acetaldehyde	1.34E-01 lb/MMscf	0.0326 lb/hr	0.0005 tpy	4.01E-01 lb/MMscf	0.0978 lb/hr	0.0000 tpy
Acrolein	2.14E-02 lb/MMscf	0.0052 lb/hr	0.0001 tpy	6.42E-02 lb/MMscf	0.0157 lb/hr	0.0000 tpy
Benzene	4.01E-02 lb/MMscf	0.0098 lb/hr	0.0001 tpy	1.20E-01 lb/MMscf	0.0293 lb/hr	0.0000 tpy
Biphenyl						
Butadiene (1,3-)	1.44E-03 lb/MMscf	0.0004 lb/hr	0.0000 tpy	4.32E-03 lb/MMscf	0.0011 lb/hr	0.0000 tpy
Carbon Tetrachloride						
Chlorobenzene						
Chloroform						
Dichloropropene (1,3-)						
Ethylbenzene	1.07E-01 lb/MMscf	0.0261 lb/hr	0.0004 tpy	3.21E-01 lb/MMscf	0.0783 lb/hr	0.0000 tpy
Ethylene Dibromide						
Formaldehyde	2.38E+00 lb/MMscf	0.5788 lb/hr	0.0084 tpy	7.13E+00 lb/MMscf	1.7364 lb/hr	0.0000 tpy
Hexane (n-)						
Methanol						
Methylene Chloride						
Methylnaphthalene (2-)						
Naphthalene	4.35E-03 lb/MMscf	0.0011 lb/hr	0.0000 tpy	1.30E-02 lb/MMscf	0.0032 lb/hr	0.0000 tpy
PAH	7.36E-03 lb/MMscf	0.0018 lb/hr	0.0000 tpy	2.21E-02 lb/MMscf	0.0054 lb/hr	0.0000 tpy
Phenol						
Propylene Oxide	9.70E-02 lb/MMscf	0.0236 lb/hr	0.0003 tpy	2.91E-01 lb/MMscf	0.0709 lb/hr	0.0000 tpy
Styrene						
Tetrachloroethane (1,1,2,2-)						
Toluene	4.35E-01 lb/MMscf	0.1060 lb/hr	0.0015 tpy	1.30E+00 lb/MMscf	0.3179 lb/hr	0.0000 tpy
Trichloroethane (1,1,2-)						
Trimethylpentane (2,2,4-)						
Vinyl Chloride						
Xylenes	2.14E-01 lb/MMscf	0.0522 lb/hr	0.0008 tpy	6.42E-01 lb/MMscf	0.1565 lb/hr	0.0000 tpy

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Operating hours for low ambient temperatures best on best fit of available data (see TABLE B-1Aa).
3. Manufacturer provided data on: power output, heat rate, along with NOx, CO, and UHC (or TOC) emissions.
4. Footnotes 4 thru 8 of TABLE B-1Ac.

TABLE B-1Ai
Gas-Fired Turbines
Maximum Emission Estimates
Normal Operations, Startup, Shutdown, and Low Temperature Operations
PTE - 100% Fuel Utilization at 100% Power Output

Make	Solar																	
Model	250-30002S4																	
Normal Operating Load	100%																	
Operations	Normal			Startup			Shutdown			Startup/Shutdown w/ Normal			Low Temperatures			Combined Operations		
Maximum Annual Combined Event Frequency	8,760 hrs/yr			39 hrs/yr			37 hrs/yr			8,760 hrs/yr			29 hrs/yr			8,760 hrs/yr		
	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum	Hourly			Hourly		Maximum	Hourly		Maximum
Pollutant	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Maximum Annual	Average	Maximum	Annual	Average	Maximum	Annual
NO_X	6.9983 lb/hr	7.7768 lb/hr	30.6524 tpy	5.0483 lb/hr	5.3044 lb/hr	0.3281 tpy	5.3837 lb/hr	5.6911 lb/hr	0.3499 tpy	7.0925 lb/hr	14.2358 lb/hr	31.0651 tpy	8.0848 lb/hr	107.7979 lb/hr	0.1172 tpy	7.0961 lb/hr	107.7979 lb/hr	31.0809 tpy
CO	11.8345 lb/hr	13.1510 lb/hr	51.8350 tpy	77.2631 lb/hr	80.8909 lb/hr	5.0221 tpy	66.4022 lb/hr	70.1940 lb/hr	4.3161 tpy	13.8640 lb/hr	156.5645 lb/hr	60.7245 tpy	13.6719 lb/hr	82.0316 lb/hr	0.1982 tpy	13.8701 lb/hr	156.5645 lb/hr	60.7511 tpy
SO_2	0.7348 lb/hr	0.8140 lb/hr	3.2184 tpy	0.0935 lb/hr	0.0980 lb/hr	0.0061 tpy	0.0998 lb/hr	0.1050 lb/hr	0.0065 tpy	0.7348 lb/hr	0.8140 lb/hr	3.2184 tpy	0.8450 lb/hr	0.8450 lb/hr	0.0123 tpy	0.7352 lb/hr	0.8450 lb/hr	3.2200 tpy
$PM_{10/2.5}$	1.4264 lb/hr	1.5802 lb/hr	6.2475 tpy	0.1815 lb/hr	0.1901 lb/hr	0.0118 tpy	0.1938 lb/hr	0.2038 lb/hr	0.0126 tpy	1.4264 lb/hr	1.5802 lb/hr	6.2475 tpy	1.6403 lb/hr	1.6403 lb/hr	0.0238 tpy	1.4271 lb/hr	1.6403 lb/hr	6.2506 tpy
CO_{2-e}	25,595 lb/hr	28,356 lb/hr	112,106 tpy	3,342 lb/hr	3,501 lb/hr	217 tpy	3,549 lb/hr	3,733 lb/hr	231 tpy	25,595 lb/hr	28,356 lb/hr	112,106 tpy	29,435 lb/hr	29,785 lb/hr	427 tpy	25,608 lb/hr	29,785 lb/hr	112,162 tpy
CO_2	25,429 lb/hr	28,171 lb/hr	111,379 tpy	3,236 lb/hr	3,390 lb/hr	210 tpy	3,455 lb/hr	3,633 lb/hr	225 tpy	25,429 lb/hr	28,171 lb/hr	111,379 tpy	29,243 lb/hr	29,243 lb/hr	424 tpy	25,442 lb/hr	29,243 lb/hr	111,435 tpy
N_2O	0.0479 lb/hr	0.0531 lb/hr	0.2099 tpy	0.0061 lb/hr	0.0064 lb/hr	0.0004 tpy	0.0065 lb/hr	0.0068 lb/hr	0.0004 tpy	0.0479 lb/hr	0.0531 lb/hr	0.2099 tpy	0.0551 lb/hr	0.0551 lb/hr	0.0008 tpy	0.0479 lb/hr	0.0551 lb/hr	0.2100 tpy
TOC (Total)	7.7622 lb/hr	8.6257 lb/hr	33.9986 tpy	5.3317 lb/hr	5.5848 lb/hr	0.3466 tpy	4.7294 lb/hr	4.9994 lb/hr	0.3074 tpy	7.8443 lb/hr	14.1782 lb/hr	34.3582 tpy	8.9674 lb/hr	26.9023 lb/hr	0.1300 tpy	7.8483 lb/hr	26.9023 lb/hr	34.3757 tpy
Methane	6.0687 lb/hr	6.7438 lb/hr	26.5807 tpy	4.1684 lb/hr	4.3663 lb/hr	0.2709 tpy	3.6975 lb/hr	3.9087 lb/hr	0.2403 tpy	6.1329 lb/hr	11.0848 lb/hr	26.8619 tpy	7.0109 lb/hr	21.0327 lb/hr	0.1017 tpy	6.1360 lb/hr	21.0327 lb/hr	26.8756 tpy
Ethane	0.2117 lb/hr	0.2352 lb/hr	0.9272 tpy	0.1454 lb/hr	0.1523 lb/hr	0.0095 tpy	0.1290 lb/hr	0.1363 lb/hr	0.0084 tpy	0.2139 lb/hr	0.3867 lb/hr	0.9370 tpy	0.2446 lb/hr	0.7337 lb/hr	0.0035 tpy	0.2140 lb/hr	0.7337 lb/hr	0.9375 tpy
VOC (Total)	1.4819 lb/hr	1.6467 lb/hr	6.4906 tpy	1.0179 lb/hr	1.0662 lb/hr	0.0662 tpy	0.9029 lb/hr	0.9544 lb/hr	0.0587 tpy	1.4976 lb/hr	2.7068 lb/hr	6.5593 tpy	1.7120 lb/hr	5.1359 lb/hr	0.0248 tpy	1.4983 lb/hr	5.1359 lb/hr	6.5626 tpy
VOC (non-HAP)	0.7569 lb/hr	0.8411 lb/hr	3.3154 tpy	0.5199 lb/hr	0.5446 lb/hr	0.0338 tpy	0.4612 lb/hr	0.4875 lb/hr	0.0300 tpy	0.7649 lb/hr	1.3826 lb/hr	3.3505 tpy	0.8745 lb/hr	2.6234 lb/hr	0.0127 tpy	0.7653 lb/hr	2.6234 lb/hr	3.3522 tpy
HAP (Total)	0.7249 lb/hr	0.8056 lb/hr	3.1753 tpy	0.4979 lb/hr	0.5216 lb/hr	0.0324 tpy	0.4417 lb/hr	0.4669 lb/hr	0.0287 tpy	0.7326 lb/hr	1.3242 lb/hr	3.2088 tpy	0.8375 lb/hr	2.5125 lb/hr	0.0121 tpy	0.7330 lb/hr	2.5125 lb/hr	3.2105 tpy
Acetaldehyde	2.82E-02 lb/hr	3.14E-02 lb/hr	1.24E-01 tpy	1.94E-02 lb/hr	2.03E-02 lb/hr	1.26E-03 tpy	1.72E-02 lb/hr	1.82E-02 lb/hr	1.12E-03 tpy	2.85E-02 lb/hr	5.16E-02 lb/hr	1.25E-01 tpy	3.26E-02 lb/hr	9.78E-02 lb/hr	4.73E-04 tpy	2.85E-02 lb/hr	9.78E-02 lb/hr	1.25E-01 tpy
Acrolein	4.52E-03 lb/hr	5.02E-03 lb/hr	1.98E-02 tpy	3.10E-03 lb/hr	3.25E-03 lb/hr	2.02E-04 tpy	2.75E-03 lb/hr	2.91E-03 lb/hr	1.79E-04 tpy	4.56E-03 lb/hr	8.25E-03 lb/hr	2.00E-02 tpy	5.22E-03 lb/hr	1.57E-02 lb/hr	7.57E-05 tpy	4.57E-03 lb/hr	1.57E-02 lb/hr	2.00E-02 tpy
Benzene	8.47E-03 lb/hr	9.41E-03 lb/hr	3.71E-02 tpy	5.82E-03 lb/hr	6.09E-03 lb/hr	3.78E-04 tpy	5.16E-03 lb/hr	5.45E-03 lb/hr	3.35E-04 tpy	8.56E-03 lb/hr	1.55E-02 lb/hr	3.75E-02 tpy	9.78E-03 lb/hr	2.93E-02 lb/hr	1.42E-04 tpy	8.56E-03 lb/hr	2.93E-02 lb/hr	3.75E-02 tpy
Biphenyl																		
Butadiene (1,3-)	3.03E-04 lb/hr	3.37E-04 lb/hr	1.33E-03 tpy	2.08E-04 lb/hr	2.18E-04 lb/hr	1.35E-05 tpy	1.85E-04 lb/hr	1.95E-04 lb/hr	1.20E-05 tpy	3.07E-04 lb/hr	5.54E-04 lb/hr	1.34E-03 tpy	3.51E-04 lb/hr	1.05E-03 lb/hr	5.08E-06 tpy	3.07E-04 lb/hr	1.05E-03 lb/hr	1.34E-03 tpy
Carbon Tetrachloride																		
Chlorobenzene																		
Chloroform																		
Dichloropropene (1,3-)																		
Ethylbenzene	2.26E-02 lb/hr	2.51E-02 lb/hr	9.89E-02 tpy	1.55E-02 lb/hr	1.62E-02 lb/hr	1.01E-03 tpy	1.38E-02 lb/hr	1.45E-02 lb/hr	8.94E-04 tpy	2.28E-02 lb/hr	4.12E-02 lb/hr	1.00E-01 tpy	2.61E-02 lb/hr	7.83E-02 lb/hr	3.78E-04 tpy	2.28E-02 lb/hr	7.83E-02 lb/hr	1.00E-01 tpy
Ethylene Dibromide																		
Formaldehyde	5.01E-01 lb/hr	5.57E-01 lb/hr	2.19E+00 tpy	3.44E-01 lb/hr	3.60E-01 lb/hr	2.24E-02 tpy	3.05E-01 lb/hr	3.23E-01 lb/hr	1.98E-02 tpy	5.06E-01 lb/hr	9.15E-01 lb/hr	2.22E+00 tpy	5.79E-01 lb/hr	1.74E+00 lb/hr	8.39E-03 tpy	5.07E-01 lb/hr	1.74E+00 lb/hr	2.22E+00 tpy
Hexane (n-)																		
Methanol																		
Methylene Chloride																		
Methylnaphthalene (2-)																		
Naphthalene	9.17E-04 lb/hr	1.02E-03 lb/hr	4.02E-03 tpy	6.30E-04 lb/hr	6.60E-04 lb/hr	4.10E-05 tpy	5.59E-04 lb/hr	5.91E-04 lb/hr	3.63E-05 tpy	9.27E-04 lb/hr	1.68E-03 lb/hr	4.06E-03 tpy	1.06E-03 lb/hr	3.18E-03 lb/hr	1.54E-05 tpy	9.28E-04 lb/hr	3.18E-03 lb/hr	4.06E-03 tpy
PAH	1.55E-03 lb/hr	1.73E-03 lb/hr	6.80E-03 tpy	1.07E-03 lb/hr	1.12E-03 lb/hr	6.93E-05 tpy	9.46E-04 lb/hr	1.00E-03 lb/hr	6.15E-05 tpy	1.57E-03 lb/hr	2.84E-03 lb/hr	6.87E-03 tpy	1.79E-03 lb/hr	5.38E-03 lb/hr	2.60E-05 tpy	1.57E-03 lb/hr	5.38E-03 lb/hr	6.88E-03 tpy
Phenol																		
Propylene Oxide	2.05E-02 lb/hr	2.27E-02 lb/hr	8.96E-02 tpy	1.41E-02 lb/hr	1.47E-02 lb/hr	9.14E-04 tpy	1.25E-02 lb/hr	1.32E-02 lb/hr	8.10E-04 tpy	2.07E-02 lb/hr	3.74E-02 lb/hr	9.06E-02 tpy	2.36E-02 lb/hr	7.09E-02 lb/hr	3.43E-04 tpy	2.07E-02 lb/hr	7.09E-02 lb/hr	9.06E-02 tpy
Styrene																		
Tetrachloroethane (1,1,2,2-)																		
Toluene	9.17E-02 lb/hr	1.02E-01 lb/hr	4.02E-01 tpy	6.30E-02 lb/hr	6.60E-02 lb/hr	4.10E-03 tpy	5.59E-02 lb/hr	5.91E-02 lb/hr	3.63E-03 tpy	9.27E-02 lb/hr	1.68E-01 lb/hr	4.06E-01 tpy	1.06E-01 lb/hr	3.18E-01 lb/hr	1.54E-03 tpy	9.28E-02 lb/hr	3.18E-01 lb/hr	4.06E-01 tpy
Trichloroethane (1,1,2-)																		
Trimethylpentane (2,2,4-)																		
Vinyl Chloride																		
Xylenes	4.52E-02 lb/hr	5.02E-02 lb/hr	1.98E-01 tpy	3.10E-02 lb/hr	3.25E-02 lb/hr	2.02E-03 tpy	2.75E-02 lb/hr	2.91E-02 lb/hr	1.79E-03 tpy	4.56E-02 lb/hr	8.25E-02 lb/hr	2.00E-01 tpy	5.22E-02 lb/hr	1.57E-01 lb/hr	7.57E-04 tpy	4.57E-02 lb/hr	1.57E-01 lb/hr	2.00E-01 tpy

NOTES

1. See TABLE B-1Ac, TABLE B-1Af, TABLE B-1Ag, and TABLE B-1Ah.
2. If $E(t)_{normal} > E(t)_{transient}$, then $E(8{,}760\ hrs/yr)_{all} = E(8{,}760\ hrs/yr)_{normal}$
   Otherwise, $E(8{,}760\ hrs/yr)_{all} = E(8{,}760\ hrs/yr)_{normal} - E(t)_{normal} + E(t)_{transient}$.
   where t = the duration of transient operation.

TABLE B-1Aj
Gas-Fired Turbines
Maximum Emission Estimates
Normal Operations, Startup, Shutdown, and Low Temperature Operations
PTE - 100% Fuel Utilization at 100% Power Output

Make		Solar																		
Model		250-30002S4																		
Normal Operating Load		100%																		
Operations		Normal			Startup			Shutdown			Startup/Shutdown w/ Normal			Low Temperatures			Combined Operations		
Maximum Annual Combined Event Frequency		8,760 hrs/yr			39 hrs/yr			37 hrs/yr			8,760 hrs/yr			29 hrs/yr			8,760 hrs/yr		
Pollutant	Control Efficiency	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum	Hourly		Maximum
		Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual	Average	Maximum	Annual
NO_X		6.9983 lb/hr	7.7768 lb/hr	30.6524 tpy	5.0483 lb/hr	5.3044 lb/hr	0.3281 tpy	5.3837 lb/hr	5.6911 lb/hr	0.3499 tpy	7.0925 lb/hr	14.2358 lb/hr	31.0651 tpy	8.0848 lb/hr	107.7979 lb/hr	0.1172 tpy	7.0961 lb/hr	107.7979 lb/hr	31.0809 tpy
CO	95.00% by weight	0.5917 lb/hr	0.6575 lb/hr	2.5917 tpy	77.2631 lb/hr	80.8909 lb/hr	5.0221 tpy	3.3201 lb/hr	3.5097 lb/hr	0.2158 tpy	1.7825 lb/hr	84.6746 lb/hr	7.8072 tpy	0.6836 lb/hr	4.1016 lb/hr	0.0099 tpy	1.7828 lb/hr	84.6746 lb/hr	7.8086 tpy
SO_2		0.7348 lb/hr	0.8140 lb/hr	3.2184 tpy	0.0935 lb/hr	0.0980 lb/hr	0.0061 tpy	0.0998 lb/hr	0.1050 lb/hr	0.0065 tpy	0.7348 lb/hr	0.8140 lb/hr	3.2184 tpy	0.8450 lb/hr	0.8450 lb/hr	0.0123 tpy	0.7352 lb/hr	0.8450 lb/hr	3.2200 tpy
$PM_{10/2.5}$		1.4264 lb/hr	1.5802 lb/hr	6.2475 tpy	0.1815 lb/hr	0.1901 lb/hr	0.0118 tpy	0.1938 lb/hr	0.2038 lb/hr	0.0126 lb/hr	1.4264 lb/hr	1.5802 lb/hr	6.2475 tpy	1.6403 lb/hr	1.6403 lb/hr	0.0238 tpy	1.4271 lb/hr	1.6403 lb/hr	6.2506 tpy
CO_{2-e}		25,613 lb/hr	28,375 lb/hr	112,184 tpy	3,342 lb/hr	3,501 lb/hr	217 tpy	3,648 lb/hr	3,838 lb/hr	237 tpy	25,613 lb/hr	28,375 lb/hr	112,184 tpy	29,455 lb/hr	29,908 lb/hr	427 tpy	25,625 lb/hr	29,908 lb/hr	112,240 tpy
CO_2		25,447 lb/hr	28,191 lb/hr	111,457 tpy	3,236 lb/hr	3,390 lb/hr	210 tpy	3,554 lb/hr	3,738 lb/hr	231 tpy	25,447 lb/hr	28,191 lb/hr	111,457 tpy	29,264 lb/hr	29,366 lb/hr	424 tpy	25,459 lb/hr	29,366 lb/hr	111,512 tpy
N_2O		0.0479 lb/hr	0.0531 lb/hr	0.2099 tpy	0.0061 lb/hr	0.0064 lb/hr	0.0004 tpy	0.0065 lb/hr	0.0068 lb/hr	0.0004 tpy	0.0479 lb/hr	0.0531 lb/hr	0.2099 tpy	0.0551 lb/hr	0.0551 lb/hr	0.0008 tpy	0.0479 lb/hr	0.0551 lb/hr	0.2100 tpy
TOC (Total)	10.91% by weight	6.9154 lb/hr	7.6847 lb/hr	30.2897 tpy	5.3317 lb/hr	5.5848 lb/hr	0.3466 tpy	4.2134 lb/hr	4.4540 lb/hr	0.2739 tpy	6.9972 lb/hr	13.2408 lb/hr	30.6479 tpy	7.9892 lb/hr	23.9675 lb/hr	0.1158 tpy	7.0008 lb/hr	23.9675 lb/hr	30.6634 tpy
Methane	0.00% by weight	6.0687 lb/hr	6.7438 lb/hr	26.5807 tpy	4.1684 lb/hr	4.3663 lb/hr	0.2709 tpy	3.6975 lb/hr	3.9087 lb/hr	0.2403 tpy	6.1329 lb/hr	11.0848 lb/hr	26.8619 tpy	7.0109 lb/hr	21.0327 lb/hr	0.1017 tpy	6.1360 lb/hr	21.0327 lb/hr	26.8756 tpy
Ethane	50.00% by weight	0.1058 lb/hr	0.1176 lb/hr	0.4636 tpy	0.1454 lb/hr	0.1523 lb/hr	0.0095 tpy	0.0645 lb/hr	0.0682 lb/hr	0.0042 tpy	0.1080 lb/hr	0.2695 lb/hr	0.4732 tpy	0.1223 lb/hr	0.3668 lb/hr	0.0018 tpy	0.1081 lb/hr	0.3668 lb/hr	0.4735 tpy
VOC (Total)	50.00% by weight	0.7409 lb/hr	0.8234 lb/hr	3.2453 tpy	1.0179 lb/hr	1.0662 lb/hr	0.0662 tpy	0.4514 lb/hr	0.4772 lb/hr	0.0293 tpy	0.7563 lb/hr	1.8865 lb/hr	3.3127 tpy	0.8560 lb/hr	2.5679 lb/hr	0.0124 tpy	0.7567 lb/hr	2.5679 lb/hr	3.3144 tpy
VOC (non-HAP)	19.10% by weight	0.6124 lb/hr	0.6805 lb/hr	2.6823 tpy	0.5199 lb/hr	0.5446 lb/hr	0.0338 tpy	0.3731 lb/hr	0.3944 lb/hr	0.0243 tpy	0.6203 lb/hr	1.2226 lb/hr	2.7171 tpy	0.7075 lb/hr	2.1224 lb/hr	0.0103 tpy	0.6207 lb/hr	2.1224 lb/hr	2.7185 tpy
HAP (Total)	8.23E-01 by weight	0.1285 lb/hr	0.1428 lb/hr	0.5630 tpy	0.4979 lb/hr	0.5216 lb/hr	0.0324 tpy	0.0783 lb/hr	0.0828 lb/hr	0.0051 tpy	0.1360 lb/hr	0.6639 lb/hr	0.5956 tpy	0.1485 lb/hr	0.4455 lb/hr	0.0022 tpy	0.1361 lb/hr	0.6639 lb/hr	0.5959 tpy
Acetaldehyde	80.00% by weight	5.65E-03 lb/hr	6.27E-03 lb/hr	2.47E-02 tpy	1.94E-02 lb/hr	2.03E-02 lb/hr	1.26E-03 tpy	3.44E-03 lb/hr	3.64E-03 lb/hr	2.24E-04 tpy	5.94E-03 lb/hr	2.66E-02 lb/hr	2.60E-02 tpy	6.52E-03 lb/hr	1.96E-02 lb/hr	9.46E-05 tpy	5.94E-03 lb/hr	2.66E-02 lb/hr	2.60E-02 tpy
Acrolein	50.00% by weight	2.26E-03 lb/hr	2.51E-03 lb/hr	9.89E-03 tpy	3.10E-03 lb/hr	3.25E-03 lb/hr	2.02E-04 tpy	1.38E-03 lb/hr	1.45E-03 lb/hr	8.94E-05 tpy	2.31E-03 lb/hr	5.75E-03 lb/hr	1.01E-02 tpy	2.61E-03 lb/hr	7.83E-03 lb/hr	3.78E-05 tpy	2.31E-03 lb/hr	7.83E-03 lb/hr	1.01E-02 tpy
Benzene	50.00% by weight	4.23E-03 lb/hr	4.70E-03 lb/hr	1.85E-02 tpy	5.82E-03 lb/hr	6.09E-03 lb/hr	3.78E-04 tpy	2.58E-03 lb/hr	2.73E-03 lb/hr	1.68E-04 tpy	4.32E-03 lb/hr	1.08E-02 lb/hr	1.89E-02 tpy	4.89E-03 lb/hr	1.47E-02 lb/hr	7.09E-05 tpy	4.32E-03 lb/hr	1.47E-02 lb/hr	1.89E-02 tpy
Biphenyl	0.00% by weight																		
Butadiene (1,3-)	50.00% by weight	1.52E-04 lb/hr	1.69E-04 lb/hr	6.65E-04 tpy	2.08E-04 lb/hr	2.18E-04 lb/hr	1.35E-05 tpy	9.24E-05 lb/hr	9.77E-05 lb/hr	6.01E-06 tpy	1.55E-04 lb/hr	3.86E-04 lb/hr	6.78E-04 tpy	1.75E-04 lb/hr	5.26E-04 lb/hr	2.54E-06 tpy	1.55E-04 lb/hr	5.26E-04 lb/hr	6.79E-04 tpy
Carbon Tetrachloride	50.00% by weight																		
Chlorobenzene	50.00% by weight																		
Chloroform	50.00% by weight																		
Dichloropropene (1,3-)	50.00% by weight																		
Ethylbenzene	50.00% by weight	1.13E-02 lb/hr	1.25E-02 lb/hr	4.95E-02 tpy	1.55E-02 lb/hr	1.62E-02 lb/hr	1.01E-03 tpy	6.88E-03 lb/hr	7.27E-03 lb/hr	4.47E-04 tpy	1.15E-02 lb/hr	2.87E-02 lb/hr	5.05E-02 tpy	1.30E-02 lb/hr	3.91E-02 lb/hr	1.89E-04 tpy	1.15E-02 lb/hr	3.91E-02 lb/hr	5.05E-02 tpy
Ethylene Dibromide	50.00% by weight																		
Formaldehyde	95.00% by weight	2.51E-02 lb/hr	2.78E-02 lb/hr	1.10E-01 tpy	3.44E-01 lb/hr	3.60E-01 lb/hr	2.24E-02 tpy	1.53E-02 lb/hr	1.61E-02 lb/hr	9.92E-04 tpy	3.02E-02 lb/hr	3.88E-01 lb/hr	1.32E-01 tpy	2.89E-02 lb/hr	8.68E-02 lb/hr	4.20E-04 tpy	3.02E-02 lb/hr	3.88E-01 lb/hr	1.32E-01 tpy
Hexane (n-)	50.00% by weight																		
Methanol	95.00% by weight																		
Methylene Chloride	50.00% by weight																		
Methylnaphthalene (2-)	50.00% by weight																		
Naphthalene	50.00% by weight	4.59E-04 lb/hr	5.10E-04 lb/hr	2.01E-03 tpy	6.30E-04 lb/hr	6.60E-04 lb/hr	4.10E-05 tpy	2.79E-04 lb/hr	2.95E-04 lb/hr	1.82E-05 tpy	4.68E-04 lb/hr	1.17E-03 lb/hr	2.05E-03 tpy	5.30E-04 lb/hr	1.59E-03 lb/hr	7.68E-06 tpy	4.68E-04 lb/hr	1.59E-03 lb/hr	2.05E-03 tpy
PAH	50.00% by weight	7.76E-04 lb/hr	8.63E-04 lb/hr	3.40E-03 tpy	1.07E-03 lb/hr	1.12E-03 lb/hr	6.93E-05 tpy	4.73E-04 lb/hr	5.00E-04 lb/hr	3.07E-05 tpy	7.92E-04 lb/hr	1.98E-03 lb/hr	3.47E-03 tpy	8.97E-04 lb/hr	2.69E-03 lb/hr	1.30E-05 tpy	7.93E-04 lb/hr	2.69E-03 lb/hr	3.47E-03 tpy
Phenol	50.00% by weight																		
Propylene Oxide	50.00% by weight	1.02E-02 lb/hr	1.14E-02 lb/hr	4.48E-02 tpy	1.41E-02 lb/hr	1.47E-02 lb/hr	9.14E-04 tpy	6.23E-03 lb/hr	6.59E-03 lb/hr	4.05E-04 tpy	1.04E-02 lb/hr	2.61E-02 lb/hr	4.57E-02 tpy	1.18E-02 lb/hr	3.55E-02 lb/hr	1.71E-04 tpy	1.04E-02 lb/hr	3.55E-02 lb/hr	4.58E-02 tpy
Styrene	0.00% by weight																		
Tetrachloroethane (1,1,2,2-)	50.00% by weight																		
Toluene	50.00% by weight	4.59E-02 lb/hr	5.10E-02 lb/hr	2.01E-01 tpy	6.30E-02 lb/hr	6.60E-02 lb/hr	4.10E-03 tpy	2.79E-02 lb/hr	2.95E-02 lb/hr	1.82E-03 tpy	4.68E-02 lb/hr	1.17E-01 lb/hr	2.05E-01 tpy	5.30E-02 lb/hr	1.59E-01 lb/hr	7.68E-04 tpy	4.68E-02 lb/hr	1.59E-01 lb/hr	2.05E-01 tpy
Trichloroethane (1,1,2-)	50.00% by weight																		
Trimethylpentane (2,2,4-)	50.00% by weight																		
Vinyl Chloride	0.00% by weight																		
Xylenes	50.00% by weight	2.26E-02 lb/hr	2.51E-02 lb/hr	9.89E-02 tpy	3.10E-02 lb/hr	3.25E-02 lb/hr	2.02E-03 tpy	1.38E-02 lb/hr	1.45E-02 lb/hr	8.94E-04 tpy	2.31E-02 lb/hr	5.75E-02 lb/hr	1.01E-01 tpy	2.61E-02 lb/hr	7.83E-02 lb/hr	3.78E-04 tpy	2.31E-02 lb/hr	7.83E-02 lb/hr	1.01E-01 tpy

NOTES

1. See TABLE B-1Ai.
2. It's assumed that oxidation catalyst will be ineffective during startup events.
3. $CO2 = CO2_{uncontrolled} + CE_{CO\text{-}control\ efficiency} * CO_{uncontrolled} * (MW_{CO2}/MW_{CO}) = CO2_{uncontrolled} + CE_{CO\text{-}control\ efficiency} * CO_{uncontrolled} * (44.0095/28.0101)$.

TABLE C-1A
4-Stroke Lean-Burn Reciprocating Engines
Hourly and Annual Emission Estimates
Uncontrolled

Type		4slb				
Service		Emergency				
JJJJ Relevant Date		Manufactured: On or After 01/01/2009				
ZZZZ Status		New RICE at Area HAP Source				
Make		Waukesha				
Model		VGF36GL				
Fuel		Natural Gas				
Fuel Higher Heating Value (HHV)		1,020 BTU/scf			1,020 BTU/scf	
Ambient Temperature		80 °F			80 °F	
Power Output		880 bhp (mech.)			880 bhp (mech.)	
		625 kW (elec.)			625 kW (elec.)	
Heat Rate at HHV		7,904 BTU/hp-hr			7,904 BTU/hp-hr	
Operating Hours		500 hrs/yr				
Fuel Consumption		6,820 scfh			6,820 scfh	
		3.410 MMscf/yr				
Heat Input at HHV		6.96 MMBTU/hr			6.96 MMBTU/hr	
		3,478 MMBTU/yr	Uncontrolled			Uncontrolled
Pollutant	Control Efficiency	Uncontrolled	Average Hourly	Maximum Annual	Uncontrolled	Maximum Hourly
NO_X		568.97 lb/MMscf	3.8801 lb/hr	0.9700 tpy	568.97 lb/MMscf	3.8801 lb/hr
CO		1,137.93 lb/MMscf	7.7601 lb/hr	1.9400 tpy	1,137.93 lb/MMscf	7.7601 lb/hr
SO_2		0.60 lb/MMscf	0.0041 lb/hr	0.0010 tpy	0.60 lb/MMscf	0.0041 lb/hr
$PM_{10/2.5}$		10.19 lb/MMscf	0.0695 lb/hr	0.0174 tpy	10.19 lb/MMscf	0.0695 lb/hr
CO_{2-e}		253,565 lb/MMscf	1,729 lb/hr	432 tpy	253,565 lb/MMscf	1,729 lb/hr
CO_2		120,017 lb/MMscf	818 lb/hr	205 tpy	120,017 lb/MMscf	818 lb/hr
N_2O		0.23 lb/MMscf	0.0015 lb/hr	0.0004 tpy	0.23 lb/MMscf	0.0015 lb/hr
TOC (Total)		6,278.90 lb/MMscf	42.8191 lb/hr	10.7048 tpy	6,278.90 lb/MMscf	42.8191 lb/hr
Methane		5,339.20 lb/MMscf	36.4108 lb/hr	9.1027 tpy	5,339.20 lb/MMscf	36.4108 lb/hr
Ethane		429.69 lb/MMscf	2.9303 lb/hr	0.7326 tpy	429.69 lb/MMscf	2.9303 lb/hr
VOC (Total)		510.01 lb/MMscf	3.4780 lb/hr	0.8695 tpy	510.01 lb/MMscf	3.4780 lb/hr
VOC (non-HAP)		201.64 lb/MMscf	1.3751 lb/hr	0.3438 tpy	201.64 lb/MMscf	1.3751 lb/hr
HAP (Total)		308.37 lb/MMscf	2.1029 lb/hr	0.5257 tpy	308.37 lb/MMscf	2.1029 lb/hr
Acetaldehyde		3.57E+01 lb/MMscf	2.44E-01 lb/hr	6.09E-02 tpy	3.57E+01 lb/MMscf	2.44E-01 lb/hr
Acrolein		2.20E+01 lb/MMscf	1.50E-01 lb/hr	3.74E-02 tpy	2.20E+01 lb/MMscf	1.50E-01 lb/hr
Benzene		1.88E+00 lb/MMscf	1.28E-02 lb/hr	3.20E-03 tpy	1.88E+00 lb/MMscf	1.28E-02 lb/hr
Biphenyl		9.06E-01 lb/MMscf	6.18E-03 lb/hr	1.54E-03 tpy	9.06E-01 lb/MMscf	6.18E-03 lb/hr
Butadiene (1,3-)		1.14E+00 lb/MMscf	7.78E-03 lb/hr	1.94E-03 tpy	1.14E+00 lb/MMscf	7.78E-03 lb/hr
Carbon Tetrachloride		1.57E-01 lb/MMscf	1.07E-03 lb/hr	2.67E-04 tpy	1.57E-01 lb/MMscf	1.07E-03 lb/hr
Chlorobenzene		1.30E-01 lb/MMscf	8.86E-04 lb/hr	2.21E-04 tpy	1.30E-01 lb/MMscf	8.86E-04 lb/hr
Chloroform		1.22E-01 lb/MMscf	8.30E-04 lb/hr	2.08E-04 tpy	1.22E-01 lb/MMscf	8.30E-04 lb/hr
Dichloropropene (1,3-)		1.13E-01 lb/MMscf	7.69E-04 lb/hr	1.92E-04 tpy	1.13E-01 lb/MMscf	7.69E-04 lb/hr
Ethylbenzene		1.70E-01 lb/MMscf	1.16E-03 lb/hr	2.89E-04 tpy	1.70E-01 lb/MMscf	1.16E-03 lb/hr
Ethylene Dibromide		1.89E-01 lb/MMscf	1.29E-03 lb/hr	3.23E-04 tpy	1.89E-01 lb/MMscf	1.29E-03 lb/hr
Formaldehyde		2.26E+02 lb/MMscf	1.54E+00 lb/hr	3.84E-01 tpy	2.26E+02 lb/MMscf	1.54E+00 lb/hr
Hexane (n-)		4.74E+00 lb/MMscf	3.23E-02 lb/hr	8.08E-03 tpy	4.74E+00 lb/MMscf	3.23E-02 lb/hr
Methanol		1.07E+01 lb/MMscf	7.28E-02 lb/hr	1.82E-02 tpy	1.07E+01 lb/MMscf	7.28E-02 lb/hr
Methylene Chloride		8.54E-02 lb/MMscf	5.83E-04 lb/hr	1.46E-04 tpy	8.54E-02 lb/MMscf	5.83E-04 lb/hr
Methylnaphthalene (2-)		1.42E-01 lb/MMscf	9.67E-04 lb/hr	2.42E-04 tpy	1.42E-01 lb/MMscf	9.67E-04 lb/hr
Naphthalene		3.18E-01 lb/MMscf	2.17E-03 lb/hr	5.42E-04 tpy	3.18E-01 lb/MMscf	2.17E-03 lb/hr
PAH		1.15E-01 lb/MMscf	7.84E-04 lb/hr	1.96E-04 tpy	1.15E-01 lb/MMscf	7.84E-04 lb/hr
Phenol		1.03E-01 lb/MMscf	6.99E-04 lb/hr	1.75E-04 tpy	1.03E-01 lb/MMscf	6.99E-04 lb/hr
Propylene Oxide						
Styrene		1.01E-01 lb/MMscf	6.87E-04 lb/hr	1.72E-04 tpy	1.01E-01 lb/MMscf	6.87E-04 lb/hr
Tetrachloroethane (1,1,2,2-)		1.81E-01 lb/MMscf	1.24E-03 lb/hr	3.09E-04 tpy	1.81E-01 lb/MMscf	1.24E-03 lb/hr
Toluene		1.74E+00 lb/MMscf	1.19E-02 lb/hr	2.97E-03 tpy	1.74E+00 lb/MMscf	1.19E-02 lb/hr
Trichloroethane (1,1,2-)		1.36E-01 lb/MMscf	9.26E-04 lb/hr	2.32E-04 tpy	1.36E-01 lb/MMscf	9.26E-04 lb/hr
Trimethylpentane (2,2,4-)		1.07E+00 lb/MMscf	7.28E-03 lb/hr	1.82E-03 tpy	1.07E+00 lb/MMscf	7.28E-03 lb/hr
Vinyl Chloride		6.36E-02 lb/MMscf	4.34E-04 lb/hr	1.09E-04 tpy	6.36E-02 lb/MMscf	4.34E-04 lb/hr
Xylenes		7.86E-01 lb/MMscf	5.36E-03 lb/hr	1.34E-03 tpy	7.86E-01 lb/MMscf	5.36E-03 lb/hr

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Maximum hourly emissions based on 100% of rated capacity.
3. Vendor provided data on power output and heat rate.
4. SO2 and PM10/2.5 emission factors based on AP-42, Section 3.2 (Revised 7/00), Table 3.2-2.
5. CO2 and N2O emission factors based on 40 CFR 98, Subpart C, Table C-1 and 40 CFR 98, Subpart C, Table C-2, respectively.
6. NOX and CO emission factors based on 40 CFR 60, Subpart JJJJ.
7. TOC (Total) and TOC specie emissions are estimated based on scaling of AP-42 using 40 CFR 60, Subpart JJJJ (VOC - Formaldehyde) data.
   Emission factors based on: $EF_i = [EF_{(VOC - Formaldehyde)}]/[(EF_{VOC-AP42} - EF_{Formaldehyde-AP42})] (EF_{i-AP42})$

TABLE D-1A
Natural Gas Combustion
Hourly and Annual Emission Estimates
Uncontrolled

Application		Process Heater				
Combustion Process		Conventional				
Add-on Controls		None				
Package (Make: Model)		Engineering Technology, Inc.: N/A				
Burner (Make: Model)		Unknown: Unknown				
Fuel		Natural Gas				
Fuel Higher Heating Value (HHV)		1,020 BTU/scf			1,020 BTU/scf	
Heat Output at HHV		0.750 MMBTU/hr			0.788 MMBTU/hr	
Thermal Efficiency		70%			70%	
Operating Hours		8,760 hrs/yr				
Fuel Consumption		1,050 scfh			1,103 scfh	
		9.202 MMscf/yr				
Heat Input at HHV		1.071 MMBTU/hr			1.125 MMBTU/hr	
		9,386 MMBTU/yr	Uncontrolled			Uncontrolled
Pollutant	Control Efficiency	Uncontrolled	Average Hourly	Maximum Annual	Uncontrolled	Maximum Hourly
NO_X		153.80 lb/MMscf	0.1616 lb/hr	0.7076 tpy	153.80 lb/MMscf	0.1696 lb/hr
CO		93.75 lb/MMscf	0.0985 lb/hr	0.4313 tpy	93.75 lb/MMscf	0.1034 lb/hr
SO_2		0.60 lb/MMscf	0.0006 lb/hr	0.0028 tpy	0.60 lb/MMscf	0.0007 lb/hr
$PM_{10/2.5}$		7.60 lb/MMscf	0.0080 lb/hr	0.0350 tpy	7.60 lb/MMscf	0.0084 lb/hr
CO_{2-e}		120,338.86 lb/MMscf	126.4064 lb/hr	553.6599 tpy	120,338.86 lb/MMscf	132.7267 lb/hr
CO_2		120,017.45 lb/MMscf	126.0688 lb/hr	552.1811 tpy	120,017.45 lb/MMscf	132.3722 lb/hr
N_2O		0.23 lb/MMscf	0.0002 lb/hr	0.0010 tpy	0.23 lb/MMscf	0.0002 lb/hr
TOC (Total)		60.00 lb/MMscf	0.0630 lb/hr	0.2761 tpy	60.00 lb/MMscf	0.0662 lb/hr
Methane		10.16 lb/MMscf	0.0107 lb/hr	0.0467 tpy	10.16 lb/MMscf	0.0112 lb/hr
Ethane		13.69 lb/MMscf	0.0144 lb/hr	0.0630 tpy	13.69 lb/MMscf	0.0151 lb/hr
VOC (Total)		36.15 lb/MMscf	0.0380 lb/hr	0.1663 tpy	36.15 lb/MMscf	0.0399 lb/hr
VOC (non-HAP)		27.83 lb/MMscf	0.0292 lb/hr	0.1280 tpy	27.83 lb/MMscf	0.0307 lb/hr
HAP (Total)		8.32 lb/MMscf	0.0087 lb/hr	0.0383 tpy	8.32 lb/MMscf	0.0092 lb/hr
Acetaldehyde						
Acrolein						
Benzene		9.28E-03 lb/MMscf	9.74E-06 lb/hr	4.27E-05 tpy	9.28E-03 lb/MMscf	1.02E-05 lb/hr
Biphenyl						
Butadiene (1,3-)						
Carbon Tetrachloride						
Chlorobenzene						
Chloroform						
Dichloropropene (1,3-)						
Ethylbenzene						
Ethylene Dibromide						
Formaldehyde		3.31E-01 lb/MMscf	3.48E-04 lb/hr	1.52E-03 tpy	3.31E-01 lb/MMscf	3.65E-04 lb/hr
Hexane (n-)		7.95E+00 lb/MMscf	8.35E-03 lb/hr	3.66E-02 tpy	7.95E+00 lb/MMscf	8.77E-03 lb/hr
Methanol						
Methylene Chloride						
Methylnaphthalene (2-)		1.06E-04 lb/MMscf	1.11E-07 lb/hr	4.88E-07 tpy	1.06E-04 lb/MMscf	1.17E-07 lb/hr
Naphthalene		2.69E-03 lb/MMscf	2.83E-06 lb/hr	1.24E-05 tpy	2.69E-03 lb/MMscf	2.97E-06 lb/hr
PAH						
Phenol						
Propylene Oxide						
Styrene						
Tetrachloroethane (1,1,2,2-)						
Toluene		1.50E-02 lb/MMscf	1.58E-05 lb/hr	6.91E-05 tpy	1.50E-02 lb/MMscf	1.66E-05 lb/hr
Trichloroethane (1,1,2-)						
Trimethylpentane (2,2,4-)						
Vinyl Chloride						
Xylenes						

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Maximum hourly emissions based on 105% of rated capacity.
3. Vendor provided data on: heat output and heat input.
4. CO2 and N2O emission factors based on 40 CFR 98, Subpart C, Table C-1 and 40 CFR 98, Subpart C, Table C-2, respectively.
5. NOX, CO and TOC (Total) emission factors based on vendor data.
6. SO2 and PM10/2.5 emission factors based on AP-42, Section 1.4 (Revised 3/98), Table 1.4-2.
7. Remaining TOC specie emission factors based on scaling of AP-42, Section 1.4 (Revised 3/98), Table 1.4-3 using vendor HC data.
   $EF_i = (EF_{HC}/EF_{TOC\text{-}AP42})\ (EF_{i\text{-}AP42})$

TABLE E-1
Flash Analysis
Summary of Laboratory Analysis

	FEED Pressurized Liquid	VAPOR Flash Gas	LIQUID Residual Liquid
Pressure	575.000 psig	0.034 psig	0.034 psig
	589.696 psia	14.730 psia	14.730 psia
Temperature	72 °F	60 °F	60 °F
API Gravity at 60°F	73.960 n.d.	788.526 n.d.	61.227 n.d.
Specific Gravity at 60°F	0.6887 n.d. (water)	0.1538 n.d. (water)	0.7342 n.d. (water)
	3.3880 n.d. (air)	0.9301 n.d. (air)	4.4320 n.d. (air)
Molecular Weight	98.125 lb/lb-mol	26.938 lb/lb-mol	128.362 lb/lb-mol
Density at 60°F and 14.730 psia	5.747 lb/gal	1.283 lb/gal	6.126 lb/gal
	0.2593 lb/ft^3	0.0712 lb/ft^3	0.3392 lb/ft^3
	22.1622 ft^3/gal	18.0282 ft^3/gal	18.0610 ft^3/gal
	930.8120 ft^3/bbl	757.1853 ft^3/bbl	758.5600 ft^3/bbl
	378.4123 ft^3/lb-mol	378.4123 ft^3/lb-mol	378.4123 ft^3/lb-mol
	17.0747 gal/lb-mol	20.9900 gal/lb-mol	20.9520 gal/lb-mol
	2.4598 lb-mol/bbl	2.0010 lb-mol/bbl	2.0046 lb-mol/bbl
Density at 68°F and 14.696 psia	947.3299 scf/bbl	770.6220 scf/bbl	772.0211 scf/bbl
	385.1275 scf/lb-mol	385.1275 scf/lb-mol	385.1275 scf/lb-mol
	2.4598 lb-mol/bbl	2.0010 lb-mol/bbl	2.0046 lb-mol/bbl
Vapor to Liquid Mole Ratio (V/L)	0.4249 n.d. ($lb\text{-}mol_{VAPOR}/lb\text{-}mol_{LIQUID}$)		
Mole Balance	1.0000 bbl	0.3666 bbl	0.8612 bbl
	2.4598 lb-mol	0.7335 lb-mol	1.7263 lb-mol
	947.3299 scf	282.4903 scf	664.8396 scf
Flash Factor (FF)	328.0318 scf_{VAPOR}/bbl_{LIQUID}		

NOTES

1. Sample Data:
   - Location: Atlanta, TX
   - Date: 04/15/09
   - Time: Not Recorded
2. Reference Conditions:

	SPL	Standard
T =	60 °F	68 °F
P =	14.730 psia	14.696 psia
Water	8.344 lb/gal	8.338 lb/gal
Air	0.0765 lb/ft^3	0.0752 lb/ft^3

3. V + L = F => F = (1 + V/L)L {Overall Mole Balance}.

TABLE E-2
Flash Analysis
Extrapolation of Specie Mole Percentages

Component						Liquid Dump Flash Data				
						Input			Output	
						Liquid	Scaled	*Calculated*	Vapor	Liquid
Name (i)	GC Postition	SPL Class	Formula	Type	HAP	z_i ($mol_{i\text{-}F}/mol_F$)		z_i ($mol_{i\text{-}F}/mol_F$)	y_i ($mol_{i\text{-}V}/mol_V$)	x_i ($mol_{i\text{-}L}/mol_L$)
Nitrogen	1		N2			0.034%	0.034%	0.030%	0.101%	0.000%
Carbon Dioxide	3		CO2	GHG		0.968%	0.968%	0.970%	3.163%	0.038%
Methane	2		C01H04	GHG		20.922%	20.922%	20.921%	69.445%	0.303%
Ethane	4		C02H06			3.391%	3.391%	3.390%	10.467%	0.383%
Propane	5		C03H08	VOC		2.183%	2.183%	2.180%	5.339%	0.838%
Butane (i-)	6		C04H10	VOC		1.232%	1.232%	1.230%	2.126%	0.849%
Butane (n-)	7		C04H10	VOC		1.721%	1.721%	1.720%	2.495%	1.391%
Pentane (i-)	8		C05H12	VOC		2.354%	2.354%	2.350%	1.895%	2.543%
Pentane (n-)	9		C05H12	VOC		1.622%	1.622%	1.620%	1.056%	1.859%
Dimethylbutane (2,2-)	10	Hexanes	C06H14	VOC		0.174%	0.174%	0.174%	0.050%	0.227%
Dimethylbutane (2,3-)	11	Hexanes	C06H14	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Cyclopentane	12	Hexanes	C05H10	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylpentane (2-)	13	Hexanes	C06H14	VOC		1.218%	1.218%	1.218%	0.352%	1.586%
Methylpentane (3-)	14	Hexanes	C06H14	VOC		0.912%	0.912%	0.912%	0.264%	1.187%
Hexane (n-)	15	Hexanes	C06H14	VOC	X	1.937%	1.937%	1.937%	0.561%	2.522%
Dimethylpentane (2,2-)	16	Heptanes	C07H16	VOC		0.311%	0.311%	0.311%	0.032%	0.430%
Methylcyclopentane	17	Heptanes	C06H12	VOC		1.134%	1.134%	1.134%	0.116%	1.566%
Dimethylpentane (2,4-)	18	Heptanes	C07H16	VOC		0.128%	0.128%	0.128%	0.013%	0.177%
Trimethylbutane (2,2,3-)	19	Heptanes	C07H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Benzene	20	Heptanes	C06H06	VOC	X	1.713%	1.713%	1.713%	0.175%	2.366%
Dimethylpentane (3,3-)	21	Heptanes	C07H16	VOC		0.221%	0.221%	0.221%	0.023%	0.305%
Cyclohexane	22	Heptanes	C06H12	VOC		1.106%	1.106%	1.106%	0.113%	1.528%
Methylhexane (2-)	23	Heptanes	C07H16	VOC		2.292%	2.292%	2.292%	0.235%	3.166%
Dimethylpentane (2,3-)	24	Heptanes	C07H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclopentane (1,1-)	25	Heptanes	C07H14	VOC		0.603%	0.603%	0.603%	0.062%	0.833%
Methylhexane (3-)	26	Heptanes	C07H16	VOC		2.379%	2.379%	2.379%	0.244%	3.286%
Dimethylcyclopentane (1,t-3-)	27	Heptanes	C07H14	VOC		0.163%	0.163%	0.163%	0.017%	0.225%
Dimethylcyclopentane (1,c-3-)	28	Heptanes	C07H14	VOC		0.266%	0.266%	0.266%	0.027%	0.367%
Ethylpentane (3-)	29	Heptanes	C07H16	VOC		0.029%	0.029%	0.029%	0.003%	0.040%
Dimethylcyclopentane (1,t-2-)	30	Heptanes	C07H14	VOC		0.222%	0.222%	0.222%	0.023%	0.307%
Trimethylpentane (2,2,4-)	31	Heptanes	C08H18	VOC	X	0.021%	0.021%	0.021%	0.002%	0.029%
Heptane (n-)	32	Heptanes	C07H16	VOC		3.742%	3.742%	3.742%	0.383%	5.169%
Methylcyclohexane	33	Octanes	C07H14	VOC		3.301%	3.301%	3.301%	0.136%	4.646%
Trimethylcyclopentane (1,1,3-)	34	Octanes	C08H16	VOC		0.225%	0.225%	0.225%	0.009%	0.317%
Dimethylhexane (2,2-)	35	Octanes	C08H18	VOC		0.095%	0.095%	0.095%	0.004%	0.134%
Dimethylcyclopentane (1,c-2-)	36	Octanes	C07H14	VOC		0.848%	0.848%	0.848%	0.035%	1.193%
Dimethylhexane (2,5-)	37	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,4-)	38	Octanes	C08H18	VOC		0.143%	0.143%	0.143%	0.006%	0.201%
Ethylcyclopentane	39	Octanes	C07H14	VOC		0.464%	0.464%	0.464%	0.019%	0.653%
Trimethylpentane (2,2,3-)	40	Octanes	C08H18	VOC		0.028%	0.028%	0.028%	0.001%	0.039%
Trimethylcyclopentane (1,t-2,c-4-)	41	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (3,3-)	42	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	43	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylpentane (2,3,4-)	44	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,3-)	45	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Toluene	46	Octanes	C07H08	VOC	X	4.444%	4.444%	4.444%	0.183%	6.255%
Trimethylcyclopentane (1,1,2-)	47	Octanes	C08H16	VOC		0.371%	0.371%	0.371%	0.015%	0.522%
Dimethylhexane (3,4-)	48	Octanes	C08H18	VOC		3.505%	3.505%	3.505%	0.144%	4.933%
Methylheptane (2-)	49	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylheptane (4-)	50	Octanes	C08H18	VOC		2.896%	2.896%	2.896%	0.119%	4.076%
Dimethylhexane (3,4-)	51	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylheptane (3-)	52	Octanes	C08H18	VOC		0.416%	0.416%	0.416%	0.017%	0.585%
Ethylhexane (3-)	53	Octanes	C08H18	VOC		0.111%	0.111%	0.111%	0.005%	0.156%
Trimethylcyclopentane (1,c-2,t-4-)	54	Octanes	C08H16	VOC		0.028%	0.028%	0.028%	0.001%	0.039%
Dimethylcyclohexane (1,c-3-)	55	Octanes	C08H16	VOC		0.170%	0.170%	0.170%	0.007%	0.239%
Trimethylcyclopentane (1,c-2,t-3-)	56	Octanes	C08H16	VOC		0.170%	0.170%	0.170%	0.007%	0.239%
Dimethylcyclohexane (1,t-4-)	57	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,5-)	58	Octanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,1-)	59	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	60	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	61	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	62	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,4-)	63	Octanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	64	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Cycloheptane	65	Octanes	C07H14	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Octane (n-)	66	Octanes	C08H18	VOC		4.372%	4.372%	4.372%	0.180%	6.153%
Trimethylhexane (2,4,4-)	67	Nonanes	C09H20	VOC		0.190%	0.190%	0.190%	0.003%	0.269%
Tetramethylpentane (2,2,4,4-)	68	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	69	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Dimethylcyclohexane (1,c-4-)	70	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Trimethylcyclopentane (1,c-2,c-3-)	71	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Propylcyclopentane (i-)	72	Nonanes	C08H16	VOC		0.348%	0.348%	0.348%	0.006%	0.493%
Trimethylhexane (2,3,5-)	73	Nonanes	C09H20	VOC		0.006%	0.006%	0.006%	0.000%	0.009%
Dimethylheptane (2,2-)	74	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,4-)	75	Nonanes	C09H20	VOC		0.158%	0.158%	0.158%	0.003%	0.224%
Methylcyclopentane (1-ethyl-c-2-)	76	Nonanes	C08H16	VOC		0.181%	0.181%	0.181%	0.003%	0.257%
Trimethylhexane (2,2,3-)	77	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%

TABLE E-2
Flash Analysis
Extrapolation of Specie Mole Percentages

Component						Liquid Dump Flash Data				
						Input			Output	
						Liquid	Scaled	*Calculated*	Vapor	Liquid
Name (i)	GC Postition	SPL Class	Formula	Type	HAP	z_i ($mol_{i\text{-}F}/mol_F$)		z_i ($mol_{i\text{-}F}/mol_F$)	y_i ($mol_{i\text{-}V}/mol_V$)	x_i ($mol_{i\text{-}L}/mol_L$)
Dimethylcyclohexane (1,c-2-)	78	Nonanes	C08H16	VOC		0.510%	0.510%	0.510%	0.009%	0.723%
Dimethylheptane (2,6-)	79	Nonanes	C09H20	VOC		0.112%	0.112%	0.112%	0.002%	0.159%
Propylcyclopentane (n-)	80	Nonanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	81	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclohexane	82	Nonanes	C08H16	VOC		1.365%	1.365%	1.365%	0.023%	1.935%
Dimethylheptane (2,5-)	83	Nonanes	C09H20	VOC		0.067%	0.067%	0.067%	0.001%	0.095%
Dimethylheptane (3,5-)	84	Nonanes	C09H20	VOC		0.067%	0.067%	0.067%	0.001%	0.095%
Trimethylcyclohexane (1,1,3-)	85	Nonanes	C09H18	VOC		0.077%	0.077%	0.077%	0.001%	0.109%
Trimethylhexane (2,3,3-)	86	Nonanes	C09H20	VOC		0.038%	0.038%	0.038%	0.001%	0.054%
Dimethylheptane (3,3-)	87	Nonanes	C09H20	VOC		0.038%	0.038%	0.038%	0.001%	0.054%
Trimethylcyclohexane (1,1,4-)	88	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Tetramethylpentane (2,2,3,3-)	89	Nonanes	C09H20	VOC		0.261%	0.261%	0.261%	0.004%	0.370%
Ethylbenzene	90	Nonanes	C08H10	VOC	X	0.406%	0.406%	0.406%	0.007%	0.576%
Trimethylhexane (2,3,4-)	91	Nonanes	C09H20	VOC		0.007%	0.007%	0.007%	0.000%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	92	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,3-)	93	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	94	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Xylene (m-)	95	Nonanes	C08H10	VOC	X	2.462%	2.462%	2.462%	0.042%	3.490%
Xylene (p-)	96	Nonanes	C08H10	VOC	X	2.462%	2.462%	2.462%	0.042%	3.490%
Dimethylheptane (3,4-)	97	Nonanes	C09H20	VOC		0.092%	0.092%	0.092%	0.002%	0.130%
Methyloctane (2-)	98	Nonanes	C09H20	VOC		0.782%	0.782%	0.782%	0.013%	1.109%
Methyloctane (4-)	99	Nonanes	C09H20	VOC		0.782%	0.782%	0.782%	0.013%	1.109%
Dimethylheptane (3,4-)	100	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methyloctane (3-)	101	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Butylcyclopentane (i-)	102	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	103	Nonanes	C09H18	VOC		0.231%	0.231%	0.231%	0.004%	0.327%
Trimethylcyclohexane (1,t-2,c-4-)	104	Nonanes	C09H18	VOC		0.231%	0.231%	0.231%	0.004%	0.327%
Xylene (o-)	105	Nonanes	C08H10	VOC	X	0.547%	0.547%	0.547%	0.009%	0.775%
Trimethylcyclohexane (1,1,2-)	106	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	107	Nonanes	C09H18	VOC		0.200%	0.200%	0.200%	0.003%	0.284%
Trimethylcyclohexane (1,c-2,c-4-)	108	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Nonane (n-)	109	Nonanes	C09H20	VOC		2.884%	2.884%	2.884%	0.050%	4.088%
Unknowns	110	Decanes+	C10+	VOC		10.753%	10.753%	10.753%	0.079%	15.288%
TOTAL						100.001%	100.000%	99.984%	100.001%	99.976%
TOC (Total)						98.999%	98.998%	98.984%	96.737%	99.938%
VOC (Total)						74.686%	74.685%	74.673%	16.825%	99.252%
Hexanes						4.241%	4.240%	4.241%	1.227%	5.521%
Heptanes						14.330%	14.310%	14.330%	1.468%	19.795%
Octanes						21.587%	21.610%	21.587%	0.888%	30.382%
Nonanes						14.663%	14.660%	14.663%	0.252%	20.786%
Decanes+						10.753%	10.770%	10.753%	0.079%	15.288%
HAP (Total)						13.992%	13.992%	13.992%	1.022%	19.503%
Xylenes						1.209%	1.209%	1.209%	0.021%	1.714%

NOTES

1. Sample Data:
   Location: Atlanta, TX
   Date: 04/15/09
   Dimethyloctane (2,3-)
   Time: Not Recorded
2. $v_i + l_i = f_i$; $y_i = v_i/V$; $x_i = l_i/L$; $z_i = f_i/F$ => $y_iV + x_iL = z_iF$ => $y_i(V/L)L + x_iL = z_i(1 + V/L)L$ => $z_i = [y_i(V/L) + x_i]/[1 + (V/L)]$ {Mole Balance}.
3. V/L = 0.4249 1 + V/L = 1.4249
4. z_i is refined to the same number if significant digits as y_i and x_i using the component mole balance and laboratory results for V/L.
5. z_i is scale using the hydrocarbon (e.g., hexanes+) z_i percentage in the flash analysis results, with the exception of HAP species.
6. $[y_i ; x_i]$ mole percent for species of hydrocarbons is estimated using scaled lab mole percent results for z_i and $[y ; x]_{HC}$ for the hydrocarbon.
   (assumes v_i/l_i is same for all hydrocarbon species)

	$(v/l)_{hexanes}$ =	0.2219		
$y_{hexanes}$ = 1.227%		$x_{hexanes}$ = 5.520%	$z_{hexanes}$ =	4.240%
	$y_i = z_i(y/z)_{hexanes}$ =	0.2894 z_i		
	$x_i = z_i(x/z)_{hexanes}$ =	1.3019 z_i		
	$(v/l)_{heptanes}$ =	0.0740		
$y_{heptanes}$ = 1.466%		$x_{heptanes}$ = 19.767%	$z_{heptanes}$ =	14.310%
	$y_i = z_i(y/z)_{heptanes}$ =	0.1024 z_i		
	$x_i = z_i(x/z)_{heptanes}$ =	1.3814 z_i		
	$(v/l)_{octanes}$ =	0.0292		
$y_{octanes}$ = 0.889%		$x_{octanes}$ = 30.414%	$z_{octanes}$ =	21.610%
	$y_i = z_i(y/z)_{octanes}$ =	0.0411 z_i		
	$x_i = z_i(x/z)_{octanes}$ =	1.4074 z_i		
	$(v/l)_{nonanes}$ =	0.0121		
$y_{nonanes}$ = 0.252%		$x_{nonanes}$ = 20.782%	$z_{nonanes}$ =	14.660%
	$y_i = z_i(y/z)_{nonanes}$ =	0.0172 z_i		
	$x_i = z_i(x/z)_{nonanes}$ =	1.4176 z_i		
	$(v/l)_{decanes+}$ =	0.0051		
$y_{decanes+}$ = 0.079%		$x_{decanes+}$ = 15.313%	$z_{decanes+}$ =	10.770%
	$y_i = z_i(y/z)_{decanes+}$ =	0.0073 z_i		
	$x_i = z_i(x/z)_{decanes+}$ =	1.4218 z_i		

TABLE E-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Nitrogen			28.013	0.0727	0.030%	0.009%
Carbon Dioxide	GHG		44.010	0.1143	0.970%	0.435%
Methane	GHG		16.042	0.0417	20.924%	3.421%
Ethane			30.069	0.0781	3.391%	1.039%
Propane	VOC		44.096	0.1145	2.181%	0.980%
Butane (i-)	VOC		58.122	0.1509	1.230%	0.729%
Butane (n-)	VOC		58.122	0.1509	1.720%	1.019%
Pentane (i-)	VOC		72.149	0.1873	2.350%	1.728%
Pentane (n-)	VOC		72.149	0.1873	1.620%	1.191%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.174%	0.153%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	1.218%	1.070%
Methylpentane (3-)	VOC		86.175	0.2238	0.912%	0.801%
Hexane (n-)	VOC	X	86.175	0.2238	1.937%	1.701%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.311%	0.318%
Methylcyclopentane	VOC		84.159	0.2185	1.134%	0.973%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.128%	0.131%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	1.713%	1.364%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.221%	0.226%
Cyclohexane	VOC		84.159	0.2185	1.106%	0.949%
Methylhexane (2-)	VOC		100.202	0.2602	2.292%	2.341%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.603%	0.603%
Methylhexane (3-)	VOC		100.202	0.2602	2.379%	2.430%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.163%	0.163%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.266%	0.266%
Ethylpentane (3-)	VOC		100.202	0.2602	0.029%	0.030%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.222%	0.222%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.021%	0.024%
Heptane (n-)	VOC		100.202	0.2602	3.743%	3.822%
Methylcyclohexane	VOC		98.186	0.2549	3.302%	3.304%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.225%	0.257%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.095%	0.111%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	0.848%	0.849%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.143%	0.166%
Ethylcyclopentane	VOC		98.186	0.2549	0.464%	0.464%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.028%	0.033%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE E-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	4.445%	4.174%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.371%	0.424%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	3.506%	4.081%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	2.896%	3.372%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.416%	0.484%
Ethylhexane (3-)	VOC		114.229	0.2966	0.111%	0.129%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.028%	0.032%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.170%	0.194%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.170%	0.194%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	4.373%	5.090%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.190%	0.248%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.053%	0.061%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.053%	0.061%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.053%	0.061%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.348%	0.398%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.006%	0.008%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.158%	0.207%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.181%	0.207%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.510%	0.583%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.112%	0.146%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	1.365%	1.561%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.067%	0.088%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.067%	0.088%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.077%	0.099%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.038%	0.050%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.038%	0.050%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE E-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.261%	0.341%
Ethylbenzene	VOC	X	106.165	0.2757	0.406%	0.439%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.007%	0.009%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	2.462%	2.664%
Xylene (p-)	VOC	X	106.165	0.2757	2.462%	2.664%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.092%	0.120%
Methyloctane (2-)	VOC		128.255	0.3330	0.782%	1.022%
Methyloctane (4-)	VOC		128.255	0.3330	0.782%	1.022%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.231%	0.297%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.231%	0.297%
Xylene (o-)	VOC	X	106.165	0.2757	0.547%	0.592%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.200%	0.257%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	2.884%	3.770%
Unknowns	VOC		**283.704**	0.7366	10.755%	31.094%
Pressurized Liquid			98.125	0.2548	100.000%	100.000%
TOC (Total)			98.677	0.2562	99.000%	99.556%
VOC (Total)			124.943	0.3244	74.685%	95.096%
HAP (Total)			92.449	0.2400	7.356%	6.931%
Xylenes			106.165	0.2757	5.472%	5.920%

NOTES

1. Normalized mole percentages from TABLE E-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE E-1.

MW = 98.125 lb/lb-mol

TABLE E-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Nitrogen			28.013	0.0727	0.101%	0.105%
Carbon Dioxide	GHG		44.010	0.1143	3.163%	5.167%
Methane	GHG		16.042	0.0417	69.444%	41.356%
Ethane			30.069	0.0781	10.467%	11.683%
Propane	VOC		44.096	0.1145	5.339%	8.739%
Butane (i-)	VOC		58.122	0.1509	2.126%	4.587%
Butane (n-)	VOC		58.122	0.1509	2.495%	5.383%
Pentane (i-)	VOC		72.149	0.1873	1.895%	5.075%
Pentane (n-)	VOC		72.149	0.1873	1.056%	2.828%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.050%	0.161%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	0.352%	1.128%
Methylpentane (3-)	VOC		86.175	0.2238	0.264%	0.844%
Hexane (n-)	VOC	X	86.175	0.2238	0.561%	1.793%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.032%	0.119%
Methylcyclopentane	VOC		84.159	0.2185	0.116%	0.363%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.013%	0.049%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	0.175%	0.509%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.023%	0.084%
Cyclohexane	VOC		84.159	0.2185	0.113%	0.354%
Methylhexane (2-)	VOC		100.202	0.2602	0.235%	0.873%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.062%	0.225%
Methylhexane (3-)	VOC		100.202	0.2602	0.244%	0.907%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.017%	0.061%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.027%	0.099%
Ethylpentane (3-)	VOC		100.202	0.2602	0.003%	0.011%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.023%	0.083%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.002%	0.009%
Heptane (n-)	VOC		100.202	0.2602	0.383%	1.426%
Methylcyclohexane	VOC		98.186	0.2549	0.136%	0.495%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.009%	0.039%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.004%	0.017%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	0.035%	0.127%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.006%	0.025%
Ethylcyclopentane	VOC		98.186	0.2549	0.019%	0.070%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.001%	0.005%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE E-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	0.183%	0.625%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.015%	0.064%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.144%	0.611%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	0.119%	0.505%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.017%	0.073%
Ethylhexane (3-)	VOC		114.229	0.2966	0.005%	0.019%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.001%	0.005%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.007%	0.029%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.007%	0.029%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	0.180%	0.763%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.003%	0.016%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.001%	0.004%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.001%	0.004%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.001%	0.004%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.006%	0.025%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.003%	0.013%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.003%	0.013%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.009%	0.037%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.002%	0.009%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	0.023%	0.098%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.001%	0.005%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.001%	0.005%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.001%	0.006%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.001%	0.003%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.001%	0.003%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE E-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.004%	0.021%
Ethylbenzene	VOC	X	106.165	0.2757	0.007%	0.028%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.000%	0.001%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	0.042%	0.167%
Xylene (p-)	VOC	X	106.165	0.2757	0.042%	0.167%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.002%	0.008%
Methyloctane (2-)	VOC		128.255	0.3330	0.013%	0.064%
Methyloctane (4-)	VOC		128.255	0.3330	0.013%	0.064%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.004%	0.019%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.004%	0.019%
Xylene (o-)	VOC	X	106.165	0.2757	0.009%	0.037%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.003%	0.016%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	0.050%	0.236%
Unknowns	VOC		**473.700**	1.2300	0.079%	1.387%
Flash Gas			26.938	0.0699	100.000%	100.000%
TOC (Total)			26.379	0.0685	96.736%	94.728%
VOC (Total)			66.745	0.1733	16.825%	41.688%
HAP (Total)			88.115	0.2288	0.762%	2.492%
Xylenes			106.165	0.2757	0.094%	0.371%

NOTES

1. Normalized mole percentages from TABLE E-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE E-1, unless value negative.

MW = 26.938 lb/lb-mol

TABLE E-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Nitrogen			28.013	0.0727	0.000%	0.000%
Carbon Dioxide	GHG		44.010	0.1143	0.038%	0.013%
Methane	GHG		16.042	0.0417	0.303%	0.038%
Ethane			30.069	0.0781	0.383%	0.090%
Propane	VOC		44.096	0.1145	0.838%	0.288%
Butane (i-)	VOC		58.122	0.1509	0.849%	0.385%
Butane (n-)	VOC		58.122	0.1509	1.391%	0.630%
Pentane (i-)	VOC		72.149	0.1873	2.544%	1.430%
Pentane (n-)	VOC		72.149	0.1873	1.859%	1.045%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.227%	0.152%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	1.586%	1.065%
Methylpentane (3-)	VOC		86.175	0.2238	1.188%	0.797%
Hexane (n-)	VOC	X	86.175	0.2238	2.522%	1.693%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.430%	0.335%
Methylcyclopentane	VOC		84.159	0.2185	1.567%	1.027%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.177%	0.138%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	2.367%	1.440%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.305%	0.238%
Cyclohexane	VOC		84.159	0.2185	1.528%	1.002%
Methylhexane (2-)	VOC		100.202	0.2602	3.167%	2.472%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.833%	0.637%
Methylhexane (3-)	VOC		100.202	0.2602	3.287%	2.566%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.225%	0.172%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.368%	0.281%
Ethylpentane (3-)	VOC		100.202	0.2602	0.040%	0.031%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.307%	0.235%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.029%	0.026%
Heptane (n-)	VOC		100.202	0.2602	5.170%	4.036%
Methylcyclohexane	VOC		98.186	0.2549	4.647%	3.555%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.317%	0.277%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.134%	0.119%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	1.194%	0.913%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.201%	0.179%
Ethylcyclopentane	VOC		98.186	0.2549	0.653%	0.500%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.039%	0.035%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE E-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	6.256%	4.491%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.522%	0.457%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	4.934%	4.391%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	4.077%	3.628%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.586%	0.521%
Ethylhexane (3-)	VOC		114.229	0.2966	0.156%	0.139%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.039%	0.034%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.239%	0.209%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.239%	0.209%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	6.155%	5.477%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.269%	0.269%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.075%	0.066%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.075%	0.066%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.075%	0.066%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.493%	0.431%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.009%	0.009%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.224%	0.224%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.257%	0.224%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.723%	0.632%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.159%	0.159%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	1.935%	1.692%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.095%	0.095%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.095%	0.095%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.109%	0.107%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.054%	0.054%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.054%	0.054%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE E-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.370%	0.370%
Ethylbenzene	VOC	X	106.165	0.2757	0.576%	0.476%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.010%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	3.491%	2.887%
Xylene (p-)	VOC	X	106.165	0.2757	3.491%	2.887%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.130%	0.130%
Methyloctane (2-)	VOC		128.255	0.3330	1.109%	1.108%
Methyloctane (4-)	VOC		128.255	0.3330	1.109%	1.108%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.328%	0.322%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.328%	0.322%
Xylene (o-)	VOC	X	106.165	0.2757	0.776%	0.641%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.284%	0.279%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	4.089%	4.086%
Unknowns	VOC		**283.170**	0.7353	15.292%	33.734%
Residual Liquid			128.362	0.3333	100.000%	100.000%
TOC (Total)			128.394	0.3334	99.962%	99.987%
VOC (Total)			129.116	0.3353	99.276%	99.859%
HAP (Total)			92.587	0.2404	10.159%	7.327%
Xylenes			106.165	0.2757	7.757%	6.416%

NOTES

1. Normalized mole percentages from TABLE E-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE E-1.

MW = 128.362 lb/lb-mol

TABLE E-4a
Flash Analysis
Maximum Hourly and Annual Emission Estimates

Station ID	WATE-SV-V2				
Service	Pipeline Liquids				
Liquids Holding Capacity	317 gal			317 gal	
Liquids Input Rate	4,000 gal/yr			317 gal/hr	
Flash Gas Density	0.0769 lb/scf			0.0769 lb/scf	
Flash Factor	328.03 scf/bbl			328.03 scf/bbl	
Flash Gas Rate	31,241 scf/yr			2,473 scfh	
Flash Losses	2,404 lb/yr	Average	Maximum	190 lb/hr	Maximum
Flash Gas	100.00% by weight	0.2744 lb/hr	1.2018 tpy	100.00% by weight	190.2917 lb/hr
CO_{2-e}	1039.07% by weight	2.8511 lb/hr	12.4880 tpy	1039.07% by weight	1,977 lb/hr
CO_2	5.17% by weight	0.0142 lb/hr	0.0621 tpy	5.17% by weight	9.8332 lb/hr
TOC (Total)	94.73% by weight	0.2599 lb/hr	1.1385 tpy	94.73% by weight	180.2587 lb/hr
Methane	41.36% by weight	0.1135 lb/hr	0.4970 tpy	41.36% by weight	78.6974 lb/hr
Ethane	11.68% by weight	0.0321 lb/hr	0.1404 tpy	11.68% by weight	22.2326 lb/hr
VOC (Total)	41.69% by weight	0.1144 lb/hr	0.5010 tpy	41.69% by weight	79.3286 lb/hr
HAP (Total)	2.49% by weight	0.0068 lb/hr	0.0300 tpy	2.49% by weight	4.7425 lb/hr
Benzene	0.5089% by weight	0.0014 lb/hr	0.0061 tpy	0.5089% by weight	0.9683 lb/hr
Ethylbenzene	0.0275% by weight	0.0001 lb/hr	0.0003 tpy	0.0275% by weight	0.0523 lb/hr
Hexane (n-)	1.7932% by weight	0.0049 lb/hr	0.0216 tpy	1.7932% by weight	3.4123 lb/hr
Methanol					
Naphthalene					
Toluene	0.6253% by weight	0.0017 lb/hr	0.0075 tpy	0.6253% by weight	1.1899 lb/hr
Trimethylpentane (2,2,4-)	0.0091% by weight	0.0000 lb/hr	0.0001 tpy	0.0091% by weight	0.0174 lb/hr
Xylenes	0.3706% by weight	0.0010 lb/hr	0.0045 tpy	0.3706% by weight	0.7053 lb/hr

NOTES

1. Separator Characteristics: Flash is represented for separators that receive majority of liquids, but flash may be emitted from other separators.
   - Orientation: Vertical Fixed Roof Tank
   - Height/Length: 10.00 ft
   - Diameter: 4.00 ft
   - Capacity (physical): 940 gal
   - Capacity (liquid): 317 gal — 34% of physical capacity
2. Liquid input rates:
   - a. maximum hourly based on operator experience; 317 gal
   - b. maximum annual based on operating experience and safety factor; and 4,000 gal
   - c. average hourly is just the maximum annual divided by 8,760 hrs/yr.
3. Flash gas density is 110% of the value extracted from TABLE E-3b.
   Density (TABLE E-3b): 0.0699 lb/scf Safety Factor: 110%
4. Flash factor extracted from TABLE E-1.
5. Speciated emissions vapor weight percentages extracted from TABLE E-3b.

TABLE F-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum			mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ M_i	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	T (°F)	P_i (psia)		(mol_i/mol_L) f_{v-i}	(lb_i/lb_L) f_{m-i}	(mol_i/mol_V)	(lb_i/lb_V)
Nitrogen			28.013	3.7362	2.6465E+02	-6.7880E+00	0.0000E+00	0.0000E+00	-345.75	-232.60	68.00			0.000%	0.000%	0.000%	0.000%
Carbon Dioxide	GHG		44.010	35.0169	-1.5119E+03	-1.1334E+01	9.3368E-03	1.7136E-09	-68.80	87.80	68.00	833.1743		0.038%	0.013%	1.087%	2.183%
Methane	GHG		16.042	14.6667	-5.7097E+02	-3.3373E+00	-2.1999E-09	1.3096E-05	-295.60	-115.60	68.00	7,889.8148		0.303%	0.038%	82.053%	60.088%
Ethane			30.069	20.6973	-1.1341E+03	-5.2514E+00	-9.8774E-11	6.7329E-06	-297.40	89.60	68.00	546.5426		0.383%	0.090%	7.185%	9.862%
Propane	VOC		44.096	21.4469	-1.4627E+03	-5.2610E+00	3.2820E-11	3.7349E-06	-306.40	206.60	68.00	121.5870		0.838%	0.288%	3.497%	7.039%
Butane (i-)	VOC		58.122	31.2541	-1.9532E+03	-8.8060E+00	8.9246E-11	5.7501E-06	-254.20	275.00	68.00	44.2751		0.849%	0.385%	1.290%	3.423%
Butane (n-)	VOC		58.122	27.0441	-1.9049E+03	-7.1805E+00	-6.6845E-11	4.2190E-06	-216.40	305.60	68.00	30.1688		1.391%	0.630%	1.440%	3.821%
Pentane (i-)	VOC		72.149	29.2963	-2.1762E+03	-7.8830E+00	-4.6512E-11	3.8997E-06	-256.00	368.60	68.00	11.1082		2.544%	1.430%	0.970%	3.193%
Pentane (n-)	VOC		72.149	33.3239	-2.4227E+03	-9.2354E+00	9.0199E-11	4.1050E-06	-202.00	386.60	68.00	8.1938		1.859%	1.045%	0.523%	1.722%
Dimethylbutane (2,2-)	VOC		86.175	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.227%	0.152%	0.039%	0.155%
Dimethylbutane (2,3-)	VOC		86.175	33.6319	-2.5524E+03	-9.3142E+00	1.4759E-10	3.9140E-06	-223.60	500.00	68.00	3.6998		0.000%	0.000%	0.000%	0.000%
Cyclopentane	VOC		70.133	29.1547	-2.3512E+03	-7.6965E+00	-1.6212E-10	3.1250E-06	-137.20	462.20	68.00	5.0181		0.000%	0.000%	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	30.7477	-2.4888E+03	-8.2295E+00	-2.3723E-11	3.2402E-06	-243.40	437.00	68.00	3.3041		1.586%	1.065%	0.180%	0.707%
Methylpentane (3-)	VOC		86.175	35.2848	-2.6773E+03	-9.8546E+00	2.2352E-11	4.0277E-06	-261.40	447.80	68.00	2.9617		1.188%	0.797%	0.121%	0.475%
Hexane (n-)	VOC	X	86.175	69.7378	-3.6278E+03	-2.3927E+01	1.2810E-02	-1.6844E-16	-139.00	453.20	68.00	2.3626		2.522%	1.693%	0.204%	0.804%
Dimethylpentane (2,2-)	VOC		100.202	6.2875	-2.1682E+03	2.6936E+00	-1.5525E-02	1.0917E-05	-191.20	478.40	68.00	1.6191		0.430%	0.335%	0.024%	0.109%
Methylcyclopentane	VOC		84.159	32.4766	-2.6434E+03	-8.7933E+00	2.0749E-11	3.2158E-06	-223.60	500.00	68.00	2.1257		1.567%	1.027%	0.114%	0.439%
Dimethylpentane (2,4-)	VOC		100.202	35.9436	-2.8460E+03	-9.9938E+00	8.0693E-11	3.6419E-06	-182.20	476.60	68.00	1.5074		0.177%	0.138%	0.009%	0.042%
Trimethylbutane (2,2,3-)	VOC		100.202	32.3633	-2.6614E+03	-8.7743E+00	-7.6870E-10	3.2006E-06	-11.20	496.40	68.00	1.5789		0.000%	0.000%	0.000%	0.000%
Benzene	VOC	X	78.112	31.7718	-2.7254E+03	-8.4443E+00	-5.3534E-09	2.7187E-06	42.80	552.20	68.00	1.4495		2.367%	1.440%	0.118%	0.420%
Dimethylpentane (3,3-)	VOC		100.202	30.2570	-2.6313E+03	-7.9839E+00	4.6848E-13	2.7170E-06	-209.20	505.40	68.00	1.2681		0.305%	0.238%	0.013%	0.061%
Cyclohexane	VOC		84.159	48.5529	-3.0874E+03	-1.5521E+01	7.3830E-03	6.3563E-12	44.60	537.80	68.00	1.5112		1.528%	1.002%	0.079%	0.304%
Methylhexane (2-)	VOC		100.202	54.1075	-3.3785E+03	-1.7547E+01	8.2594E-03	-3.4967E-14	-180.40	494.60	68.00	0.9987		3.167%	2.472%	0.109%	0.496%
Dimethylpentane (2,3-)	VOC		100.202	39.7737	-2.9050E+03	-1.2012E+01	5.1334E-03	-2.3807E-14	-171.40	507.20	68.00	1.0467		0.000%	0.000%	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	58.1943	-3.4151E+03	-1.9294E+01	9.6704E-03	-2.4361E-15	-94.00	525.20	68.00	1.1616		0.833%	0.637%	0.033%	0.149%
Methylhexane (3-)	VOC		100.202	35.2535	-2.9310E+03	-9.6667E+00	-5.2026E-11	3.2107E-06	-182.20	503.60	68.00	0.9291		3.287%	2.566%	0.105%	0.479%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	53.1912	-3.3121E+03	-1.7277E+01	8.3107E-03	5.0896E-14	-209.20	536.00	68.00	0.9791		0.225%	0.172%	0.008%	0.034%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	35.4255	-2.7286E+03	-1.0444E+01	4.6608E-03	1.7565E-14	-209.20	532.40	68.00	1.0075		0.368%	0.281%	0.013%	0.057%
Ethylpentane (3-)	VOC		100.202	8.5463	-2.2979E+03	1.5503E+00	-1.2233E-02	8.2670E-06	-180.40	514.40	68.00	0.8755		0.040%	0.031%	0.001%	0.006%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	36.8109	-2.9536E+03	-1.0275E+01	-4.6212E-12	3.6730E-06	-178.60	536.00	68.00	0.9713		0.307%	0.235%	0.010%	0.046%
Trimethylpentane (2,2,4-)	VOC	X	114.229	50.3422	-3.2789E+03	-1.6111E+01	7.4260E-03	-9.1804E-14	-160.60	519.80	68.00	0.7453		0.029%	0.026%	0.001%	0.004%
Heptane (n-)	VOC		100.202	65.0257	-3.8188E+03	-2.1684E+01	1.0387E-02	1.0206E-14	-130.00	512.60	68.00	0.6808		5.170%	4.036%	0.121%	0.552%
Methylcyclohexane	VOC		98.186	38.0955	-3.0738E+03	-1.0684E+01	-5.1766E-11	3.5282E-06	-194.80	570.20	68.00	0.6925		4.647%	3.555%	0.110%	0.495%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.317%	0.277%	0.000%	0.001%
Dimethylhexane (2,2-)	VOC		114.229	38.7670	-3.1841E+03	-1.0857E+01	1.9275E-12	3.4797E-06	-185.80	530.60	68.00	0.5066		0.134%	0.119%	0.002%	0.012%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	36.3623	-3.0025E+03	-1.0070E+01	-1.0435E-09	3.3726E-06	-65.20	557.60	68.00	0.7110		1.194%	0.913%	0.029%	0.131%
Dimethylhexane (2,5-)	VOC		114.229	40.0260	-3.2647E+03	-1.1282E+01	-6.5408E-10	3.6200E-06	-131.80	530.60	68.00	0.4490		0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	56.2877	-3.6225E+03	-1.8225E+01	8.1864E-03	8.7232E-12	30.20	537.80	68.00	0.4499		0.201%	0.179%	0.003%	0.016%
Ethylcyclopentane	VOC		98.186	36.3631	-3.0448E+03	-1.0038E+01	3.5007E-11	3.2347E-06	-216.40	566.60	68.00	0.5963		0.653%	0.500%	0.013%	0.060%
Trimethylpentane (2,2,3-)	VOC		114.229	35.9540	-3.0569E+03	-9.8896E+00	-7.2916E-11	3.1060E-06	-169.60	555.80	68.00	0.4788		0.039%	0.035%	0.001%	0.003%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	38.0712	-3.1736E+03	-1.0617E+01	6.3090E-11	3.3817E-06	-194.80	552.20	68.00	0.4250		0.000%	0.000%	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%

TABLE F-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum		mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ M_i	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	T (°F)	P_i (psia)	(mol_i/mol_L) f_{v-i}	(lb_i/lb_L) f_{m-i}	(mol_i/mol_V)	(lb_i/lb_V)
Trimethylpentane (2,3,4-)	VOC		114.229	34.1565	-3.0232E+03	-9.2267E+00	2.7691E-11	2.7828E-06	-164.20	559.40	68.00	0.4029	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,3-)	VOC		114.229	57.3778	-3.7143E+03	-1.8599E+01	8.2907E-03	-2.8441E-12	30.20	554.00	68.00	0.3451	0.000%	0.000%	0.000%	0.000%
Toluene	VOC	X	92.138	34.0775	-3.0379E+03	-9.1635E+00	1.0289E-11	2.7035E-06	-139.00	606.20	68.00	0.4219	6.256%	4.491%	0.091%	0.381%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.522%	0.457%	0.000%	0.001%
Dimethylhexane (3,4-)	VOC		114.229	38.6119	-3.2685E+03	-1.0752E+01	3.6386E-09	3.2771E-06	30.20	564.80	68.00	0.3186	4.934%	4.391%	0.054%	0.281%
Methylheptane (2-)	VOC		114.229	37.6930	-3.2611E+03	-1.0391E+01	-1.0524E-12	3.0560E-06	-164.20	548.60	68.00	0.3028	0.000%	0.000%	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	40.2080	-3.3661E+03	-1.1279E+01	-8.7855E-11	3.4055E-06	-185.80	552.20	68.00	0.3001	4.077%	3.628%	0.042%	0.219%
Dimethylhexane (3,4-)	VOC		114.229	38.6119	-3.2685E+03	-1.0752E+01	3.6386E-09	3.2771E-06	30.20	564.80	68.00	0.3186	0.000%	0.000%	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	52.8828	-3.6231E+03	-1.6804E+01	7.1828E-03	7.4077E-14	-184.00	555.80	68.00	0.2869	0.586%	0.521%	0.006%	0.030%
Ethylhexane (3-)	VOC		114.229	40.2079	-3.3651E+03	-1.1285E+01	-5.4180E-09	3.4199E-06	30.20	557.60	68.00	0.2931	0.156%	0.139%	0.002%	0.008%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.039%	0.034%	0.000%	0.000%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	32.4775	-3.0067E+03	-8.5896E+00	7.0258E-11	2.1739E-06	-103.00	604.40	68.00	0.3176	0.239%	0.209%	0.003%	0.013%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.239%	0.209%	0.000%	0.001%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	32.5731	-2.9872E+03	-8.6494E+00	-2.1355E-09	2.2946E-06	-34.60	602.60	68.00	0.3364	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	7.8816	-2.6422E+03	2.3902E+00	-1.5376E-02	9.7931E-06	-158.80	563.00	68.00	0.2426	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	33.1329	-3.0084E+03	-8.8498E+00	-4.3621E-10	2.3704E-06	-27.40	604.40	68.00	0.3361	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Cycloheptane	VOC		98.186	54.0858	-3.6109E+03	-1.7331E+01	7.5272E-03	1.7553E-12	17.60	627.80	68.00	0.3185	0.000%	0.000%	0.000%	0.000%
Octane (n-)	VOC		114.229	29.0948	-3.0114E+03	-7.2653E+00	-2.2696E-11	1.4680E-06	-70.60	564.80	68.00	0.2040	6.155%	5.477%	0.043%	0.225%
Trimethylhexane (2,4,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.269%	0.269%	0.047%	0.275%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	-3.8184	-2.2442E+03	7.0671E+00	-1.9644E-02	1.1435E-05	-86.80	568.40	68.00	0.2957	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	32.4384	-3.0550E+03	-8.5372E+00	2.2892E-10	2.0099E-06	-130.00	617.00	68.00	0.2590	0.075%	0.066%	0.001%	0.003%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	31.9151	-3.0253E+03	-8.3613E+00	5.7055E-12	1.9673E-06	-124.60	617.00	68.00	0.2640	0.075%	0.066%	0.001%	0.003%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.075%	0.066%	0.000%	0.000%
Propylcyclopentane (i-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.493%	0.431%	0.000%	0.001%
Trimethylhexane (2,3,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.009%	0.009%	0.001%	0.009%
Dimethylheptane (2,2-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.224%	0.224%	0.039%	0.228%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.257%	0.224%	0.000%	0.001%
Trimethylhexane (2,2,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	32.1635	-3.0728E+03	-8.4344E+00	6.8943E-10	1.9558E-06	-58.00	631.40	68.00	0.2121	0.723%	0.632%	0.005%	0.027%
Dimethylheptane (2,6-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.159%	0.159%	0.028%	0.162%
Propylcyclopentane (n-)	VOC		112.213	33.9220	-3.2097E+03	-8.9914E+00	-3.2992E-11	2.0684E-06	-178.60	626.00	68.00	0.1793	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	32.7090	-3.1283E+03	-8.6023E+00	-3.9268E-11	1.9935E-06	-167.80	636.80	68.00	0.1870	1.935%	1.692%	0.012%	0.064%
Dimethylheptane (2,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.095%	0.095%	0.017%	0.097%
Dimethylheptane (3,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.095%	0.095%	0.017%	0.097%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.109%	0.107%	0.000%	0.000%
Trimethylhexane (2,3,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.054%	0.054%	0.009%	0.055%

TABLE F-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum		mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ $\mathbf{M_i}$	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	**T** (°F)	P_i (psia)	(mol_i/mol_L) $\mathbf{f_{v\text{-}i}}$	(lb_i/lb_L) $\mathbf{f_{m\text{-}i}}$	(mol_i/mol_V)	(lb_i/lb_V)
Dimethylheptane (3,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.054%	0.054%	0.009%	0.055%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Tetramethylpentane (2,2,3,3-)	VOC		128.255	35.4216	-3.2760E+03	-9.5678E+00	9.0298E-10	2.4355E-06	14.00	640.40	68.00	0.1369	0.370%	0.370%	0.002%	0.010%
Ethylbenzene	VOC	X	106.165	36.1998	-3.3402E+03	-9.7970E+00	-1.1467E-11	2.5758E-06	-139.00	651.20	68.00	0.1388	0.576%	0.476%	0.003%	0.013%
Trimethylhexane (2,3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.010%	0.010%	0.002%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	34.6803	-3.2981E+03	-9.2570E+00	-4.3563E-10	-2.4103E-06	-54.40	649.40	68.00	0.0468	3.491%	2.887%	0.006%	0.027%
Xylene (p-)	VOC	X	106.165	60.0531	-4.0159E+03	-1.9441E+01	8.2881E-03	-2.3647E-12	55.40	649.40	68.00	0.1277	3.491%	2.887%	0.015%	0.074%
Dimethylheptane (3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.130%	0.130%	0.023%	0.133%
Methyloctane (2-)	VOC		128.255	6.0191	-2.8579E+03	3.4068E+00	-1.6572E-02	9.8047E-06	-112.00	597.20	68.00	0.0881	1.109%	1.108%	0.003%	0.020%
Methyloctane (4-)	VOC		128.255	11.2012	-2.9467E+03	1.2133E+00	-1.4423E-02	9.1770E-06	-171.40	599.00	68.00	0.0974	1.109%	1.108%	0.004%	0.022%
Dimethylheptane (3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	9.8147	-2.9609E+03	1.9061E+00	-1.5675E-02	9.7961E-06	-160.60	602.60	68.00	0.0889	0.000%	0.000%	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.328%	0.322%	0.000%	0.001%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.328%	0.322%	0.000%	0.001%
Xylene (o-)	VOC	X	106.165	37.2413	-3.4573E+03	-1.0126E+01	9.0676E-11	2.6123E-06	-13.00	674.60	68.00	0.0946	0.776%	0.641%	0.003%	0.012%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.284%	0.279%	0.000%	0.001%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Nonane (n-)	VOC		128.255	8.8817	-2.8042E+03	1.5262E+00	-1.0464E-02	5.7972E-06	-63.40	613.40	68.00	0.0627	4.089%	4.086%	0.009%	0.051%
Unknowns	VOC		283.170	116.5157	-8.0140E+03	-3.8799E+01	1.3398E-02	-4.4444E-13	50.00	813.20	68.00	0.0000	15.292%	33.734%	0.000%	0.000%
Residual Liquid	Liquid	128.362 lb/lb-mol	Vapor	68.00 °F	29.1420 psia	21.907 lb/lb-mol							100.000%	100.000%	100.000%	100.000%
TOC (Total)		128.394 lb/lb-mol		68.00 °F	28.8362 psia	21.664 lb/lb-mol							99.962%	99.987%	98.913%	97.817%
VOC (Total)		129.116 lb/lb-mol		68.00 °F	2.8403 psia	63.095 lb/lb-mol							99.276%	99.859%	9.676%	27.868%
HAP (Total)		95.690 lb/lb-mol		68.00 °F	0.6569 psia	86.481 lb/lb-mol							19.507%	14.542%	0.440%	1.736%
Xylenes		106.165 lb/lb-mol		68.00 °F	0.0880 psia	106.165 lb/lb-mol							7.757%	6.416%	0.023%	0.114%

NOTES

1. Liquid composition of residual liquid based on SPL flash analysis (see TABLE E-3c).
2. Vapor pressure data for unknowns based on: Pentadecane (n-)

TABLE F-2
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		WATE-SV-V1S					
Service		Pipeline Liquids					
Capacity		530 gal			530 gal		
Temperature of Stored Liquid		56.84 °F			84.59 °F		
Vapor Pressure		4.9552 psia			8.1762 psia		
Pumping Rate		150 gal/min			150 gal/min		
Throughput		0.13 turnover/yr					
		71 gal/yr			530 gal/hr		
Standing Losses					**July**		
					744 hrs/month		
					43.8327 lbs/month		
		282.2447 lb/yr			0.0589 lb/hr		
Working Losses		**7.79E-03** lb/gal			**1.01E-02** lb/gal		
		0.5490 lb/yr	Average	Maximum	5.3346 lb/hr		Maximum
Residual Liquid	Stand	358.84% by weight	0.1156 lb/hr	0.5064 tpy	358.84% by weight		0.2114 lb/hr
	Work		0.0002 lb/hr	0.0010 tpy			19.1425 lb/hr
	Total		0.1158 lb/hr	0.5074 tpy			19.3540 lb/hr
CO_{2-e}		5398.27% by weight	1.7427 lb/hr	7.6330 tpy	5398.27% by weight		291 lb/hr
CO_2		7.83% by weight	0.0025 lb/hr	0.0111 tpy	7.83% by weight		0.4225 lb/hr
TOC (Total)		351.00% by weight	0.1133 lb/hr	0.4963 tpy	351.00% by weight		18.9314 lb/hr
Methane		215.62% by weight	0.0696 lb/hr	0.3049 tpy	215.62% by weight		11.6293 lb/hr
Ethane		35.39% by weight	0.0114 lb/hr	0.0500 tpy	35.39% by weight		1.9086 lb/hr
VOC (Total)		100.00% by weight	0.0323 lb/hr	0.1414 tpy	100.00% by weight		5.3935 lb/hr
HAP (Total)		6.23% by weight	0.0020 lb/hr	0.0088 tpy	6.23% by weight		0.3359 lb/hr
Benzene		1.5063% by weight	4.86E-04 lb/hr	2.13E-03 tpy	1.5063% by weight		8.12E-02 lb/hr
Ethylbenzene		0.0477% by weight	1.54E-05 lb/hr	6.74E-05 tpy	0.0477% by weight		2.57E-03 lb/hr
Hexane (n-)		2.8866% by weight	9.32E-04 lb/hr	4.08E-03 tpy	2.8866% by weight		1.56E-01 lb/hr
Methanol							
Naphthalene							
Toluene		1.3668% by weight	4.41E-04 lb/hr	1.93E-03 tpy	1.3668% by weight		7.37E-02 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	4.48E-06 lb/hr	1.96E-05 tpy	0.0139% by weight		7.49E-04 lb/hr
Xylenes		0.4073% by weight	1.31E-04 lb/hr	5.76E-04 tpy	0.4073% by weight		2.20E-02 lb/hr

NOTES

1. Tank Characteristics:

		TANKS 4.09d			
Orientation	Vertical Fixed Roof Tank		Above Ground?	Yes	
Height/Length	10.83 ft	10.83 ft	Shell/Roof Color	Gray/Medium	or less solar
Diameter	5.00 ft		Shell Condition	Good	absorptance
Capacity (estimated)	1,591 gal		Vacuum Setting	-0.03 psig	
Capacity (nominal)	1,590 gal		Pressure Setting	0.03 psig	

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Toledo, Ohio	
Material	Gasoline (RVP 10)	Selection based on VOC vapor pressure (see TABLE F-1).		
Liquid Molecular Weight	92.00 lb/lb-mol	Vapor Molecular Weight	66.00 lb/lb-mol	

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.5928	4.0125	41.74	47.10	8.2282	8.9768	1,590
February	28	3.7908	4.3550	44.33	51.15	10.1377	9.4717	1,590
March	31	4.3224	5.1309	50.78	59.45	16.7093	10.7997	1,590
April	30	4.9749	6.1598	57.87	69.03	24.8157	12.4300	1,590
May	31	5.6532	7.1986	64.49	77.48	35.3718	14.1250	1,590
June	30	6.2211	8.0083	69.56	83.42	41.8397	15.5439	1,590
July	31	6.4052	8.1762	71.12	84.59	43.8327	16.0038	1,590
August	31	6.1405	7.6954	68.86	81.18	37.6080	15.3426	1,590
September	30	5.5821	6.8015	63.83	74.37	27.1777	13.9474	1,590
October	31	4.8396	5.7058	56.46	64.98	18.7576	12.0922	1,590
November	30	4.2150	4.7293	49.53	55.29	10.2743	10.5316	1,590
December	31	3.7246	4.1032	43.48	48.20	7.4919	9.3061	1,590
ALL	365	4.9552	8.1762	56.84	84.59	282.2447	148.5708	19,080

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01

4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-3
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		WATE-SV-V1D				
Service		Pipeline Liquids				
Capacity		530 gal			530 gal	
Temperature of Stored Liquid		56.84 °F			84.59 °F	
Vapor Pressure		4.9552 psia			8.1762 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		0.13 turnover/yr				
		71 gal/yr			530 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					43.8327 lbs/month	
		282.2447 lb/yr			0.0589 lb/hr	
Working Losses		**7.79E-03** lb/gal			**1.01E-02** lb/gal	
		0.5490 lb/yr	Average	Maximum	5.3346 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.1156 lb/hr	0.5064 tpy	358.84% by weight	0.2114 lb/hr
	Work		0.0002 lb/hr	0.0010 tpy		19.1425 lb/hr
	Total		0.1158 lb/hr	0.5074 tpy		19.3540 lb/hr
CO_{2-e}		5398.27% by weight	1.7427 lb/hr	7.6330 tpy	5398.27% by weight	291 lb/hr
CO_2		7.83% by weight	0.0025 lb/hr	0.0111 tpy	7.83% by weight	0.4225 lb/hr
TOC (Total)		351.00% by weight	0.1133 lb/hr	0.4963 tpy	351.00% by weight	18.9314 lb/hr
Methane		215.62% by weight	0.0696 lb/hr	0.3049 tpy	215.62% by weight	11.6293 lb/hr
Ethane		35.39% by weight	0.0114 lb/hr	0.0500 tpy	35.39% by weight	1.9086 lb/hr
VOC (Total)		100.00% by weight	0.0323 lb/hr	0.1414 tpy	100.00% by weight	5.3935 lb/hr
HAP (Total)		6.23% by weight	0.0020 lb/hr	0.0088 tpy	6.23% by weight	0.3359 lb/hr
Benzene		1.5063% by weight	4.86E-04 lb/hr	2.13E-03 tpy	1.5063% by weight	8.12E-02 lb/hr
Ethylbenzene		0.0477% by weight	1.54E-05 lb/hr	6.74E-05 tpy	0.0477% by weight	2.57E-03 lb/hr
Hexane (n-)		2.8866% by weight	9.32E-04 lb/hr	4.08E-03 tpy	2.8866% by weight	1.56E-01 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	4.41E-04 lb/hr	1.93E-03 tpy	1.3668% by weight	7.37E-02 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	4.48E-06 lb/hr	1.96E-05 tpy	0.0139% by weight	7.49E-04 lb/hr
Xylenes		0.4073% by weight	1.31E-04 lb/hr	5.76E-04 tpy	0.4073% by weight	2.20E-02 lb/hr

NOTES

1. Tank Characteristics:

		TANKS 4.09d			
Orientation	Vertical Fixed Roof Tank		Above Ground?	Yes	
Height/Length	10.83 ft	10.83 ft	Shell/Roof Color	Gray/Medium	or less solar
Diameter	5.00 ft		Shell Condition	Good	absorptance
Capacity (estimated)	1,591 gal		Vacuum Setting	-0.03 psig	
Capacity (nominal)	1,590 gal		Pressure Setting	0.03 psig	

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Toledo, Ohio
Material	Gasoline (RVP 10)	Selection based on VOC vapor pressure (see TABLE F-1).	
Liquid Molecular Weight	92.00 lb/lb-mol	Vapor Molecular Weight	66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.5928	4.0125	41.74	47.10	8.2282	8.9768	1,590
February	28	3.7908	4.3550	44.33	51.15	10.1377	9.4717	1,590
March	31	4.3224	5.1309	50.78	59.45	16.7093	10.7997	1,590
April	30	4.9749	6.1598	57.87	69.03	24.8157	12.4300	1,590
May	31	5.6532	7.1986	64.49	77.48	35.3718	14.1250	1,590
June	30	6.2211	8.0083	69.56	83.42	41.8397	15.5439	1,590
July	31	6.4052	8.1762	71.12	84.59	43.8327	16.0038	1,590
August	31	6.1405	7.6954	68.86	81.18	37.6080	15.3426	1,590
September	30	5.5821	6.8015	63.83	74.37	27.1777	13.9474	1,590
October	31	4.8396	5.7058	56.46	64.98	18.7576	12.0922	1,590
November	30	4.2150	4.7293	49.53	55.29	10.2743	10.5316	1,590
December	31	3.7246	4.1032	43.48	48.20	7.4919	9.3061	1,590
ALL	365	4.9552	8.1762	56.84	84.59	282.2447	148.5708	19,080

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01

4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-4
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		WATE-SV-V1C1				
Service		Pipeline Liquids				
Capacity		400 gal			400 gal	
Temperature of Stored Liquid		56.84 °F			84.59 °F	
Vapor Pressure		4.9552 psia			8.1762 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		0.13 turnover/yr				
		53 gal/yr			400 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					34.5057 lbs/month	
		221.4637 lb/yr			0.0464 lb/hr	
Working Losses		**7.79E-03** lb/gal			**1.01E-02** lb/gal	
		0.4144 lb/yr	Average	Maximum	4.0261 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.0907 lb/hr	0.3973 tpy	358.84% by weight	0.1664 lb/hr
	Work		0.0002 lb/hr	0.0007 tpy		14.4472 lb/hr
	Total		0.0909 lb/hr	0.3981 tpy		14.6136 lb/hr
CO_{2-e}		5398.27% by weight	1.3673 lb/hr	5.9888 tpy	5398.27% by weight	220 lb/hr
CO_2		7.83% by weight	0.0020 lb/hr	0.0087 tpy	7.83% by weight	0.3190 lb/hr
TOC (Total)		351.00% by weight	0.0889 lb/hr	0.3894 tpy	351.00% by weight	14.2946 lb/hr
Methane		215.62% by weight	0.0546 lb/hr	0.2392 tpy	215.62% by weight	8.7810 lb/hr
Ethane		35.39% by weight	0.0090 lb/hr	0.0393 tpy	35.39% by weight	1.4411 lb/hr
VOC (Total)		100.00% by weight	0.0253 lb/hr	0.1109 tpy	100.00% by weight	4.0725 lb/hr
HAP (Total)		6.23% by weight	0.0016 lb/hr	0.0069 tpy	6.23% by weight	0.2537 lb/hr
Benzene		1.5063% by weight	3.82E-04 lb/hr	1.67E-03 tpy	1.5063% by weight	6.13E-02 lb/hr
Ethylbenzene		0.0477% by weight	1.21E-05 lb/hr	5.29E-05 tpy	0.0477% by weight	1.94E-03 lb/hr
Hexane (n-)		2.8866% by weight	7.31E-04 lb/hr	3.20E-03 tpy	2.8866% by weight	1.18E-01 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	3.46E-04 lb/hr	1.52E-03 tpy	1.3668% by weight	5.57E-02 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	3.52E-06 lb/hr	1.54E-05 tpy	0.0139% by weight	5.65E-04 lb/hr
Xylenes		0.4073% by weight	1.03E-04 lb/hr	4.52E-04 tpy	0.4073% by weight	1.66E-02 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	10.00 ft	Shell/Roof Color	Gray/Medium or less solar
Diameter	4.50 ft	Shell Condition	Good absorptance
Capacity (estimated)	1,190 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	1,200 gal	Pressure Setting	0.03 psig

2. Stored Liquid Characteristics:

Basis: USEPA TANKS 4.09d MET Station: Toledo, Ohio
Material: Gasoline (RVP 10) Selection based on VOC vapor pressure (see TABLE F-1).
Liquid Molecular Weight: 92.00 lb/lb-mol Vapor Molecular Weight: 66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.5928	4.0125	41.74	47.10	6.4036	6.7750	1,200
February	28	3.7908	4.3550	44.33	51.15	7.8983	7.1484	1,200
March	31	4.3224	5.1309	50.78	59.45	13.0531	8.1507	1,200
April	30	4.9749	6.1598	57.87	69.03	19.4404	9.3812	1,200
May	31	5.6532	7.1986	64.49	77.48	27.7794	10.6604	1,200
June	30	6.2211	8.0083	69.56	83.42	32.9188	11.7313	1,200
July	31	6.4052	8.1762	71.12	84.59	34.5057	12.0783	1,200
August	31	6.1405	7.6954	68.86	81.18	29.5821	11.5793	1,200
September	30	5.5821	6.8015	63.83	74.37	21.3389	10.5263	1,200
October	31	4.8396	5.7058	56.46	64.98	14.6865	9.1262	1,200
November	30	4.2150	4.7293	49.53	55.29	8.0221	7.9484	1,200
December	31	3.7246	4.1032	43.48	48.20	5.8349	7.0235	1,200
ALL	365	4.9552	8.1762	56.84	84.59	221.4637	112.1289	14,400

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-5
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		WATE-SV-V2				
Service		Pipeline Liquids				
Capacity		317 gal			317 gal	
Temperature of Stored Liquid		56.84 °F			84.59 °F	
Vapor Pressure		4.9552 psia			8.1762 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		12.63 turnover/yr				
		4,000 gal/yr			317 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					27.2006 lbs/month	
		174.5332 lb/yr			0.0366 lb/hr	
Working Losses		**7.79E-03** lb/gal			**1.01E-02** lb/gal	
		31.1469 lb/yr	Average	Maximum	3.1873 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.0715 lb/hr	0.3131 tpy	358.84% by weight	0.1312 lb/hr
	Work		0.0128 lb/hr	0.0559 tpy		11.4374 lb/hr
	Total		0.0843 lb/hr	0.3690 tpy		11.5686 lb/hr
CO_{2-e}		5398.27% by weight	1.2675 lb/hr	5.5516 tpy	5398.27% by weight	174 lb/hr
CO_2		7.83% by weight	0.0018 lb/hr	0.0081 tpy	7.83% by weight	0.2526 lb/hr
TOC (Total)		351.00% by weight	0.0824 lb/hr	0.3610 tpy	351.00% by weight	11.3160 lb/hr
Methane		215.62% by weight	0.0506 lb/hr	0.2217 tpy	215.62% by weight	6.9513 lb/hr
Ethane		35.39% by weight	0.0083 lb/hr	0.0364 tpy	35.39% by weight	1.1408 lb/hr
VOC (Total)		100.00% by weight	0.0235 lb/hr	0.1028 tpy	100.00% by weight	3.2239 lb/hr
HAP (Total)		6.23% by weight	0.0015 lb/hr	0.0064 tpy	6.23% by weight	0.2008 lb/hr
Benzene		1.5063% by weight	3.54E-04 lb/hr	1.55E-03 tpy	1.5063% by weight	4.86E-02 lb/hr
Ethylbenzene		0.0477% by weight	1.12E-05 lb/hr	4.90E-05 tpy	0.0477% by weight	1.54E-03 lb/hr
Hexane (n-)		2.8866% by weight	6.78E-04 lb/hr	2.97E-03 tpy	2.8866% by weight	9.31E-02 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	3.21E-04 lb/hr	1.41E-03 tpy	1.3668% by weight	4.41E-02 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	3.26E-06 lb/hr	1.43E-05 tpy	0.0139% by weight	4.48E-04 lb/hr
Xylenes		0.4073% by weight	9.56E-05 lb/hr	4.19E-04 tpy	0.4073% by weight	1.31E-02 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	10.00 ft	Shell/Roof Color	Gray/Medium or less solar
Diameter	4.00 ft	Shell Condition	Good absorptance
Capacity (estimated)	940 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	950 gal	Pressure Setting	0.03 psig

2. Stored Liquid Characteristics:

Basis: USEPA TANKS 4.09d MET Station: Toledo, Ohio
Material: Gasoline (RVP 10) Selection based on VOC vapor pressure (see TABLE F-1).
Liquid Molecular Weight: 92.00 lb/lb-mol Vapor Molecular Weight: 66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.5928	4.0125	41.74	47.10	5.0433	5.3635	950
February	28	3.7908	4.3550	44.33	51.15	6.2211	5.6592	950
March	31	4.3224	5.1309	50.78	59.45	10.2834	6.4527	950
April	30	4.9749	6.1598	57.87	69.03	15.3188	7.4268	950
May	31	5.6532	7.1986	64.49	77.48	21.8942	8.4394	950
June	30	6.2211	8.0083	69.56	83.42	25.9486	9.2873	950
July	31	6.4052	8.1762	71.12	84.59	27.2006	9.5620	950
August	31	6.1405	7.6954	68.86	81.18	23.3180	9.1670	950
September	30	5.5821	6.8015	63.83	74.37	16.8178	8.3333	950
October	31	4.8396	5.7058	56.46	64.98	11.5723	7.2249	950
November	30	4.2150	4.7293	49.53	55.29	6.3196	6.2925	950
December	31	3.7246	4.1032	43.48	48.20	4.5957	5.5603	950
ALL	365	4.9552	8.1762	56.84	84.59	174.5332	88.7687	11,400

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-6
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		WATE-SV-V4SD				
Service		Pipeline Liquids				
Capacity		43 gal			43 gal	
Temperature of Stored Liquid		56.84 °F			84.59 °F	
Vapor Pressure		4.9552 psia			8.1762 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		0.13 turnover/yr				
		6 gal/yr			43 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					4.3061 lbs/month	
		27.3530 lb/yr			0.0058 lb/hr	
Working Losses		**7.79E-03** lb/gal			**1.01E-02** lb/gal	
		0.0449 lb/yr	Average	Maximum	0.4362 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.0112 lb/hr	0.0491 tpy	358.84% by weight	0.0208 lb/hr
	Work		0.0000 lb/hr	0.0001 tpy		1.5651 lb/hr
	Total		0.0112 lb/hr	0.0492 tpy		1.5859 lb/hr
CO_{2-e}		5398.27% by weight	0.1688 lb/hr	0.7395 tpy	5398.27% by weight	24 lb/hr
CO_2		7.83% by weight	0.0002 lb/hr	0.0011 tpy	7.83% by weight	0.0346 lb/hr
TOC (Total)		351.00% by weight	0.0110 lb/hr	0.0481 tpy	351.00% by weight	1.5513 lb/hr
Methane		215.62% by weight	0.0067 lb/hr	0.0295 tpy	215.62% by weight	0.9529 lb/hr
Ethane		35.39% by weight	0.0011 lb/hr	0.0048 tpy	35.39% by weight	0.1564 lb/hr
VOC (Total)		100.00% by weight	0.0031 lb/hr	0.0137 tpy	100.00% by weight	0.4419 lb/hr
HAP (Total)		6.23% by weight	0.0002 lb/hr	0.0009 tpy	6.23% by weight	0.0275 lb/hr
Benzene		1.5063% by weight	4.71E-05 lb/hr	2.06E-04 tpy	1.5063% by weight	6.66E-03 lb/hr
Ethylbenzene		0.0477% by weight	1.49E-06 lb/hr	6.53E-06 tpy	0.0477% by weight	2.11E-04 lb/hr
Hexane (n-)		2.8866% by weight	9.03E-05 lb/hr	3.95E-04 tpy	2.8866% by weight	1.28E-02 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	4.27E-05 lb/hr	1.87E-04 tpy	1.3668% by weight	6.04E-03 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	4.34E-07 lb/hr	1.90E-06 tpy	0.0139% by weight	6.14E-05 lb/hr
Xylenes		0.4073% by weight	1.27E-05 lb/hr	5.58E-05 tpy	0.4073% by weight	1.80E-03 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank		Above Ground?	Yes	
Height/Length	8.00 ft		Shell/Roof Color	Gray/Medium	or less solar
Diameter	1.67 ft	1.67 ft	Shell Condition	Good	absorptance
Capacity (estimated)	131 gal		Vacuum Setting	-0.03 psig	
Capacity (nominal)	130 gal		Pressure Setting	0.03 psig	

2. Stored Liquid Characteristics:

Basis: USEPA TANKS 4.09d MET Station: Toledo, Ohio
Material: Gasoline (RVP 10) Selection based on VOC vapor pressure (see TABLE F-1).
Liquid Molecular Weight: 92.00 lb/lb-mol Vapor Molecular Weight: 66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.5928	4.0125	41.74	47.10	0.7707	0.7340	130
February	28	3.7908	4.3550	44.33	51.15	0.9538	0.7744	130
March	31	4.3224	5.1309	50.78	59.45	1.5895	0.8830	130
April	30	4.9749	6.1598	57.87	69.03	2.3885	1.0163	130
May	31	5.6532	7.1986	64.49	77.48	3.4403	1.1549	130
June	30	6.2211	8.0083	69.56	83.42	4.1008	1.2709	130
July	31	6.4052	8.1762	71.12	84.59	4.3061	1.3085	130
August	31	6.1405	7.6954	68.86	81.18	3.6823	1.2544	130
September	30	5.5821	6.8015	63.83	74.37	2.6406	1.1403	130
October	31	4.8396	5.7058	56.46	64.98	1.8013	0.9887	130
November	30	4.2150	4.7293	49.53	55.29	0.9753	0.8611	130
December	31	3.7246	4.1032	43.48	48.20	0.7038	0.7609	130
ALL	365	4.9552	8.1762	56.84	84.59	27.3530	12.1473	1,560

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-7
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		WATE-TK-V5				
Service		Pipeline Liquids				
Capacity		2,000 gal			2,000 gal	
Temperature of Stored Liquid		56.84 °F			84.59 °F	
Vapor Pressure		4.9552 psia			8.1762 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		2.00 turnover/yr				
		4,000 gal/yr			2,000 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					86.2423 lbs/month	
		541.1429 lb/yr			0.1159 lb/hr	
Working Losses		**7.79E-03** lb/gal			**1.01E-02** lb/gal	
		31.1469 lb/yr	Average	Maximum	20.1305 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.2217 lb/hr	0.9709 tpy	358.84% by weight	0.4160 lb/hr
	Work		0.0128 lb/hr	0.0559 tpy		72.2360 lb/hr
	Total		0.2344 lb/hr	1.0268 tpy		72.6520 lb/hr
CO_{2-e}		5398.27% by weight	3.5267 lb/hr	15.4469 tpy	5398.27% by weight	1,093 lb/hr
CO_2		7.83% by weight	0.0051 lb/hr	0.0224 tpy	7.83% by weight	1.5861 lb/hr
TOC (Total)		351.00% by weight	0.2293 lb/hr	1.0044 tpy	351.00% by weight	71.0659 lb/hr
Methane		215.62% by weight	0.1409 lb/hr	0.6170 tpy	215.62% by weight	43.6548 lb/hr
Ethane		35.39% by weight	0.0231 lb/hr	0.1013 tpy	35.39% by weight	7.1646 lb/hr
VOC (Total)		100.00% by weight	0.0653 lb/hr	0.2861 tpy	100.00% by weight	20.2464 lb/hr
HAP (Total)		6.23% by weight	0.0041 lb/hr	0.0178 tpy	6.23% by weight	1.2611 lb/hr
Benzene		1.5063% by weight	9.84E-04 lb/hr	4.31E-03 tpy	1.5063% by weight	3.05E-01 lb/hr
Ethylbenzene		0.0477% by weight	3.11E-05 lb/hr	1.36E-04 tpy	0.0477% by weight	9.65E-03 lb/hr
Hexane (n-)		2.8866% by weight	1.89E-03 lb/hr	8.26E-03 tpy	2.8866% by weight	5.84E-01 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	8.93E-04 lb/hr	3.91E-03 tpy	1.3668% by weight	2.77E-01 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	9.07E-06 lb/hr	3.97E-05 tpy	0.0139% by weight	2.81E-03 lb/hr
Xylenes		0.4073% by weight	2.66E-04 lb/hr	1.17E-03 tpy	0.4073% by weight	8.25E-02 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	5.00 ft	Shell/Roof Color	Gray/Medium
Diameter	8.00 ft	Shell Condition	Good
Capacity (estimated)	1,880 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	2,000 gal	Pressure Setting	0.03 psig

or less solar absorptance

2. Stored Liquid Characteristics:

Basis: USEPA TANKS 4.09d — MET Station: Toledo, Ohio
Material: Gasoline (RVP 10) — Selection based on VOC vapor pressure (see TABLE F-1).
Liquid Molecular Weight: 92.00 lb/lb-mol — Vapor Molecular Weight: 66.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	3.5928	4.0125	41.74	47.10	14.7876	11.2916	2,000
February	28	3.7908	4.3550	44.33	51.15	18.3728	11.9140	2,000
March	31	4.3224	5.1309	50.78	59.45	30.9144	13.5846	2,000
April	30	4.9749	6.1598	57.87	69.03	46.9418	15.6353	2,000
May	31	5.6532	7.1986	64.49	77.48	68.2645	17.7673	2,000
June	30	6.2211	8.0083	69.56	83.42	81.9533	19.5521	2,000
July	31	6.4052	8.1762	71.12	84.59	86.2423	20.1305	2,000
August	31	6.1405	7.6954	68.86	81.18	73.5167	19.2988	2,000
September	30	5.5821	6.8015	63.83	74.37	52.3471	17.5438	2,000
October	31	4.8396	5.7058	56.46	64.98	35.3285	15.2103	2,000
November	30	4.2150	4.7293	49.53	55.29	18.9336	13.2473	2,000
December	31	3.7246	4.1032	43.48	48.20	13.5403	11.7058	2,000
ALL	365	4.9552	8.1762	56.84	84.59	541.1429	186.8815	24,000

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. Speciation of emissions is based on vapor weight percentages in TABLE F-1 normalized on VOC to assure methodology is conservative.

TABLE F-8
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		WATE-TK-OIL1				
Service		Oil				
Capacity		570 gal			570 gal	
Temperature of Stored Liquid		56.84 °F			84.59 °F	
Vapor Pressure		0.0061 psia			0.0138 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		365.00 turnover/yr				
		208,050 gal/yr			570 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					0.0266 lbs/month	
		0.1648 lb/yr			0.00004 lb/hr	
Working Losses		**1.90E-05** lb/gal			**2.89E-05** lb/gal	
		3.9504 lb/yr	Average	Maximum	0.0165 lb/hr	Maximum
Liquid	Stand	100.00% by weight	0.0000 lb/hr	0.0001 tpy	100.00% by weight	0.0000 lb/hr
	Work		0.0005 lb/hr	0.0020 tpy		0.0165 lb/hr
	Total		0.0005 lb/hr	0.0021 tpy		0.0165 lb/hr
TOC (Total)		100.00% by weight	0.0005 lb/hr	0.0021 tpy	100.00% by weight	0.0165 lb/hr
Methane						
Ethane						
VOC (Total)		100.00% by weight	0.0005 lb/hr	0.0021 tpy	100.00% by weight	0.0165 lb/hr
HAP (Total)						
Benzene						
Ethylbenzene						
Hexane (n-)						
Methanol						
Naphthalene						
Toluene						
Trimethylpentane (2,2,4-)						
Xylenes						

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	6.00 ft	Shell/Roof Color	Gray/Medium or less solar
Diameter	4.00 ft	Shell Condition	Good absorptance
Capacity (estimated)	564 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	570 gal	Pressure Setting	0.03 psig

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Toledo, Ohio
Material	Distillate fuel oil no. 2	Selected purely for a worst-case scenario.	
Liquid Molecular Weight	188.00 lb/lb-mol	Vapor Molecular Weight	130.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	0.0033	0.0041	41.74	47.10	0.0040	0.0059	570
February	28	0.0037	0.0047	44.33	51.15	0.0051	0.0065	570
March	31	0.0047	0.0064	50.78	59.45	0.0090	0.0082	570
April	30	0.0061	0.0088	57.87	69.03	0.0144	0.0107	570
May	31	0.0076	0.0112	64.49	77.48	0.0214	0.0134	570
June	30	0.0089	0.0134	69.56	83.42	0.0254	0.0157	570
July	31	0.0093	0.0138	71.12	84.59	0.0266	0.0165	570
August	31	0.0087	0.0125	68.86	81.18	0.0228	0.0154	570
September	30	0.0075	0.0103	63.83	74.37	0.0163	0.0132	570
October	31	0.0058	0.0077	56.46	64.98	0.0107	0.0102	570
November	30	0.0044	0.0056	49.53	55.29	0.0054	0.0078	570
December	31	0.0036	0.0042	43.48	48.20	0.0037	0.0063	570
ALL	365	0.0061	0.0138	56.84	84.59	0.1648	0.1299	6,840

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. There is no basis for speciation of emissions.

TABLE F-9
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		WATE-TK-OW1				
Service		Oily Water				
Capacity		3,000 gal			3,000 gal	
Temperature of Stored Liquid		56.84 °F			84.59 °F	
Vapor Pressure		0.0061 psia			0.0138 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		12.00 turnover/yr				
		36,000 gal/yr			3,000 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					0.1682 lbs/month	
		1.0442 lb/yr			0.00023 lb/hr	
Working Losses		**1.90E-05** lb/gal			**2.89E-05** lb/gal	
		0.6836 lb/yr	Average	Maximum	0.0867 lb/hr	Maximum
Liquid	Stand	100.00% by weight	0.0001 lb/hr	0.0005 tpy	100.00% by weight	0.0002 lb/hr
	Work		0.0001 lb/hr	0.0003 tpy		0.0867 lb/hr
	Total		0.0002 lb/hr	0.0009 tpy		0.0869 lb/hr
TOC (Total)		100.00% by weight	0.0002 lb/hr	0.0009 tpy	100.00% by weight	0.0869 lb/hr
Methane						
Ethane						
VOC (Total)		100.00% by weight	0.0002 lb/hr	0.0009 tpy	100.00% by weight	0.0869 lb/hr
HAP (Total)						
Benzene						
Ethylbenzene						
Hexane (n-)						
Methanol						
Naphthalene						
Toluene						
Trimethylpentane (2,2,4-)						
Xylenes						

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Horizontal Tank		Above Ground?	Yes	
Height/Length	18.00 ft		Shell/Roof Color	Gray/Medium	or less solar
Diameter	5.38 ft	5.38 ft	Shell Condition	Good	absorptance
Capacity (estimated)	3,055 gal		Vacuum Setting	-0.03 psig	
Capacity (nominal)	3,000 gal		Pressure Setting	0.03 psig	

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Toledo, Ohio
Material	Distillate fuel oil no. 2	Selected purely for a worst-case scenario.	
Liquid Molecular Weight	188.00 lb/lb-mol	Vapor Molecular Weight	130.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	0.0033	0.0041	41.74	47.10	0.0252	0.0310	3,000
February	28	0.0037	0.0047	44.33	51.15	0.0325	0.0344	3,000
March	31	0.0047	0.0064	50.78	59.45	0.0571	0.0432	3,000
April	30	0.0061	0.0088	57.87	69.03	0.0915	0.0564	3,000
May	31	0.0076	0.0112	64.49	77.48	0.1357	0.0708	3,000
June	30	0.0089	0.0134	69.56	83.42	0.1607	0.0825	3,000
July	31	0.0093	0.0138	71.12	84.59	0.1682	0.0867	3,000
August	31	0.0087	0.0125	68.86	81.18	0.1443	0.0809	3,000
September	30	0.0075	0.0103	63.83	74.37	0.1035	0.0692	3,000
October	31	0.0058	0.0077	56.46	64.98	0.0681	0.0538	3,000
November	30	0.0044	0.0056	49.53	55.29	0.0340	0.0412	3,000
December	31	0.0036	0.0042	43.48	48.20	0.0233	0.0333	3,000
ALL	365	0.0061	0.0138	56.84	84.59	1.0442	0.6836	36,000

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. There is no basis for speciation of emissions.

TABLE F-10
Volatile Organic Liquids Loading (Tanker Trucks)
Hourly and Annual Emission Estimates

Source	WATE-TL-PL				
Supply Vessel	WATE-TK-V5				
	Pipeline Liquids				
	2,000 gal			2,000 gal	
Tanker Truck Service	Dedicated Normal			Dedicated Normal	
Loading Method	Submerged			Submerged	
Saturation Factor	0.60 n.d.			0.60 n.d.	
Vapor Molecular Weight	66.00 lb/lb-mol			66.00 lb/lb-mol	
Bulk Liquid Temperature	56.84 °F			84.59 °F	
	516.84 R			544.59 R	
Vapor Pressure	4.9552 psia			8.1762 psia	
Loading Loss Factor	4.7306 lb/kgal			7.4079 lb/kgal	
Pumping Rate				150 gpm	
Throughput	2.00 turnover/yr				
	4,000 gal/yr			2,000 gal/hr	
Loading Losses	18.9226 lb/yr	Average	Maximum	14.8158 lb/hr	Maximum
Residual Liquid	358.84% by weight	0.0078 lb/hr	0.0340 tpy	358.84% by weight	53.1648 lb/hr
CO_{2-e}	5398.27% by weight	0.1166 lb/hr	0.5107 tpy	5398.27% by weight	799.7969 lb/hr
CO_2	7.83% by weight	0.0002 lb/hr	0.0007 tpy	7.83% by weight	1.1606 lb/hr
TOC (Total)	351.00% by weight	0.0076 lb/hr	0.0332 tpy	351.00% by weight	52.0041 lb/hr
Methane	215.62% by weight	0.0047 lb/hr	0.0204 tpy	215.62% by weight	31.9455 lb/hr
Ethane	35.39% by weight	0.0008 lb/hr	0.0033 tpy	35.39% by weight	5.2429 lb/hr
VOC (Total)	100.00% by weight	0.0022 lb/hr	0.0095 tpy	100.00% by weight	14.8158 lb/hr
HAP (Total)	6.23% by weight	0.0001 lb/hr	0.0006 tpy	6.23% by weight	0.9228 lb/hr
Benzene	1.5063% by weight	3.25E-05 lb/hr	1.43E-04 tpy	1.5063% by weight	2.23E-01 lb/hr
Ethylbenzene	0.0477% by weight	1.03E-06 lb/hr	4.51E-06 tpy	0.0477% by weight	7.06E-03 lb/hr
Hexane (n-)	2.8866% by weight	6.24E-05 lb/hr	2.73E-04 tpy	2.8866% by weight	4.28E-01 lb/hr
Methanol					
Naphthalene					
Toluene	1.3668% by weight	2.95E-05 lb/hr	1.29E-04 tpy	1.3668% by weight	2.03E-01 lb/hr
Trimethylpentane (2,2,4-)	0.0139% by weight	3.00E-07 lb/hr	1.31E-06 tpy	0.0139% by weight	2.06E-03 lb/hr
Xylenes	0.4073% by weight	8.80E-06 lb/hr	3.85E-05 tpy	0.4073% by weight	6.04E-02 lb/hr

NOTES

1. Emissions calculated using methods provided in USEPA, AP-42 Section 5.2 dated 1/95. $L_L = 12.46[(S)M_VP/T]$
2. Physical property, throughput and speciation data based data from supply vessel emission calculation spreadsheet.

TABLE F-11
Volatile Organic Liquids Loading (Tanker Trucks)
Hourly and Annual Emission Estimates

Source	WATE-TL-OIL				
Supply Vessel	WATE-TK-OIL1				
	Oil				
	570 gal			570 gal	
Tanker Truck Service	Dedicated Normal			Dedicated Normal	
Loading Method	Splash			Splash	
Saturation Factor	1.45 n.d.			1.45 n.d.	
Vapor Molecular Weight	130.00 lb/lb-mol			130.00 lb/lb-mol	
Bulk Liquid Temperature	56.84 °F			84.59 °F	
	516.84 R			544.59 R	
Vapor Pressure	0.0061 psia			0.0138 psia	
Loading Loss Factor	0.0279 lb/kgal			0.0597 lb/kgal	
Pumping Rate				150 gpm	
Throughput	12.00 turnover/yr				
	6,840 gal/yr			570 gal/hr	
Loading Losses	0.1907 lb/yr	Average	Maximum	0.0340 lb/hr	Maximum
Residual Liquid	100.00% by weight	0.00002 lb/hr	0.0001 tpy	100.00% by weight	0.0340 lb/hr
TOC (Total)	100.00% by weight	0.00002 lb/hr	0.0001 tpy	100.00% by weight	0.0340 lb/hr
Methane					
Ethane					
VOC (Total)	100.00% by weight	0.00002 lb/hr	0.0001 tpy	100.00% by weight	0.0340 lb/hr
HAP (Total)					
Benzene					
Ethylbenzene					
Hexane (n-)					
Methanol					
Naphthalene					
Toluene					
Trimethylpentane (2,2,4-)					
Xylenes					

NOTES

1. Emissions calculated using methods provided in USEPA, AP-42 Section 5.2 dated 1/95. $L_L = 12.46[(S)M_VP/T]$
2. Physical property, throughput and speciation data based data from supply vessel emission calculation spreadsheet.

TABLE F-12
Volatile Organic Liquids Loading (Tanker Trucks)
Hourly and Annual Emission Estimates

Source	WATE-TL-OW				
Supply Vessel	WATE-TK-OW1				
	Oily Water				
	3,000 gal			3,000 gal	
Tanker Truck Service	Dedicated Normal			Dedicated Normal	
Loading Method	Splash			Splash	
Saturation Factor	1.45 n.d.			1.45 n.d.	
Vapor Molecular Weight	130.00 lb/lb-mol			130.00 lb/lb-mol	
Bulk Liquid Temperature	56.84 °F			84.59 °F	
	516.84 R			544.59 R	
Vapor Pressure	0.0061 psia			0.0138 psia	
Loading Loss Factor	0.0279 lb/kgal			0.0597 lb/kgal	
Pumping Rate				150 gpm	
Throughput	12.00 turnover/yr				
	36,000 gal/yr			3,000 gal/hr	
Loading Losses	1.0036 lb/yr	Average	Maximum	0.1790 lb/hr	Maximum
Residual Liquid	100.00% by weight	0.00011 lb/hr	0.0005 tpy	100.00% by weight	0.1790 lb/hr
TOC (Total)	100.00% by weight	0.00011 lb/hr	0.0005 tpy	100.00% by weight	0.1790 lb/hr
Methane					
Ethane					
VOC (Total)	100.00% by weight	0.00011 lb/hr	0.0005 tpy	100.00% by weight	0.1790 lb/hr
HAP (Total)					
Benzene					
Ethylbenzene					
Hexane (n-)					
Methanol					
Naphthalene					
Toluene					
Trimethylpentane (2,2,4-)					
Xylenes					

NOTES

1. Emissions calculated using methods provided in USEPA, AP-42 Section 5.2 dated 1/95. $L_L = 12.46[(S)M_VP/T]$
2. Physical property, throughput and speciation data based data from supply vessel emission calculation spreadsheet.

TABLE G-1a
Gas Releases
Hourly and Annual Emission Estimates

Category	Station Operations					
Source	WATE-GR-ST			WATE-GR-PL		
	Avg. Hourly	Max. Annual	Max. Hourly	Avg. Hourly	Max. Annual	Max. Hourly
Gas Release	1,747 scfh	15,300,000 scf/yr	975,000 scfh	1,615 scfh	14,150,000 scf/yr	5,660,000 scfh
	81 lb/hr	709,230 lb/yr	46,369 lb/hr	75 lb/hr	655,922 lb/yr	269,181 lb/hr
NO_X						
CO						
SO_2						
$PM_{10/2.5}$						
CO_{2-e}	1,827 lb/hr	8,001 tpy	1,031,296 lb/hr	1,689 lb/hr	7,400 tpy	5,986,804 lb/hr
CO_2	1.0787 lb/hr	4.7248 tpy	617.8143 lb/hr	0.9976 lb/hr	4.3697 tpy	3,586.4912 lb/hr
N_2O						
TOC (Total)	79 lb/hr	346 tpy	45,268 lb/hr	73 lb/hr	320 tpy	262,784 lb/hr
Methane	73 lb/hr	320 tpy	41,227 lb/hr	68 lb/hr	296 tpy	239,329 lb/hr
Ethane	4 lb/hr	16 tpy	2,067 lb/hr	3 lb/hr	15 tpy	11,998 lb/hr
VOC (Total)	2.3509 lb/hr	10.2969 tpy	1,973.6004 lb/hr	2.1742 lb/hr	9.5229 tpy	11,457.0035 lb/hr
VOC (non-HAP)	2.1566 lb/hr	9.4457 tpy	1,810.4612 lb/hr	1.9945 lb/hr	8.7357 tpy	10,509.9594 lb/hr
HAP (Total)	0.1943 lb/hr	0.8511 tpy	163.1392 lb/hr	0.1797 lb/hr	0.7872 tpy	947.0441 lb/hr
Acetaldehyde						
Acrolein						
Benzene	0.0686 lb/hr	0.3003 tpy	57.5644 lb/hr	0.0634 lb/hr	0.2778 tpy	334.1689 lb/hr
Biphenyl						
Butadiene (1,3-)						
Carbon Tetrachloride						
Chlorobenzene						
Chloroform						
Dichloropropene (1,3-)						
Ethylbenzene	0.0017 lb/hr	0.0074 tpy	1.4148 lb/hr	0.0016 lb/hr	0.0068 tpy	8.2131 lb/hr
Ethylene Dibromide						
Formaldehyde						
Hexane (n-)	0.0684 lb/hr	0.2996 tpy	57.4203 lb/hr	0.0633 lb/hr	0.2771 tpy	333.3321 lb/hr
Methanol						
Methylene Chloride						
Methylnaphthalene (2-)						
Naphthalene						
PAH						
Phenol						
Propylene Oxide						
Styrene						
Tetrachloroethane (1,1,2,2-)						
Toluene	0.0439 lb/hr	0.1922 tpy	36.8361 lb/hr	0.0406 lb/hr	0.1777 tpy	213.8386 lb/hr
Trichloroethane (1,1,2-)						
Trimethylpentane (2,2,4-)						
Vinyl Chloride						
Xylenes	0.0118 lb/hr	0.0517 tpy	9.9036 lb/hr	0.0109 lb/hr	0.0478 tpy	57.4915 lb/hr

NOTES

1. Gas release estimates based on data for a similar compressor station.
2. Gas density is the value extracted from physical property estimation spreadsheets.

					Density:
Density (Lab):	0.0441 lb/scf				
Density (GC - Avg+):	0.0464 lb/scf	Safety Factor (GC):	103%	Average Plus:	0.0464 lb/scf
Density (GC - Max):	0.0476 lb/scf			Maximum:	0.0476 lb/scf

3. As it will be assumed that Gas Chromatograph (GC) is more representative, the following is used to scaled the extended analysis (Lab).

				Average Plus	Maximum	VOC Specie Scaling:	
VOC (Lab):	0.00128 lb/scf	VOC:	GC	0.00128 lb/scf	0.00188 lb/scf	Average Plus:	100%
	2.91% wt%		Use	2.90% wt%	4.26% wt%	Maximum:	146%
Methane (Lab):	90.19% wt%	Methane (Use):		90.20% wt%	88.91% wt%		
Ethane (Lab):	4.52% wt%	Ethane (Use):		4.52% wt%	4.46% wt%		

TABLE G-2
Natural Gas
Physical Property Estimations

Component				Molecular	Vapor	Stream		
Name (i)	Formula	Type	HAP	Weight M_i $(lb/lb\text{-}mol)_i$	Density ρ_i $(lb/scf)_i$	Mole Fraction $f_{n\text{-}i}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $f_{m\text{-}i}$ $(f_{n\text{-}i}M_i)/\Sigma(f_{n\text{-}i}M_i)$ (lb_i/lb_T)	Volume Fraction $f_{v\text{-}i}$ $f_{m\text{-}i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Nitrogen	N2			28.013	0.0727	0.632%	1.044%	0.633%
Carbon Dioxide	CO2	GHG		44.010	0.1143	0.514%	1.332%	0.514%
Methane	C01H04	GHG		16.042	0.0417	95.390%	90.193%	95.447%
Ethane	C02H06			30.069	0.0781	2.551%	4.522%	2.553%
Propane	C03H08	VOC		44.096	0.1145	0.449%	1.167%	0.449%
Butane (i-)	C04H10	VOC		58.122	0.1509	0.097%	0.333%	0.097%
Butane (n-)	C04H10	VOC		58.122	0.1509	0.114%	0.391%	0.114%
Cyclopentane	C05H10	VOC		70.133	0.1821	0.002%	0.007%	0.002%
Pentane (i-)	C05H12	VOC		72.149	0.1873			
Pentane (i-)	C05H12	VOC		72.149	0.1873			
Pentane (n-)	C05H12	VOC		72.149	0.1873	0.041%	0.176%	0.041%
Benzene	C06H06	VOC	X	78.112	0.2028	0.018%	0.085%	0.018%
Cyclohexane	C06H12	VOC		84.159	0.2185	0.007%	0.035%	0.007%
Methylcyclopentane	C06H12	VOC		84.159	0.2185	0.005%	0.026%	0.005%
Dimethylbutane (2,2-)	C06H14	VOC		86.175	0.2238	0.004%	0.019%	0.004%
Dimethylbutane (2,3-)	C06H14	VOC		86.175	0.2238	0.003%	0.014%	0.003%
Hexane (n-)	C06H14	VOC	X	86.175	0.2238	0.017%	0.085%	0.017%
Methylpentane (2-)	C06H14	VOC		86.175	0.2238	0.014%	0.073%	0.014%
Methylpentane (3-)	C06H14	VOC		86.175	0.2238	0.009%	0.044%	0.009%
Toluene	C07H08	VOC	X	92.138	0.2392	0.010%	0.054%	0.010%
Cycloheptane	C07H14	VOC		98.186	0.2549			
Dimethylcyclopentane (1,1-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Dimethylcyclopentane (1,c-2-)	C07H14	VOC		98.186	0.2549			
Dimethylcyclopentane (1,c-3-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Dimethylcyclopentane (1,t-2-)	C07H14	VOC		98.186	0.2549	0.001%	0.006%	0.001%
Dimethylcyclopentane (1,t-3-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Ethylcyclopentane	C07H14	VOC		98.186	0.2549	0.000%	0.002%	0.000%
Methylcyclohexane	C07H14	VOC		98.186	0.2549	0.007%	0.042%	0.007%
Dimethylpentane (2,2-)	C07H16	VOC		100.202	0.2602	0.001%	0.006%	0.001%
Dimethylpentane (2,3-)	C07H16	VOC		100.202	0.2602	0.002%	0.010%	0.002%
Dimethylpentane (2,4-)	C07H16	VOC		100.202	0.2602	0.001%	0.006%	0.001%
Dimethylpentane (3,3-)	C07H16	VOC		100.202	0.2602	0.001%	0.004%	0.001%
Ethylpentane (3-)	C07H16	VOC		100.202	0.2602	0.000%	0.002%	0.000%
Heptane (n-)	C07H16	VOC		100.202	0.2602	0.009%	0.055%	0.009%
Methylhexane (2-)	C07H16	VOC		100.202	0.2602	0.005%	0.031%	0.005%
Methylhexane (3-)	C07H16	VOC		100.202	0.2602	0.005%	0.030%	0.005%
Trimethylbutane (2,2,3-)	C07H16	VOC		100.202	0.2602	0.001%	0.004%	0.001%
Ethylbenzene	C08H10	VOC	X	106.165	0.2757	0.000%	0.002%	0.000%
Xylene (m-)	C08H10	VOC	X	106.165	0.2757	0.001%	0.006%	0.001%
Xylene (o-)	C08H10	VOC	X	106.165	0.2757	0.000%	0.002%	0.000%
Xylene (p-)	C08H10	VOC	X	106.165	0.2757	0.001%	0.006%	0.001%
Cyclooctane	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,1-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,c-2-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Dimethylcyclohexane (1,c-3-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Dimethylcyclohexane (1,c-4-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,t-2-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Dimethylcyclohexane (1,t-3-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,t-4-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Ethylcyclohexane	C08H16	VOC		112.213	0.2914			

TABLE G-2
Natural Gas
Physical Property Estimations

Component				Molecular	Vapor	Stream		
Name (i)	Formula	Type	HAP	Weight M_i $(lb/lb\text{-}mol)_i$	Density ρ_i $(lb/scf)_i$	Mole Fraction $f_{n\text{-}i}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $f_{m\text{-}i}$ $(f_{n\text{-}i}M_i)/\Sigma(f_{n\text{-}i}M_i)$ (lb_i/lb_T)	Volume Fraction $f_{v\text{-}i}$ $f_{m\text{-}i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Ethylcyclopentane (1-methyl-1-)	C08H16	VOC		112.213	0.2914			
Ethylcyclopentane (1-methyl-c-2-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	C08H16	VOC		112.213	0.2914			
Ethylcyclopentane (1-methyl-t-2-)	C08H16	VOC		112.213	0.2914			
Propylcyclopentane (i-)	C08H16	VOC		112.213	0.2914			
Propylcyclopentane (n-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,1,2-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,1,3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,c-3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,t-3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,t-4-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,t-2,c-3-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Trimethylcyclopentane (1,t-2,c-4-)	C08H16	VOC		112.213	0.2914			
Dimethylhexane (2,2-)	C08H18	VOC		114.229	0.2966			
Dimethylhexane (2,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (2,4-)	C08H18	VOC		114.229	0.2966			
Dimethylhexane (2,5-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (3,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (3,4-)	C08H18	VOC		114.229	0.2966	0.001%	0.004%	0.001%
Ethylhexane (3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Methylheptane (2-)	C08H18	VOC		114.229	0.2966	0.002%	0.013%	0.002%
Methylheptane (3-)	C08H18	VOC		114.229	0.2966	0.003%	0.018%	0.003%
Methylheptane (4-)	C08H18	VOC		114.229	0.2966			
Octane (n-)	C08H18	VOC		114.229	0.2966	0.005%	0.034%	0.005%
Trimethylpentane (1,1,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Trimethylpentane (2,2,3-)	C08H18	VOC		114.229	0.2966			
Trimethylpentane (2,2,4-)	C08H18	VOC	X	114.229	0.2966			
Trimethylpentane (2,3,4-)	C08H18	VOC		114.229	0.2966			
Ethyltoluene (m-)	C09H12	VOC		120.192	0.3121			
Ethyltoluene (o-)	C09H12	VOC		120.192	0.3121			
Ethyltoluene (p-)	C09H12	VOC		120.192	0.3121			
Propylbenzene (i-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Propylbenzene (n-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Trimethylbenzene (1,2,4-)	C09H12	VOC		120.192	0.3121			
Trimethylbenzene (1,3,5-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Butylcyclopentane (n-)	C09H18	VOC		126.239	0.3278			
Methylcyclooctane	C09H18	VOC		126.239	0.3278			
Propylcyclohexane (i-)	C09H18	VOC		126.239	0.3278			
Propylcyclohexane (n-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,2-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,c-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,c-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,t-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,c-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,c-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,t-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-3,c-5-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-3,t-5-)	C09H18	VOC		126.239	0.3278			

TABLE G-2
Natural Gas
Physical Property Estimations

Component				Molecular Weight	Vapor Density	Stream		
Name (i)	Formula	Type	HAP	M_i $(lb/lb\text{-}mol)_i$	ρ_i $(lb/scf)_i$	Mole Fraction $f_{n\text{-}i}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $f_{m\text{-}i}$ $(f_{n\text{-}i}M_i)/\Sigma(f_{n\text{-}i}M_i)$ (lb_i/lb_T)	Volume Fraction $f_{v\text{-}i}$ $f_{m\text{-}i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Dimethylheptane (2,2-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,3-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,5-)	C09H20	VOC		128.255	0.3330			
Dimethylheptane (2,6-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (3,3-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (3,4-)	C09H20	VOC		128.255	0.3330			
Dimethylheptane (3,5-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Methyloctane (2-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Methyloctane (3-)	C09H20	VOC		128.255	0.3330	0.001%	0.005%	0.001%
Methyloctane (4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Nonane (n-)	C09H20	VOC		128.255	0.3330	0.002%	0.018%	0.002%
Trimethylhexane (2,2,3-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,2,4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Trimethylhexane (2,2,5-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Trimethylhexane (2,3,3-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,3,4-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,3,5-)	C09H20	VOC		128.255	0.3330			
Butylbenzene (t-)	C10H14	VOC		134.218	0.3485			
Butylcyclohexane (i-)	C10H20	VOC		140.266	0.3642			
Butylcyclohexane (t-)	C10H20	VOC		140.266	0.3642			
Decane (n-)	C10H22	VOC		142.282	0.3694	0.001%	0.008%	0.001%
Dimethyloctane (2,2-)	C10H22	VOC		142.282	0.3694			
Dimethyloctane (2,3-)	C10H22	VOC		142.282	0.3694			
Dimethyloctane (3,3-)	C10H22	VOC		142.282	0.3694	0.000%	0.003%	0.000%
Ethyloctane (3-)	C10H22	VOC		142.282	0.3694			
Methylnonane (2-)	C10H22	VOC		142.282	0.3694	0.000%	0.003%	0.000%
Methylnonane (3-)	C10H22	VOC		142.282	0.3694			
Methylnonane (4-)	C10H22	VOC		142.282	0.3694			
Methylnonane (5-)	C10H22	VOC		142.282	0.3694			
Trimethylheptane (2,3,4-)	C10H22	VOC		142.282	0.3694			
Trimethylheptane (2,5,5-)	C10H22	VOC		142.282	0.3694			
Undecane (n-)	C11H24	VOC		156.308	0.4059	0.000%	0.003%	0.000%
Dodecane (n-)	C12H26	VOC		170.335	0.4423	0.000%	0.003%	0.000%
Tridecane (n-)	C13H28	VOC		184.361	0.4787			
Tetradecane (n-)	C14H30	VOC		198.388	0.5151			
Natural Gas				16.977	0.0441	99.940%	100.000%	100.000%
TOC (Total)				16.766	0.0435	98.794%	97.624%	98.853%
VOC (Total)				57.866	0.1503	0.853%	2.910%	0.854%
HAP (Total)				85.428	0.2218	0.048%	0.241%	0.048%
Xylenes				106.165	0.2757	0.002%	0.015%	0.002%

NOTES

1. Vapor density is estimated using the ideal gas law (PV = nRT = (m/M)RT OR ρ = RPT/M), where R = 10.73164 (psia ft^3)/(lb-mol °R).
2. Standard conditions 68 °F
   14.696 psia
3. Mole percentages from analysis on Various of sample collected at Meter Station Avg. Results (3 Most Representative Samples).
The sample is assumed to be representative of the actual gas composition at Waterville Compressor Station.

TABLE H-1a
Piping Components
Hourly and Annual Emission Estimates

Source			WATE-PC-NG			
Service			Gas			
			Natural Gas			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	724 components			
		Emission Factor	4.50E-03 kg/hr/component			
	Connectors	Count	2,631 components			
		Emission Factor	2.00E-04 kg/hr/component			
	Flanges	Count	501 components			
		Emission Factor	3.90E-04 kg/hr/component			
	Open-Ended Lines	Count	9 components			
		Emission Factor	2.00E-03 kg/hr/component			
	Pump Seals	Count	0 components			
		Emission Factor	2.40E-03 kg/hr/component			
	Other	Count	66 components	**Emissions**		
		Emission Factor	8.80E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}		2256.29% by weight	227.7371 lb/hr	997.4885 tpy	273.2845 lb/hr
	CO_2		1.33% by weight	0.1345 lb/hr	0.5890 tpy	0.1614 lb/hr
	TOC (Total)		97.62% by weight	9.8536 lb/hr	43.1587 tpy	11.8243 lb/hr
	Methane		90.198% by weight	9.1041 lb/hr	39.8760 tpy	10.9249 lb/hr
	Ethane		4.522% by weight	0.4564 lb/hr	1.9991 tpy	0.5477 lb/hr
	VOC (Total)		2.904% by weight	0.2931 lb/hr	1.2837 tpy	0.3517 lb/hr
	HAP (Total)		0.240% by weight	0.0242 lb/hr	0.1061 tpy	0.0291 lb/hr
	Benzene		0.085% by weight	8.55E-03 lb/hr	3.74E-02 tpy	1.03E-02 lb/hr
	Ethylbenzene		0.002% by weight	2.10E-04 lb/hr	9.20E-04 tpy	2.52E-04 lb/hr
	Hexane (n-)		0.084% by weight	8.53E-03 lb/hr	3.73E-02 tpy	1.02E-02 lb/hr
	Methanol					
	Naphthalene					
	Toluene		0.054% by weight	5.47E-03 lb/hr	2.40E-02 tpy	6.56E-03 lb/hr
	Trimethylpentane (2,2,4-)					
	Xylenes		0.015% by weight	1.47E-03 lb/hr	6.44E-03 tpy	1.76E-03 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017).
The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings for a similar compressor station.
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on gas analysis used to estimate gas release annual emissions (TABLE G-1a).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.

TABLE H-2a
Piping Components
Hourly and Annual Emission Estimates

Source			WATE-PC-PL			
Service			Light Oil			
			Pipeline Liquids			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	100 components			
		Emission Factor	2.50E-03 kg/hr/component			
	Connectors	Count	666 components			
		Emission Factor	2.10E-04 kg/hr/component			
	Flanges	Count	161 components			
		Emission Factor	1.10E-04 kg/hr/component			
	Open-Ended Lines	Count	11 components			
		Emission Factor	1.40E-03 kg/hr/component			
	Pump Seals	Count	2 components			
		Emission Factor	1.30E-02 kg/hr/component			
	Other	Count	2 components	**Emissions**		
		Emission Factor	7.50E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}		0.96% by weight	0.0098 lb/hr	0.0430 tpy	0.0118 lb/hr
	CO_2		0.01% by weight	0.0001 lb/hr	0.0006 tpy	0.0002 lb/hr
	TOC (Total)		99.99% by weight	1.0227 lb/hr	4.4795 tpy	1.2273 lb/hr
	Methane		0.04% by weight	0.0004 lb/hr	0.0017 tpy	0.0005 lb/hr
	Ethane		0.09% by weight	0.0009 lb/hr	0.0040 tpy	0.0011 lb/hr
	VOC (Total)		99.86% by weight	1.0214 lb/hr	4.4738 tpy	1.2257 lb/hr
	HAP (Total)		14.54% by weight	0.1487 lb/hr	0.6515 tpy	0.1785 lb/hr
	Benzene		1.44% by weight	1.47E-02 lb/hr	6.45E-02 tpy	1.77E-02 lb/hr
	Ethylbenzene		0.48% by weight	4.87E-03 lb/hr	2.13E-02 tpy	5.84E-03 lb/hr
	Hexane (n-)		1.69% by weight	1.73E-02 lb/hr	7.59E-02 tpy	2.08E-02 lb/hr
	Methanol					
	Naphthalene					
	Toluene		4.49% by weight	4.59E-02 lb/hr	2.01E-01 tpy	5.51E-02 lb/hr
	Trimethylpentane (2,2,4-)		0.03% by weight	2.64E-04 lb/hr	1.16E-03 tpy	3.17E-04 lb/hr
	Xylenes		6.42% by weight	6.56E-02 lb/hr	2.87E-01 tpy	7.88E-02 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017). The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings for a similar compressor station.
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on composition estimate (TABLE F-1).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.

TABLE H-3a
Piping Components
Hourly and Annual Emission Estimates

Source			WATE-PC-OIL			
Service			Heavy Oil			
			Oil			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	59 components			
		Emission Factor	8.40E-06 kg/hr/component			
	Connectors	Count	278 components			
		Emission Factor	7.50E-06 kg/hr/component			
	Flanges	Count	94 components			
		Emission Factor	3.90E-07 kg/hr/component			
	Open-Ended Lines	Count	0 components			
		Emission Factor	1.40E-04 kg/hr/component			
	Pump Seals	Count	6 components			
		Emission Factor	8.62E-03 kg/hr/component			
	Other	Count	2 components	**Emissions**		
		Emission Factor	3.20E-05 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}					
	CO_2					
	TOC (Total)		100.00% by weight	0.1199 lb/hr	0.5252 tpy	0.1439 lb/hr
	Methane					
	Ethane					
	VOC (Total)		100.00% by weight	0.1199 lb/hr	0.5252 tpy	0.1439 lb/hr
	HAP (Total)					
	Benzene					
	Ethylbenzene					
	Hexane (n-)					
	Methanol					
	Naphthalene					
	Toluene					
	Trimethylpentane (2,2,4-)					
	Xylenes					

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017). The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings for a similar compressor station.
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based listed on MSDS.
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.

TABLE I-1
Parts Washer
Hourly and Annual Emission Estimates

Solvent			Eversol 143			
Solvent Density			6.84 lb/gal			
Potential	Hourly	Maximum	0.3288 gal/hr			
Make-up Solvent		Average	0.0137 gal/hr	**Emissions**		
Requirement	Annual		120.00 gal/yr	**Avg. Hourly**	**Max. Hourly**	**Max. Annual**
Speciation	TOC (Total)		100.00% by weight	0.0937 lb/hr	2.2484 lb/hr	0.4103 tpy
	Methane					
	Ethane					
	VOC (Total)		100.00% by weight	0.0937 lb/hr	2.2484 lb/hr	0.4103 tpy
	VOC (non-HAP)		100.00% by weight	0.0937 lb/hr	2.2484 lb/hr	0.4103 tpy
	HAP (Total)					
	Benzene					
	Ethylbenzene					
	Hexane (n-)					
	Naphthalene					
	Toluene					
	Trimethylpentane (2,2,4-)					
	Xylenes					

NOTES

1. Although emissions are estimated based on the physical properties and chemical speciation of Eversol 143, other solvents may be used as long as the represented solvent density and chemical species weight percents are not exceeded. MSDS indicate that the vapor pressure at 100°F is less than 5 mmHg (0.097 psia).
2. Potential maximum annual solvent make-up is based on past experience and a safety factor.
3. Potential maximum hourly solvent make-up is the potential maximum annual solvent make-up divided by 365 day/yr.
4. Potential average hourly solvent make-up is the potential maximum annual solvent make-up divided by 8,760 hrs/yr.

APPENDIX C

Traditional BAT Request Letter

July 1, 2015

Mr. Matthew Stanfield
City of Toledo
Department of Public Utilities
Division of Environmental Services
348 S. Erie St.
Toledo, Ohio 43604

RE: NEXUS Gas Transmission – Lucas, OH
Request for Application of Historic BAT Format

Dear Mr. Stanfield:

NEXUS Gas Transmission (NGT) plans to construct a natural gas compressor station in Lucas County, Ohio (Waterville Compressor Station). As part of the Waterville Compressor Station, NGT plans to install one (1) new natural gas-fired Solar Titan 250 combustion turbine sized to a nominal, NEMA-rated capacity of 26,000 horsepower (hp) and equipped with an oxidation catalyst.

Pursuant to the provisions added to Ohio Revised Code (ORC) 3704 as a result of Senate Bill 265, sources modified or constructed after August 3, 2009, are to have rule-based BAT limits established by Ohio EPA for specific source categories. However, Ohio EPA has yet to promulgate the rule based BAT limits. To address this regulatory gap, the Ohio EPA's Division of Air Pollution Control (DAPC) released a memo (February 2014 Memo) indicating that permits filed on or after August 3, 2009, must go through an interim case-by-case BAT procedure.[42]

As clarified in the February 2014 Memo,[43] Ohio EPA requires any entity establishing a synthetic minor restriction to do so in accordance with U.S. EPA's "Limiting Potential to Emit" guidance. The memo states Ohio EPA's belief that BAT established in the format of a source design/design efficiency can be used to limit potential to emit (PTE) for New Source Review (NSR) actions. The February 2014 Memo also asserts that PTE must still be calculated before controls for the purposes of assessing Title V applicability and establishes Ohio EPA's stance that limits established in accordance with the memo are legally and practically enforceable. U.S. EPA since sent a letter[44] to Ohio EPA stating concerns regarding the practical enforceability of the source design BAT format, noting that the format does not establish an expectation of ongoing compliance for the source.

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[42] Ohio EPA Memo from Mike Hopkins, Assistant Chief, Permitting, DAPC, to Permit Writers and Reviewers "BAT Requirements for Permits Issued On or After February 7, 2014" dated February 7, 2014, which supersedes the BAT guidance issued on August 30, 2013. Ohio's BAT policy will be in place only until such time when the Ohio EPA develops and promulgates rules that define BAT in accordance with ORC 3704.03(T) requirements.

[43] Refer to Questions 26, 27, and 28 in the February 2014 Memo.

[44] Letter send from John Mooney (U.S. EPA, Region V, Air Programs Branch) to Mike Hopkins (Ohio EPA) on September 2, 2014.

Ohio EPA has recently issued guidance[45] clarifying that operators may request that BAT be administered in the traditional BAT format (i.e., the format in which BAT would have been administered prior to the implementation of Senate Bill 265). Specifically, the application of the traditional BAT format would result in a short-term (e.g., pound per hour [lb/hr]) limit, annual (e.g., ton per year [tpy]) limit, and associated parametric monitoring for the control device (as necessary). As U.S. EPA has historically approved such limits as an adequate means to limit PTE, no synthetic minor limit is required when BAT has been established in this format. NGT has proposed BAT for the combustion turbine in the application narrative in accordance with this request.

***

NGT respectfully requests that Ohio EPA establish BAT for the combustion turbine in accordance with this letter and the application narrative. Please contact Reagan Mayces at (713) 627-4790 with any questions regarding this request.

Sincerely,

NEXUS GAS TRANSMISSION

Thomas V. Wooden Jr.
Vice President – US Field Operations

[45] Per discussion between Amanda Adams (Trinity Consultants) and Mike Hopkins (Ohio EPA) on November 6, 2014.

APPENDIX D

PTIO APPLICATION FORMS

Application for Permit to Install (PTI) and Permit to Install/Operate (PTIO)

Ohio Environmental Protection Agency
Lazarus Government Center
50 West Town Street, Suite 700
P.O. Box 1049
Columbus, Ohio 43216-1049

For EPA Use Only

Application Number_____

Date Received _____

Facility Information

Note: Application is incomplete if all **bolded** questions throughout the application are not completed.

Legal Facility Name	Waterville Compressor Station			
Alternate Name (if any)				
Facility Physical Address	Moosman Drive			
City, ZIP code	Waterville			
County	Lucas			
Facility ID				
Facility Description	Natural Gas Compressor Station			
NAICS Code	486210			
Facility Latitude	41	degrees 29	minutes 21.65	seconds
Facility Longitude	83	degrees 46	minutes 23.49	seconds
Core Place ID (if known)				
SCSC ID (if known)				

Portable? ☐ Yes ■ No

Portable Type ☐ Asphalt Plant ☐ Concrete Plant ☐ Generator ☐ Aggregate Processing ☐ Concrete Crusher ☐ Grinder ☐ Other

Initial Location County If "Other", describe:

Contact Information

☐ No change to information on file.

❶	☑ Billing	☐ Owner	☑ Primary	☐ Operator	☐ On-Site	☐ Responsible Official

First Name	Last Name	Phone	Fax	E-mail
Reagan	Mayces	713-627-4790		rmmayces@spectraenergy.com

Address 1	Address 2	City or Township	State	Zip Code
P.O. Box 1642		Houston	TX	77251-1642

❷	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☑ Responsible Official

First Name	Last Name	Phone	Fax	E-mail
Thomas	Wooden Jr.	713-627-5400		tvwooden@spectraenergy.com

Address 1	Address 2	City or Township	State	Zip Code
P.O. Box 1642		Houston	TX	77251-1642

❸	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☐ Responsible Official

First Name	Last Name	Phone	Fax	E-mail

Address 1	Address 2	City or Township	State	Zip Code

❹	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☐ Responsible Official

First Name	Last Name	Phone	Fax	E-mail

Address 1	Address 2	City or Township	State	Zip Code

❺	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☐ Responsible Official

First Name	Last Name	Phone	Fax	E-mail

Address 1	Address 2	City or Township	State	Zip Code

❻	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☐ Responsible Official

First Name	Last Name	Phone	Fax	E-mail

Address 1	Address 2	City or Township	State	Zip Code

Division of Air Pollution Control
Application for Permit-to-Install or Permit-to-Install and Operate

Section I – General Application Information

This section should be filled out for each permit to install (PTI) or Permit to Install and Operate (PTIO) application. A PTI is required for all air contaminant sources (emissions units) installed or modified after January 1, 1974 that are subject to OAC Chapter 3745-77. A PTIO is required for all air contaminant sources (emissions units) that are not subject to OAC Chapter 3745-77 (Title V). See the application instructions for additional information.

For OEPA use only:	☐ Installation	☐ Request Federally enforceable restrictions
	☐ Modification	☐ General Permit
	☐ Renewal	☐ Other

1. Is the purpose of this application to transition from OAC Chapter 3745-77 (Title V) to OAC Chapter 3745-31 (PTIO)?

   ☐ yes ■ no

2. **Establish PER Due Date** - Select an annual Permit Evaluation Report (PER) due date for this facility (does not apply to facilities subject to Title V, OAC Chapter 3745-77). If the PER has previously been established and a change is now desired, a PER Change Request form must be filed instead of selecting a date here.

Due Date:	For Time Period:
■ February 15	January 1 through December 31
☐ May 15	April 1 through March 31
☐ August 15	July 1 through June 30
☐ November 15	October 1 through September 30

   ☐ PER not applicable (Title V) or due date already established
   ☐ PER Request Permit Change form attached

3. **Federal Rules Applicability** - Please check all of the appropriate boxes below.

New Source Performance Standards (NSPS)
New Source Performance Standards are listed under 40 CFR 60 - Standards of Performance for New Stationary Sources.
☐ not affected ■ subject to Subpart: JJJJ, KKKK
☐ unknown ☐ exempt - explain below

National Emission Standards for Hazardous Air Pollutants (NESHAP)
National Emissions Standards for Hazardous Air Pollutants are listed under 40 CFR 61. (These include asbestos, benzene, beryllium, mercury, and vinyl chloride).
■ not affected ☐ subject to Subpart: _____
☐ unknown ☐ subject, but exempt - explain below

Maximum Achievable Control Technology (MACT)
The Maximum Achievable Control Technology standards are listed under 40 CFR 63 and OAC rule 3745-31-28.
☐ not affected ■ subject to Subpart: ZZZZ
☐ unknown ☐ subject, but exempt - explain below

Prevention of Significant Deterioration (PSD)
These rules are found under OAC rule 3745-31-10 through OAC rule 3745-31-20.
■ not affected ☐ subject to regulation
☐ unknown

Non-Attainment New Source Review
These rules are found under OAC rule 3745-31-21 through OAC rule 3745-31-27.
■ not affected ☐ subject to regulation
☐ unknown

112 (r) - Risk Management Plan
These rules are found under 40 CFR 68.
■ not affected ☐ subject to regulation
☐ unknown

Title IV (Acid Rain Requirements)
These rules are found under 40 CFR 72 and 40 CFR 73.
■ not affected ☐ subject to regulation
☐ unknown

Please explain why you checked "exempt" in this question for one or more federal rules. Identify each exemption and whether the entire facility and/or the specific air contaminant sources included in this permit application is exempted. Attach an additional page if necessary.

_____

_____

4. Express PTI/PTIO - Do you qualify for express PTI or PTIO processing?

☐ yes ■ no

If yes, are you requesting express processing per OAC rule 3745-31-05?

☐ yes ■ no

5. **Air Contaminant Sources in this Application** - Identify the air contaminant source(s) for which you are applying below. Attach additional pages if necessary. Section II of this application and an EAC form should be completed for each air contaminant source.

Emissions Unit ID*	**Company Equipment ID** (company's name for air contaminant source)	**Equipment Description** (List all equipment that are a part of this air contaminant source)
	See Attached	See Attached

* This ID would have been created when a previous air permit was issued. If no previous permits have been issued for this air contaminant source, leave this field blank. If this air contaminant source was previously identified in STARShip applications as a "Z" source (e.g., Z001), please provide that identification and a new ID will be assigned when the PTI/PTIO is issued.

6. Trade Secret Information - Is any information included in this application being claimed as a trade secret per Ohio Revised Code (ORC) 3704.08?

☐ yes (A "non-confidential" version must also be submitted in order for this application to be deemed complete.)
■ no

7. Permit Application Contact - Person to contact for questions about this application:

Reagan Mayces	EHS Manager, US Operations
Name	Title
P.O. Box 1642, Houston, TX, 77251-1642	
Address (Street, City/Township, State and Zip Code)	
713-627-4790	rmmayces@spectraenergy.com
Phone Fax	E-mail

8. **Authorized Signature** – OAC rule 3745-31-04 states that applications for permits to install or permits to install and operate shall be signed:
   (1) In the case of a corporation, by a principal executive officer of at least the level of vice president, or his duly authorized representative, if such representative is responsible for the overall operation of the facility.
   (2) In the case of a partnership by a general partner.
   (3) In the case of sole proprietorship, by the proprietor, and
   (4) In the case of a municipal, state, federal or other governmental facility, by the principal executive officer, the ranking elected official, or other duly authorized employee.

   Under OAC rule 3745-31-04, this signature shall constitute personal affirmation that all statements or assertions of fact made in the application are true and complete, comply fully with applicable state requirements, and shall subject the signatory to liability under applicable state laws forbidding false or misleading statements.

Authorized Signature (for facility)	Date
Thomas V. Wooden Jr.	Vice President - US Field Operations
Print Name	Title

5. **Air Contaminant Sources in this Application** - Identify the air contaminant source(s) for which you are applying below. Attach additional pages if necessary. Section II of this application and an EAC form should be completed for each air contaminant source.

Emissions Unit ID*	**Company Equipment ID** (company's name for air contaminant source)	**Equipment Description** (List all equipment that are a part of this air contaminant source)
	Combustion Turbine	New natural gas-fired combustion turbine sized 26,000 hp, equipped with an oxidation catalyst
	Gas Release	Periodic Maintenance, routine operations, and pigging activities will occasionally necessitate the evacuation of equipment directly to atmosphere
	Equipment Leaks	Various equipment components will be located throughout the compressor station that may result in fugitive emissions due to equipment leaks
	Separator Vessel #1	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 530 gallons handling condensate liquids collected from the pipeline
	Separator Vessel #2	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 530 gallons handling condensate liquids collected from the pipeline
	Separator Vessel #3	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 400 gallons handling condensate liquids collected from the pipeline
	Separator Vessel #4	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 317 gallons handling condensate liquids collected from the pipeline
	Separator Vessel #5	One vessel modeled as a vertical fixed roof tank with an accumulation capacity of 43 gallons handling condensate liquids collected from the pipeline
	Loading Operation	NGT will periodically transfer the condensate liquids and the used lubricating oil collected on-site to tanker trucks for shipment off-site

* This ID would have been created when a previous air permit was issued. If no previous permits have been issued for this air contaminant source, leave this field blank. If this air contaminant source was previously identified in STARShip applications as a "Z" source (e.g., Z001), please provide that identification and a new ID will be assigned when the PTI/PTIO is issued.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: J001
Company Equipment ID: Loading Operation

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-001-50 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.01
Volatile organic compounds (VOC)					0.01
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					6.00E-04
Highest single HAP: Hexane					2.73E-04
Toxic Air Contaminants (see instructions):					6.00E-04

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: J001
Company Equipment ID: Loading Operation

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
J001	■ Area ☐ Volume	1,677 x 1,417	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Loading Operation			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude			Egress Point Longitude		
J001	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3107 - Loading Rack for Liquid Materials

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
LOADING RACK FOR LIQUID MATERIALS

This form is to be completed for each loading rack for liquid materials. State/Federal regulations which may apply to loading racks for liquid materials are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ☐ Renewal or Modification of Air Permit Number(s) (e.g. J001) J001 _____

2. Maximum Operating Schedule: 24 _____ hours per day; 365 _____ days per year

If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. Complete the following table for each bay:

Bay Identification	Number of Loading Arms	Type of Vehicle Loaded (check one or more)	Loading Method (check one or more)
J001	N/A	☑ Tank Truck ❒ Barge ❒ RR Car ❒ Ship ❒ Other (describe):	❒ Top Load, Splash Fill ❒ Bottom Load ☑ Top Load, fully Submerged ❒ Top Load, Partial Submerged
		❒ Tank Truck ❒ Barge ❒ RR Car ❒ Ship ❒ Other (describe):	❒ Top Load, Splash Fill ❒ Bottom Load ❒ Top Load, fully Submerged ❒ Top Load, Partial Submerged
		❒ Tank Truck ❒ Barge ❒ RR Car ❒ Ship ❒ Other (describe):	❒ Top Load, Splash Fill ❒ Bottom Load ❒ Top Load, fully Submerged ❒ Top Load, Partial Submerged

4. Complete this section for each material loaded.

Liquid Material Loaded	Bay ID	Average Material Vapor Pressure at Loading Temperature (millimeters mercury)	Is liquid a photo-chemically reactive material?*	Maximum Daily Throughput (gallons)	Proposed Maximum Annual Throughput (gallons)
Pipeline Liquids	J001	256.26	❒Yes ☐ No	2,000	4,000
Lubricating Oil	J001	0.32	❒Yes ☐ No	570	6,840
Oily Water	J001	0.32	❒Yes ☐ No	3,000	36,000
			❒Yes ❒ No		

* Photochemically reactive material is defined in OAC rule 3745-21-01(C)(5).

5. Complete this section for each vapor control system.

Type of Vapor Control System (check one):	Minimum Control Efficiency (% by weight):	Maximum Controlled Mass Emissions Rate (pounds/1,000 gallons):	Basis for Mass Emissions Rate Data (check one):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ☑ None ❒ Other (describe):	N/A	N/A	❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ❒ None ❒ Other (describe):			❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ❒ None ❒ Other (describe):			❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ❒ None ❒ Other (describe):			❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P001
Company Equipment ID: Combustion Turbine

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P001
Company Equipment ID: Combustion Turbine

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

2-02-002-01 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)				1.58	6.25
PM • •10 microns in diameter (PE/PM_{10})				1.58	6.25
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)				1.58	6.25
Sulfur dioxide (SO_2)				0.81	3.22
Nitrogen oxides (NO_x)				7.78	31.08
Carbon monoxide (CO)				13.15	7.81
Organic compounds (OC)				1.65	3.31
Volatile organic compounds (VOC)				1.65	3.31
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					0.60
Highest single HAP: Toluene					0.21
Toxic Air Contaminants (see instructions):					0.60

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☒ Yes - fill out the applicable information below.
☐ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P001
Company Equipment ID: Combustion Turbine

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

■ Catalytic Converter
Manufacturer: Solar Year installed: Not Installed **Your ID for control equipment** P001
Describe this control equipment: Oxidation Catalyst
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ■ VOC ☐ SO_2 ☐ NO_x ■ CO ☐ Pb ■ Other HAPs
Estimated capture efficiency (%): _____ Basis for efficiency: Refer to Table B-1Ai for estimated efficiencies
Design control efficiency (%): _____ Basis for efficiency: Refer to Table B-1Ai for estimated efficiencies
Operating control efficiency (%): _____ Basis for efficiency: Refer to Table B-1Ai for estimated efficiencies
■ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: P001

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
P001	A	7.5 ft	50	897		
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
P001 Stack	Round	44.18	656	60	90	120

❷ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❷ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P001	41 deg 29 min 24.79 sec	83 deg 46 min 20.11 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3862 - Stationary Internal Combustion Engine

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STATIONARY INTERNAL COMBUSTION ENGINE

This form is to be completed for each stationary reciprocating or gas turbine engine. State/Federal regulations which may apply to stationary internal combustion engines are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

   ☑ New Permit ☐ Renewal or Modification of Air Permit Number (e.g. P001) P001

2. Maximum Operating Schedule: 24 hours per day; 365 days per year

   If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. Engine type: ☑ Gas turbine ☐ Reciprocating

4. Purpose of engine: ☑ Driving pump or compressor ☐ Driving electrical generator

5. Normal use of engine: ☐ Emergency only ☑ Non-emergency

6. Engine Manufacturer: Solar Model No: 250-30002S4

7. Engine exhaust configuration: (for turbines only)
   ☑ simple cycle *(no heat recovery)*
   ❒ regenerative cycle *(heat recovery to preheat combustion air)*
   ❒ cogeneration cycle *(heat recovered to produce steam)*
   ❒ combined cycle *(heat recovered to produce steam which drives generator)*

8. Input capacities (million BTU/hr): Rated: 196.51 Maximum: 196.51
   Normal: 196.51

   Supplemental burner (duct burner) input capacity, if equipped (million BTU/hr):

   Rated:_____ Maximum:_____ Normal:_____

9. Output capacities (Horsepower): Rated: 29,517 Maximum: 29,517 Normal: 29,517

   (Kilowatts): Rated:_____ Maximum:_____ Normal:_____

   (lbs steam/hr)*: Rated:_____ Maximum:_____ Normal:_____

   **required for cogeneration or combined cycle units only*

10. Type of ignition: ☐ non-spark (diesel) ☑ spark

11. Type of fuel fired (check all that apply):

☑ single fuel
❒ dual fuel

❒ No. 2 oil, low-sulfur
❒ No. 2 oil, high-sulfur
❒ gasoline
❒ other, explain_____

☑ natural gas
❒ diesel
❒ propane

❒ landfill gas
❒ digester gas

12. Complete the following table for all fuels identified in question 11 that are used for the engine and any supplemental (duct) burners, if equipped:

Fuel	HeatContent (BTU/unit)	wt.% Ash	wt.% Sulfur	Fuel Usage		
				Estimated Maximum Per Year	Normal Per Hour	Max. Per Hour
Nat. gas	939.2 BTU/cu ft		gr/scf	1,832,863,560 cu ft	209,231 cu ft	209,231 cu ft
No. 2 oil	BTU/gal			gal	gal	gal
Gasoline	BTU/gal			gal	gal	gal
Diesel	BTU/gal			gal	gal	gal
Landfill/digester gas	BTU/cu ft		ppm	cu ft	cu ft	cu ft
Other (show units)						
List supplemental (duct) burner fuel and information below (show units):						

13. Type of combustion cycle (check all that apply):

❒ 2-stroke
❒ rich-burn
❒ carbureted
❒ other, explain_____

☐ 4-stroke
☐ lean-burn
❒ fuel injected

14. Emissions control techniques (check all that apply):

❒ prestratified charge
☑ catalytic oxidation (CO)
❒ air/fuel ratio
❒ 2-stage rich/lean combustion
❒ water/steam injection
☐ other, explain_____

❒ nonselective catalytic reduction (NSCR)
❒ selective catalytic reduction (SCR)
❒ injection timing retard (ITR)
❒ 2-stage lean/lean combustion
❒ preignition chamber combustion (PCC)

For each emissions control technique checked above, explain what pollutants are controlled by each technique: CO, VOC, and HAPs

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P003
Company Equipment ID: Gas Releases

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P003
Company Equipment ID: Gas Releases

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

3-06-004-02 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					19.82
Volatile organic compounds (VOC)					19.82
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					1.64
Highest single HAP: Hexane					0.58
Toxic Air Contaminants (see instructions):					1.64

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P003
Company Equipment ID: Gas Releases

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (^oF) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P003	■ Area ☐ Volume	1,677 x 1,417	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)
Gas Releases			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P003	41 deg 29 min 21.65 sec	83 deg 46 min 23.49 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3100 - General Process Operation

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
GENERAL PROCESS OPERATION

This form is to be completed for each process operation when there is no specific emissions activity category (EAC) form applicable. If there is more than one end product for this process, copy and complete this form for each additional product (see instructions). Several State/Federal regulations which may apply to process operations are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. P001) P003

2. Maximum Operating Schedule: 24 hours per day; 365 days per year

If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. End product of this process: N/A - Natural Gas released during maintenance blowdown events

4. Hourly production rates (indicate appropriate units). Please see the instructions for clarification of "Maximum" and "Average" for new versus existing operations:

Hourly	Rate	Units (e.g., widgets)
Average production	N/A	N/A
Maximum production	N/A	N/A

5. Annual production rates (indicate appropriate units) Please see the instructions for clarification of "Maximum" and "Actual" for new versus existing operations:

Annual	Rate	Units (e.g., widgets)
Actual production	N/A	N/A
Maximum production	N/A	N/A

6. Type of operation (please check one):

❒ Continuous
❒ Batch (please complete items below)

Minimum cycle* time (minutes): _____
Minimum time between cycles (minutes): _____
Maximum number of cycles per daily 24 hour period: _____
(Note: include cycle time and set up/clean up time.)

*"Cycle" refers to the time the equipment is in operation.

7. Materials used in process at maximum hourly production rate (add rows/pages as needed):

Material	Physical State at Standard Conditions	Principle Use	Amount**
Pipeline Gas	Gas	Venting during planned gas release events	1,365,152 lb/yr

** Please indicate the amount **and** rate (e.g., lbs/hr, gallons/hr, lbs/cycle, etc.).

8. Please provide a narrative description of the process below (e.g., coating of metal parts using high VOC content coatings for the manufacture of widgets; emissions controlled by thermal oxidizer...):

Gas releases associated with routine operation and periodic pipeline maintenance activities.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P004
Company Equipment ID: Separator Vessel #1

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P004
Company Equipment ID: Separator Vessel #1

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.14
Volatile organic compounds (VOC)					0.14
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					8.80E-03
Highest single HAP: Hexane					4.08E-03
Toxic Air Contaminants (see instructions):					8.80E-03

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P004
Company Equipment ID: Separator Vessel #1

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P004-P008	■ Area ☐ Volume	1,677 x 1,417	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	41 deg 29 min 21.65 sec	83 deg 46 min 23.49 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P004-P005

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 1,590 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 530 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 10.83 ft.
Tank shell diameter or width: 5 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 56.84 °F and Maximum 84.59 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 4.9552 psia at average storage temperature
8.1762 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ ^{o}F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 530 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 71 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.67 ft

24. The average height of the liquid material stored within the tank during the year: 5.41 ft.

25. The maximum height of the liquid material stored within the tank during the year: 10.83 ft.

26. The average liquid surface temperature: 56.84 ^{o}F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area	❒ Gasketed	❒ Ungasketed	❒ Sock
_____ Adjustable, center area	❒ Gasketed	❒ Ungasketed	❒ Sock

_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)
_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)
_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P005
Company Equipment ID: Separator Vessel #2

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P005
Company Equipment ID: Separator Vessel #2

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.14
Volatile organic compounds (VOC)					0.14
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					8.80E-03
Highest single HAP: Hexane					4.08E-03
Toxic Air Contaminants (see instructions):					8.80E-03

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P005
Company Equipment ID: Separator Vessel #2

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (^oF) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
N/A						
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
N/A						

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P004-P008	☒ Area ☐ Volume	1,677 x 1,417	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	41 deg 29 min 21.65 sec	83 deg 46 min 23.49 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P004-P005

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 1,590 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 530 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 10.83 ft.
Tank shell diameter or width: 5 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 56.84 °F and Maximum 84.59 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 4.9552 psia at average storage temperature
8.1762 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ ^{o}F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 530 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 71 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.67 ft

24. The average height of the liquid material stored within the tank during the year: 5.41 ft.

25. The maximum height of the liquid material stored within the tank during the year: 10.83 ft.

26. The average liquid surface temperature: 56.84 ^{o}F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area	❒ Gasketed	❒ Ungasketed	❒ Sock
_____ Adjustable, center area	❒ Gasketed	❒ Ungasketed	❒ Sock

_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)
_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)
_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P006
Company Equipment ID: Separator Vessel #3

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P006
Company Equipment ID: Separator Vessel #3

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.11
Volatile organic compounds (VOC)					0.11
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					6.90E-03
Highest single HAP: Hexane					3.20E-03
Toxic Air Contaminants (see instructions):					6.90E-03

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P006
Company Equipment ID: Separator Vessel #3

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P004-P008	■ Area ☐ Volume	1,677 x 1,417	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	41 deg 29 min 21.65 sec	83 deg 46 min 23.49 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P006

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 1,200 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 400 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 10 ft.
Tank shell diameter or width: 4.5 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 56.84 °F and Maximum 84.59 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 4.9552 psia at average storage temperature
8.1762 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ ^{o}F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 400 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 53 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.6 ft

24. The average height of the liquid material stored within the tank during the year: 5 ft.

25. The maximum height of the liquid material stored within the tank during the year: 10 ft.

26. The average liquid surface temperature: 56.84 ^{o}F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area	❒ Gasketed	❒ Ungasketed	❒ Sock
_____ Adjustable, center area	❒ Gasketed	❒ Ungasketed	❒ Sock

_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)
_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)
_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P007
Company Equipment ID: Separator Vessel #4

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P007
Company Equipment ID: Separator Vessel #4

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.60
Volatile organic compounds (VOC)					0.60
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					0.04
Highest single HAP: Hexane					0.02
Toxic Air Contaminants (see instructions):					0.04

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P007
Company Equipment ID: Separator Vessel #4

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (^oF) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P004-P008	☒ Area ☐ Volume	1,677 x 1,417	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	41 deg 29 min 21.65 sec	83 deg 46 min 23.49 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P007

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 950 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 317 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 10 ft.
Tank shell diameter or width: 4 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 56.84 °F and Maximum 84.59 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 4.9552 psia at average storage temperature
8.1762 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ ^{o}F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 317 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 4,000 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.54 ft

24. The average height of the liquid material stored within the tank during the year: 5 ft.

25. The maximum height of the liquid material stored within the tank during the year: 10 ft.

26. The average liquid surface temperature: 56.84 ^{o}F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area	❒ Gasketed	❒ Ungasketed	❒ Sock
_____ Adjustable, center area	❒ Gasketed	❒ Ungasketed	❒ Sock

_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)
_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)
_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P008
Company Equipment ID: Separator Vessel #5

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P008
Company Equipment ID: Separator Vessel #5

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.01
Volatile organic compounds (VOC)					0.01
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					9.00E-04
Highest single HAP: Hexane					3.95E-04
Toxic Air Contaminants (see instructions):					9.00E-04

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P008
Company Equipment ID: Separator Vessel #5

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (^oF) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
N/A						
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
N/A						

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P004-P008	■ Area ☐ Volume	1,677 x 1,417	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Separator Vessels Fugitive			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P005-P009	41 deg 29 min 21.65 sec	83 deg 46 min 23.49 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) P008

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 130 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: 43 gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 8 ft.
Tank shell diameter or width: 1.67 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 56.84 °F and Maximum 84.59 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 4.9552 psia at average storage temperature
8.1762 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ ^{o}F

14. The vapor molecular weight: 66 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 43 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 6 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: 0.22 ft

24. The average height of the liquid material stored within the tank during the year: 4 ft.

25. The maximum height of the liquid material stored within the tank during the year: 8 ft.

26. The average liquid surface temperature: 56.84 ^{o}F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area	❒ Gasketed	❒ Ungasketed	❒ Sock
_____ Adjustable, center area	❒ Gasketed	❒ Ungasketed	❒ Sock

_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)
_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)
_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P801
Company Equipment ID: Equipment Leaks

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P801
Company Equipment ID: Equipment Leaks

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

3-10-002-20 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					6.28
Volatile organic compounds (VOC)					6.28
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					0.76
Highest single HAP: Hexane					0.11
Toxic Air Contaminants (see instructions):					0.76

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (^oF) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P801	■ Area ☐ Volume	1,677 x 1,417	
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)
Equipment Leaks			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
P801	41 deg 29 min 21.65 sec	83 deg 46 min 23.49 sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3100 - General Process Operation

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
GENERAL PROCESS OPERATION

This form is to be completed for each process operation when there is no specific emissions activity category (EAC) form applicable. If there is more than one end product for this process, copy and complete this form for each additional product (see instructions). Several State/Federal regulations which may apply to process operations are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. P001) P801

2. Maximum Operating Schedule: 24 hours per day; 365 days per year

If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. End product of this process: N/A - Fugitive Emissions from Equipment Leaks

4. Hourly production rates (indicate appropriate units). Please see the instructions for clarification of "Maximum" and "Average" for new versus existing operations:

Hourly	Rate	Units (e.g., widgets)
Average production	N/A	N/A
Maximum production	N/A	N/A

5. Annual production rates (indicate appropriate units) Please see the instructions for clarification of "Maximum" and "Actual" for new versus existing operations:

Annual	Rate	Units (e.g., widgets)
Actual production	N/A	N/A
Maximum production	N/A	N/A

6. Type of operation (please check one):

❒ Continuous
❒ Batch (please complete items below)

Minimum cycle* time (minutes): _____
Minimum time between cycles (minutes): _____
Maximum number of cycles per daily 24 hour period: _____
(Note: include cycle time and set up/clean up time.)

*"Cycle" refers to the time the equipment is in operation.

7. Materials used in process at maximum hourly production rate (add rows/pages as needed):

Material	Physical State at Standard Conditions	Principle Use	Amount**
N/A			

** Please indicate the amount **and** rate (e.g., lbs/hr, gallons/hr, lbs/cycle, etc.).

8. Please provide a narrative description of the process below (e.g., coating of metal parts using high VOC content coatings for the manufacture of widgets; emissions controlled by thermal oxidizer...):

Fugitive emissions from various equipment components, including valves, connectors, pump seals, and flanges.

PERMIT TO INSTALL AND OPERATE APPLICATION

NEXUS Gas Transmission, LLC > Kensington, OH

M&R 01

Prepared By:

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September 2015

Project 143601.0141

Trinity Consultants

Environmental solutions delivered uncommonly well

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APPENDIX A – PROCESS FLOW DIAGRAM

APPENDIX B – PTIO & EAC FORMS

APPENDIX C – EMISSION CALCULATIONS DOCUMENTATION

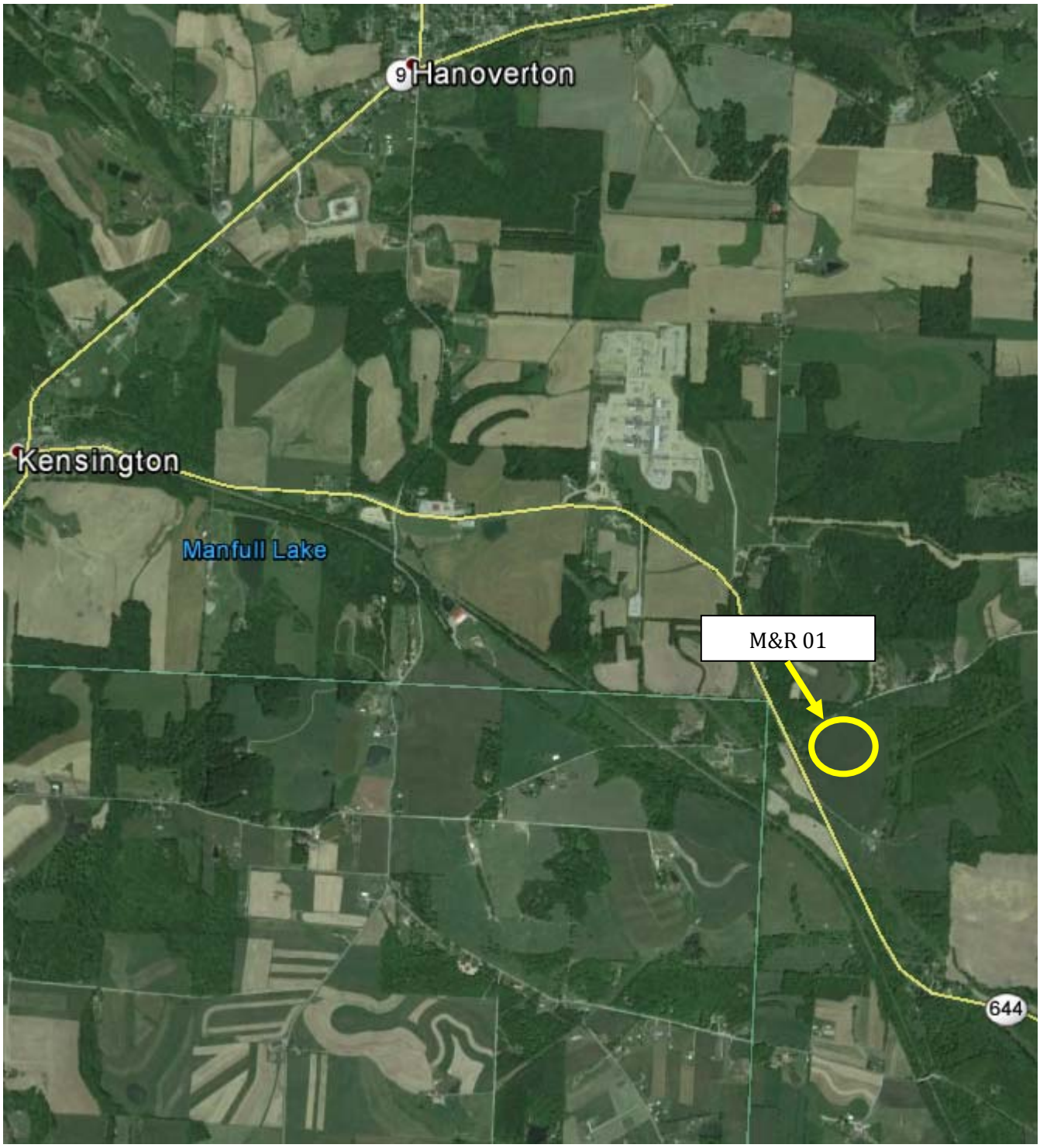
NEXUS Gas Transmission, LLC (NEXUS) plans to construct a new natural gas pipeline to facilitate the delivery of natural gas from Appalachian supplies to markets in Ohio, Michigan, Chicago, and Ontario. NEXUS proposes to construct and operate a pipeline metering and regulating site (M&R 01) located near Kensington, Ohio, in Columbiana County which monitors and measures the quality and quantity of natural gas delivered to regional customers along NEXUS's network of pipelines. With this Permit to Install and Operate (PTIO) application, NEXUS is requesting approval for the construction and operation of this M&R site.

The primary Standard Industrial Classification (SIC) code of the proposed M&R site is 4922 (Natural Gas Transmission and Distribution).

1.1. FACILITY LOCATION

M&R 01 is located approximately 2.5 miles east-southeast of the city of Kensington in Columbiana County. Figure 1-1 is an area map that shows the site location relative to predominant geographical features such as highways and railroads.

Figure 1-1. Area Map for M&R 01



1.2. PROJECT DESCRIPTION

M&R 01 will facilitate the delivery of natural gas along the NEXUS Gas Transmission, LLC (NEXUS) pipeline. NEXUS plans to install the following emission units during the construction of M&R 01. Each of the following emission units is listed with the proposed Ohio Environmental Protection Agency (Ohio EPA) Emission Unit Identification Number (EUID). Refer to Appendix A for a process flow diagram describing the organization of these emission units.

- Emergency Generator (P001) – One (1) new natural gas-fired internal combustion engine rated at a maximum capacity of 265 hp intended to drive a generator to supply power to the facility during emergency situations. Because this engine qualifies for coverage under a Permit by Rule (PBR) in accordance with Ohio Administrative Code (OAC) 3745-31-03(A)(4)(b), the application described herein will not contain any application forms for this unit; rather, NEXUS will submit under separate cover a notification of intent to operate a new emergency engine under Ohio EPA's PBR program.
- Gas Releases (P002) – Periodic maintenance, routine operations, and pigging activities will occasionally necessitate the evacuation of equipment (e.g., turbines, piping components) directly to atmosphere.
- Equipment Leaks (P801) – Various equipment components, including valves, flanges, and connectors will be located throughout the compressor station that may result in fugitive emissions due to equipment leaks.
- Storage Tank (T001) – One vertical fixed roof tank sized to a capacity of 1,000 gallons used to store condensate liquids collected from the pipeline and from station equipment.

M&R 01 will also include the following additional *de minimis* sources under Ohio Administrative Code (OAC) 3745-15-05.

- Process Heater (B001) – One (1) new natural gas-fired heater rated at a heat input capacity of 0.0006 MMBtu/hr intended to provide heat to various streams at the facility.
- Loading Operation (J001) – NEXUS will periodically transfer the condensate liquids collected in T001 to tanker trucks for shipment off-site.

NEXUS requests that the PTIO be issued for all non-exempt, non-*de minimis* emission units to be installed at M&R 01.

1.3. PROJECT EMISSIONS

Table 1-1 provides a summary of the facility-wide potential annual emissions attributable to the installation of M&R 01, including particulate matter, particulate matter with an aerodynamic diameter of less than 10 microns, and particulate matter with an aerodynamic diameter of less than 2.5 microns ($PM/PM_{10}/PM_{2.5}$); nitrogen oxides (NO_X); sulfur dioxide (SO_2); carbon monoxide (CO); volatile organic compounds (VOC); greenhouse gases (i.e., carbon dioxide [CO_2], methane [CH_4], and nitrous oxide [N_2O]) expressed as carbon dioxide equivalents (CO_2e); total hazardous air pollutants (HAP); and xylenes, which is the highest single HAP emitted by the station. Detailed emissions calculations are presented in Appendix C.

Table 1-1. Potential Emissions for M&R 01

EU ID	Emission Unit Description	Annual Emissions (tpy)							
		NO_X	CO	VOC	SO_2	$PM/PM_{10}/PM_{2.5}$	CO_2e [a]	Xylenes	Total HAP
P001	Emergency Generator[b]	3.00	0.37	0.02	3.00E-04	0.03	72	4.01E-05	1.19E-02
P002	Gas Releases	-	-	0.32	-	-	432	1.60E-03	0.03
P801	Equipment Leaks	-	-	2.17	-	-	316	0.11	0.28
T001	Storage Tank	-	-	0.61	-	-	18	4.90E-03	0.04
B001	Process Heater[c]	3.00E-04	4.50E-03	7.00E-04	2.32E-06	2.94E-05	0.47	-	3.00E-04
J001	Loading Operation[c]	-	-	1.19E-02	-	-	1	4.84E-05	7.00E-04
Totals		3.00	0.37	3.13	3.02E-04	0.03	839	0.12	0.36

a. Carbon dioxide equivalent (CO_2e) emissions. Represents the sum of carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4) emissions adjusted by each pollutant's global warming potential as identified in Table A-1 to 40 CFR 98, Subpart A.

b. This unit qualifies for coverage under a Permit by Rule pursuant to OAC 3745-31-03(A)(4)(b).

c. These units are classified as *de minimis* sources under OAC 3745-15-05.

This section of the permit application includes a discussion of potentially applicable federal and state air quality permitting and regulatory requirements.

2.1. FEDERAL REGULATORY APPLICABILITY

2.1.1. Prevention of Significant Deterioration Applicability

The applicability of the Prevention of Significant Deterioration (PSD) permitting program is evaluated for proposed construction, reconstruction, and modification projects that result in an emission increase of a regulated New Source Review (NSR) pollutant for which the area is in attainment with the National Ambient Air Quality Standards (NAAQS). Columbiana County has been designated as "attainment" or "unclassifiable" for all regulated NSR pollutants.[1] Natural gas pipeline facilities are not among the 28 listed source categories in OAC 3745-31-01(NNN)(2)(a); therefore the facility is subject to the PSD major source threshold of 250 tpy provided in OAC 3745-31-01(NNN)(2)(b). As demonstrated in Table 1-1, the proposed M&R 01 will be a minor source of criteria pollutants with respect to the PSD permitting program.

Additionally, the final PSD and Title V Greenhouse Gas (GHG) Tailoring Rule was published in the Federal Register on June 3, 2010 (75 FR 31514) but was ultimately overturned on June 23, 2014 by the US Supreme Court. Under the formerly effective rule, GHGs could, as of July 1, 2011, become "subject to regulation" under the PSD program for construction projects that would result in potential GHG emissions of 100,000 tpy carbon dioxide equivalents (CO_2e) or more. The June 23, 2014 Supreme Court Decision clarifies that construction projects cannot trigger major NSR for GHGs unless major NSR is otherwise triggered for criteria pollutants.

2.1.2. Title V Operating Permit Program Applicability

The Title V operating permit program consolidates state and federal requirements applicable to major sources into a single comprehensive operating permit for the purposes of facilitating ongoing compliance. In accordance with OAC 3745-77, sources with a PTE of 100 tpy or more for criteria pollutants, 25 tpy or more for total HAP, or 10 tpy or more for individual HAP are considered major sources for which applicants must obtain a Title V operating permit.

As mentioned previously, the final PSD and Title V Greenhouse Gas (GHG) Tailoring Rule was published in the Federal Register on June 3, 2010 (75 FR 31514) but was ultimately overturned on June 23, 2014 by the U.S. Supreme Court. Under the formerly effective rule, GHGs could, as of July 1, 2011, become "subject to regulation" under the Title V program for facilities that have a GHG potential to emit of 100,000 tpy CO_2e or more.

U.S. EPA has since issued guidance following the U.S. Supreme Court ruling indicating that, "EPA will no longer apply or enforce federal regulatory provisions or provisions of the EPA-approved Title V programs that require a stationary source to obtain a title V permit solely because the source emits or has the

[1] Attainment designations for Ohio counties are established in 40 CFR 81.336.

potential to emit greenhouse gases above the major source thresholds." EPA also clarifies in this guidance that, "The EPA also does not intend to continue applying regulations that would require Title V programs submitted for approval by the EPA to require that such sources obtain Title V permits."[2]

Table 1-1 shows that facility-wide emissions will not exceed Title V thresholds for criteria pollutants or HAP; therefore, NEXUS is not required to obtain a Title V operating permit for M&R 01.

2.1.3. New Source Performance Standards

NSPS require new, modified, or reconstructed sources in specified source categories to control emissions to the level achievable by the best demonstrated technology as specified in the applicable provisions. Any source subject to an NSPS is also subject to the general provisions of NSPS Subpart A, except as noted.

2.1.3.1. 40 CFR 60, Subpart A - General Provisions – Applicable

All affected sources subject to source specific NSPS are subject to the general provisions of NSPS Subpart A unless specifically excluded by the source-specific NSPS. Subpart A requires initial notification, performance testing, recordkeeping and monitoring, provides reference methods, and mandates general control device requirements for all other subparts as applicable.

2.1.3.2. 40 CFR 60, Subpart Dc – Small Industrial-Commercial-Institutional Steam Generating Units – Not Applicable

NSPS Subpart Dc applies to steam generating units for which construction, modification, or reconstruction is commenced after June 9, 1989 and that have a maximum design heat input capacity of greater than or equal to 10 MMBtu/hr and less than or equal to 100 MMBtu/hr. The Process Heater (B001) is sized to a maximum heat input capacity less than 10 MMBtu/hr. As such, Subpart Dc is not applicable.

2.1.3.3. 40 CFR 60, Subpart Kb – Volatile Organic Liquid Storage Vessels Constructed, Reconstructed, or Modified after July 23, 1984 – Not Applicable

Affected sources under 40 CFR 60, Subpart Kb (NSPS Kb) include all storage vessels with capacities of at least 75 cubic meters (m^3) (19,813 gallons) storing volatile organic liquids (VOL) constructed, reconstructed, or modified after July 23, 1984.

The Storage Vessel (T001) is sized to a nominal storage capacity less than 19,813 gallons; therefore, Subpart Kb is not applicable.

2.1.3.4. 40 CFR 60, Subpart KKK – Equipment Leaks of VOC from Onshore Natural Gas Processing Plants – Not Applicable

NSPS Subpart KKK applies to equipment leaks from natural gas processing plants that were constructed after June 20, 1984 but before August 23, 2011. The facility is not a natural gas processing plant (as defined in 40 CFR 60.631). Therefore, this subpart does not apply.

[2] U.S. EPA memorandum from Ms. Janet G. McCabe to U.S. EPA Regional Administrators dated July 24, 2014.

2.1.3.5. 40 CFR 60, Subpart LLL – SO_2 Emissions from Onshore Natural Gas Processing Plants – Not Applicable

NSPS Subpart LLL applies to onshore natural gas processing facilities that contain sweetening units that commence construction or modification after January 20, 1984. M&R 01 is not a natural gas processing plant and will not contain any sweetening units, as defined in 40 CFR 60.641, and therefore is not subject to this subpart.

2.1.3.6. 40 CFR 60, Subpart JJJJ – Spark Ignition Internal Combustion Engines - Applicable

NSPS Subpart JJJJ establishes requirements for owners or operators of spark ignition internal combustion engines that commence construction, modification, or reconstruction after June 12, 2006 (the date the engine is ordered constitutes construction). The spark ignition internal combustion engine (P001) used at this facility will be considered an emergency stationary internal combustion engine, as defined by 40 CFR 60.4248, and will be constructed and manufactured after the dates mentioned above; therefore, it is subject to the provisions of NSPS Subpart JJJJ.

Per 40 CFR 60.4233(e) the unit will meet the emission standards specified in Table 1 of Subpart JJJJ. NEXUS will ensure that the engine satisfies the monitoring requirements specified in 40 CFR 60.4237(b) by installing a non-resettable hour meter. NEXUS will also ensure that the Emergency Generator (P001) satisfies the compliance requirements for periodic testing and maintenance specified in 40 CFR 60.4243(b)(2), the operational restrictions for emergency engines in 40 CFR 60.4243(d), and the notification, reporting and recordkeeping requirements specified in 40 CFR 60.4245.

2.1.3.6.1. *Emission Limits*

The emergency generator will be subject to the following emissions standards from Table 1 of Subpart JJJJ (emergency engines greater than 130 hp):[3]

- NO_X: 2.0 g/hp-hr or 160 ppmvd @15% O_2
- CO: 4.0 g/hp-hr or 540 ppmvd @15% O_2
- VOC: 1.0 g/hp-hr or 86 ppmvd @15% O_2

2.1.3.6.2. *Testing*

NEXUS will comply with the requirements for a non-certified generator pursuant to 40 CFR 60.4243(a)(2)(ii), including conducting an initial performance test within one year of startup. 40 CFR 60.4245(d) requires the submittal of a copy of the performance test within 60 days of its completion.

2.1.3.6.3. *Monitoring, Recordkeeping, and Reporting*

Since the engine will be used as an emergency generator, a non-resettable hour meter is required.[4] Per 40 CFR 60.4243(d), emergency engines are allowed to be operated according to the following time constraints:

[3] 40 CFR 60.4233(e) Emission standards for operators of stationary SI ICE with a maximum engine power greater than 100 HP
[4] 40 CFR 60.4237(b)

There is no time limit on use in emergency situations.
The emergency ICE can operate for up to 100 hours per year total for the following reasons:

- Maintenance checks and readiness testing, provided that the tests are recommended by federal, state, or local government, the manufacturer, the vendor, the regional transmission organization or equivalent balancing authority and transmission operator, or the insurance company associated with the engine;
- Emergency demand response for periods specified in 40 CFR 60.4243(d)(2)(ii); and
- Periods where there is a deviation of voltage or frequency of 4 percent or greater below standard voltage or frequency.

The emergency ICE can operate for up to 50 hours per year in non-emergency situations. The 50 hours of operation in non-emergency situations are counted as part of the 100 hours per year for maintenance and testing and emergency demand response described in the previous bullet point.

2.1.3.7. 40 CFR 60, Subpart OOOO – Crude Oil and Natural Gas Production, Transmission, and Distribution – Not Applicable

NSPS Subpart OOOO establishes emission standards and compliance schedules for the control of VOC and SO_2 emissions from affected facilities that commence construction, modification or reconstruction after August 23, 2011. Affected facilities include certain units and operations located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment. "Custody transfer" is defined under 40 CFR 60.5430 as the transfer of natural gas after processing and/or treatment in the producing operations, or from storage vessels or automatic transfer facilities or other such equipment, including product loading racks, to pipelines or any other forms of transportation. "Natural gas transmission" is defined under 40 CFR 60.5430 as the pipelines used for long distance transport of natural gas (excluding processing). Specific equipment used in natural gas transmission includes the land, mains, valves, meters, boosters, regulators, storage vessels, dehydrators, compressors, and their driving units and appurtenances, and equipment used for transporting gas from a production plant, delivery point of purchased gas, gathering system, storage area, or other wholesale source of gas to one or more distribution area(s). NEXUS will gain custody of natural gas from production operations, or at "the point of custody transfer." NEXUS and its operations, including M&R 01, will be located in the natural gas transmission segment.

Affected facilities include storage vessels located in the natural gas transmission and storage segment that have the potential for VOC emissions equal to or greater than 6 tpy per 40 CFR 60.5365(e). This requirement specifies that,

> *"The potential for VOC emissions must be calculated using a generally accepted model or calculation methodology, based on the maximum average daily throughput determined for a 30-day period of production prior to the applicable emission determination deadline specified in this section. The determination may take into account requirements under a legally and practically enforceable limit in an operating permit or other requirement established under a Federal, State, local or tribal authority."*

The Storage Tank (T001) will have an annual potential to emit VOC that is less than 6 tpy and is therefore not subject to the requirements of this subpart.

2.1.3.8. 40 CFR 60, Subpart OOOOa – Crude Oil and Natural Gas Production, Transmission, and Distribution – Proposed – Not Applicable

The amendments to NSPS OOOO proposed on August 18, 2015 (i.e., NSPS OOOOa) include requirements for fugitive emissions from compressor stations. In accordance with 40 CFR 60.5430a, a compressor station site is defined as,

…any permanent combination of one or more compressors that move natural gas at increased pressure through gathering or transmission pipelines…

M&R 01 will not include any compressors and will not be subject to the requirements for fugitive emissions proposed in NSPS OOOOa. The Storage Tank (T001) will not be subject to the requirements of NSPS OOOOa for reasons consistent with the applicability determination provided in Section 2.1.3.7.

2.1.3.9. Non-Applicability of All Other NSPS

NSPS standards are developed for particular industrial source categories and the applicability of a particular NSPS to a facility can be readily ascertained based on the industrial source category covered. All other NSPS are categorically not applicable to the proposed project.

2.1.4. National Emission Standards for Hazardous Air Pollutants

NESHAPs, located in 40 CFR 63, are typically applicable to specific categories of sources that have the potential to emit HAP in levels greater than 10 tpy for any individual HAP or 25 tpy for any combination of HAP (i.e., major HAP sources). Emissions and operational limitations provided in the NESHAPs are established on the basis of a Maximum Achievable Control Technology (MACT) determination for a particular major source category.

Furthermore, generally available control technology (GACT)-based NESHAPs (located in 40 CFR 63) require area (i.e., non-major) sources to control emissions to the level achievable by the use of generally available control technologies or management practices to reduce emissions of HAP.

M&R 01 will operate as an area (i.e., non-major) source of HAP as demonstrated in Table 1-1. Each potentially applicable subpart of 40 CFR Part 63 is discussed in the subsections below.

2.1.4.1. 40 CFR 63, Subpart A – General Provisions - Applicable

NESHAP Subpart A, *General Provisions*, contains national emission standards for HAP defined in Section 112(b) of the Clean Air Act. All affected sources, which are subject to another NESHAP, are subject to the general provisions of NESHAP Subpart A, unless specifically excluded by the source-specific NESHAP.

2.1.4.2. 40 CFR 63, Subpart HH – Oil and Natural Gas Production Facilities – Not Applicable

MACT Subpart HH applies to emission points at oil and natural gas production facilities that are HAP major or HAP area sources and that process, upgrade, or store either hydrocarbon liquids or natural gas prior to the point of custody transfer. For area sources, the affected source includes each triethylene glycol (TEG) dehydration unit located at a facility that meets the criteria specified in paragraph (a) of the regulation. Also, the natural gas production facility to which the rule applies ends at the point that the natural gas

enters a facility in the natural gas transmission and storage category per 63.760(a)(3). M&R 01 will not operate a TEG dehydration unit and the station is considered a natural gas transmission and storage facility; therefore, NESHAP Subpart HH does not apply.

2.1.4.3. 40 CFR 63, Subpart HHH – Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities – Not Applicable

MACT Subpart HHH applies to natural gas transmission and storage facilities that transport or store natural gas prior to entering the pipeline to a local distribution company or to a final end user and are major sources of HAP emissions. The proposed M&R 01 is an area source for HAP; therefore this subpart is not applicable.

2.1.4.4. Subpart ZZZZ – Reciprocating Internal Combustion Engines (RICE) - Applicable

The NESHAP found in 40 CFR 63, Subpart ZZZZ (RICE NESHAP) was designed to regulate emissions from stationary reciprocating internal combustion engines at both major and area sources of hazardous air pollutants. The proposed emergency generator engine is classified as a new RICE because it will be constructed after June 12, 2006 and located at an area source of HAP [40 CFR 63.6590(a)(2)(iii)]. Subpart ZZZZ requires all new spark-ignition RICE located at an area source of HAP to comply with NSPS Subpart JJJJ with no additional applicable requirements under the RICE NESHAP [40 CFR 63.6590(c)(1)]. The Emergency Generator (P001) will meet the requirements under the RICE NESHAP by complying with NSPS Subpart JJJJ for spark ignition RICE (refer to the discussion in Section 2.1.3.6).

2.1.4.5. Subpart DDDDD – Industrial, Commercial, and Institutional Boilers and Process Heaters at Major Sources of HAP Emissions – Not Applicable

MACT Subpart DDDDD establishes emission limits, operational standards, and compliance demonstration requirements for HAP emissions from industrial, commercial, and institutional boilers and process heaters at major sources of HAP emissions. M&R 01 is not a major source of HAP emissions; therefore, this regulation is not applicable.

2.1.4.6. Subpart JJJJJJ – Industrial, Commercial, and Institutional Boilers at Area Sources of HAP Emissions – Not Applicable

The provisions of 40 CFR 63, Subpart JJJJJJ establish emission limits, operational standards, and energy assessment requirements for HAP emissions from industrial, commercial, and institutional boilers at area sources of HAP emissions. According to 40 CFR 63.11194(a)(2), affected sources include the collection of all new industrial, commercial, and institutional boilers within a subcategory (e.g., coal, biomass, oil). Furthermore, Subpart JJJJJJ specifically excludes natural gas fired boilers [40 CFR 63.11195(e)]. The proposed Process Heater (B001) is a natural gas fired catalytic style heater and does not meet the definition of industrial, commercial, or institutional boilers as defined in 40 CFR 63.11237; therefore, this regulation is not applicable

2.1.4.7. Non-Applicability of All Other NESHAP

NESHAP standards are developed for particular industrial source categories, and the applicability of a particular NESHAP to a facility can be readily ascertained based on the industrial source covered. All other NESHAP are categorically not applicable to the proposed project.

2.1. STATE REGULATORY APPLICABILITY

2.1.1. OAC 3745-17-07 – Control of Visible Particulate Emissions from Stationary Sources - *Applicable*

OAC 3745-17-07(A) limits visible particulate emissions from all stacks to less than 20 percent opacity, as a 6-minute average, except during periods of startup, shutdown, and malfunction. However, visible emissions may exceed 20 percent opacity, as a 6-minute average, but not for more than 6 consecutive minutes in any 1-hour period. Visible emissions may not exceed 60 percent opacity, as a 6-minute average, at any time. The exhaust stack associated with the Emergency Generator (P001) will be subject to this visible emissions standards.

2.1.2. OAC 3745-17-10 – Restrictions on Particulate Emissions from Fuel Burning Equipment – *Not Applicable*

Pursuant to OAC 3745-17-10(A), OAC 3745-17-10 applies to facilities in which fuel, including any product or by-product of a manufacturing process, is burned for the primary purpose of producing heat or power by indirect heat transfer. The proposed Emergency Generator (P001) will not be subject to the requirements of this rule given that this unit does not produce heat or power by indirect heat transfer.

2.1.3. OAC 3745-17-11 – Restrictions of Particulate Emissions from Industrial Processes - *Applicable*

The emission limits of OAC 3745-17-11 apply to any operation, process, or activity that releases or may release particulate emissions into the ambient air. OAC 3745-17-11(B)(5)(a) limits particulate emissions from small (i.e., less than 600 hp) stationary internal combustion engines to 0.310 lb/MMBtu of heat input. The Emergency Generator (P001) will be subject to this emissions standard.

2.1.4. OAC 3745-18-06 – General SO_2 Emission Limit Provisions – *Not Applicable*

The emission limits of OAC 3745-18-06 apply to any operation, process, or activity that releases or may release SO_2 emissions into the ambient air. Per OAC 3745-18-06(A), stationary gas turbines and stationary IC engines are exempt from OAC 3745-18-06(D), (F), and (G) during any calendar day in which natural gas is the only fuel burned. The proposed Emergency Generator (P001) will burn pipeline quality natural gas only, and are therefore exempt from the requirements of OAC 3745-18-06.

2.1.5. OAC 3745-21-09(L) – Storage of Petroleum Liquids in Fixed Roof Tanks – *Not Applicable*

The provisions of OAC 3745-21-09(L) prohibit the storage of any petroleum liquid with a true vapor pressure (TVP) greater than 1.52 actual pounds per square inch (psia) in fixed roof tanks unless such tanks meet the specified design requirements. Fixed roof tanks with capacities less than 40,000 gallons are exempt from the requirements of OAC 3745-21-09(L)(1) pursuant to OAC 3745-21-09(L)(2)(a). The Storage Vessel (T001) is sized to a nominal storage capacity less than 40,000 gallons. Therefore, OAC 3741-21-09(L) is not applicable.

2.1.6. OAC 3745-21-21 – Storage of Volatile Organic Liquids in Fixed Roof Tanks and External Floating Roof Tanks – *Not Applicable*

M&R 01 is not located in any of the counties affected by this rule; therefore, the storage vessel is not subject to the standards of OAC 3745-21-21.

2.1.7. OAC 3745-110-03 – RACT Requirements and/or Limitations for Emissions of NO_X from Stationary Sources – *Not Applicable*

The emission limitations in OAC 3745-110-03 apply to any new stationary source of NO_X emissions that meets the conditions in OAC 3745-110-02(A)(2). The Emergency Generator (P001) will be new stationary sources that meet the conditions in OAC 3745-110-02(A)(2).

In accordance with OAC 3745-110-03(K)(3), the Emergency Generator (P001) will be exempt from the emission standards of OAC 3745-110-03 given that the engine is rated at a capacity less than 2,000 hp.

Pursuant to the provisions added to Ohio Revised Code (ORC) 3704 as a result of Senate Bill 265 (SB 265), sources modified or constructed after August 3, 2009, are to have rule-based best available technology (BAT) limits established by Ohio EPA for specific source categories. However, Ohio EPA has yet to promulgate the rule-based BAT limits. To address this regulatory gap, the Ohio EPA's Division of Air Pollution Control (DAPC) released a memo on February 7, 2014 (February 2014 Memo), indicating that permits issued on or after August 3, 2009, must go through an interim case-by-case BAT procedure for non-exempt sources (i.e., sources with emission limitations greater than 10 tpy).[5]

The first step in determining BAT, according to the February 2014 Memo, is to review MACT, GACT, BACT, and LAER applicability. The next step is to determine whether the operations are of the type and size that are regulated by Reasonable Available Control Technology (RACT) requirements for VOC emissions.

The third step in the BAT analysis is to determine BAT on a case-by-case basis by: 1) reviewing past BAT determinations, and 2) determining the format for the BAT limit, which should be expressed in one of the following ways:

(1) Work practices;
(2) Source design characteristics or design efficiency of applicable air contaminant control devices;
(3) Raw material specifications or throughput limitations averaged over a 12-month rolling period; or
(4) Monthly allowable emissions averaged over a 12-month rolling period.

Furthermore, the existing "less than 10 tpy" BAT exemption pursuant to OAC 3745-31-05(A)(3)(a)(ii) is not currently approved as part of Ohio's State Implementation Plan (SIP). Ohio EPA is currently in the process of revising the procedures for specifying BAT for sources that have potential emissions less than 10 tpy. In the interim, Ohio EPA is establishing BAT for these sources based on the guidance presented in the February 2014 memo.[6]

3.1. GAS RELEASES BAT

The evacuation of piping during maintenance and routine operations results in the release of gases directly to the atmosphere. In accordance with Item 4.f of the February 2014 memo, NEXUS requests as BAT for gas releases a monthly VOC limit as a rolling, 12-month average as specified in Table 3-1. As described in Item 4.f of the February 2014 Memo, monitoring, recordkeeping, and reporting requirements will not be necessary to support this BAT limit given that potential VOC emissions will not exceed 1 tpy.

[5] Ohio EPA Memo from Mike Hopkins, Assistant Chief, Permitting, DAPC, to Permit Writers and Reviewers "BAT Requirements for Permits Issued On or After February 7, 2014," dated February 7, 2014, which supersedes previous guidance that was issued on August 30, 2013. Ohio's BAT policy will be in place only until such time when the Ohio EPA develops and promulgates rules that define BAT in accordance with Ohio Revised Code (ORC) 3704.03(T) requirements.

[6] Question 34 of the February 2014 Memo.

3.2. EQUIPMENT LEAKS BAT

Piping components (e.g., valves, flanges, connectors) at M&R 01 may exhibit leaks resulting in emissions of VOC. In accordance with Item 4.f of the February 2014 memo, NEXUS requests as BAT for Equipment Leaks a monthly VOC limit as a rolling, 12-month average as specified in Table 3-1.

3.3. STORAGE TANK BAT

Flashing losses, working losses, and breathing losses from the storage tank will generate emissions of VOC. In accordance with Item 4.f of the February 2014 memo, NEXUS requests as BAT for the Storage Tank a monthly VOC limit as a rolling, 12-month average as specified in Table 3-1. As described in Item 4.f of the February 2014 Memo, monitoring, recordkeeping, and reporting requirements will not be necessary to support this BAT limit given that potential VOC emissions will not exceed 1 tpy.

3.4. SUMMARY OF SELECTED BAT EMISSION LIMITS

Table 3-1 summarizes the requested BAT limits for each emission unit at M&R 01.

Table 3-1. Summary of Proposed BAT Limits

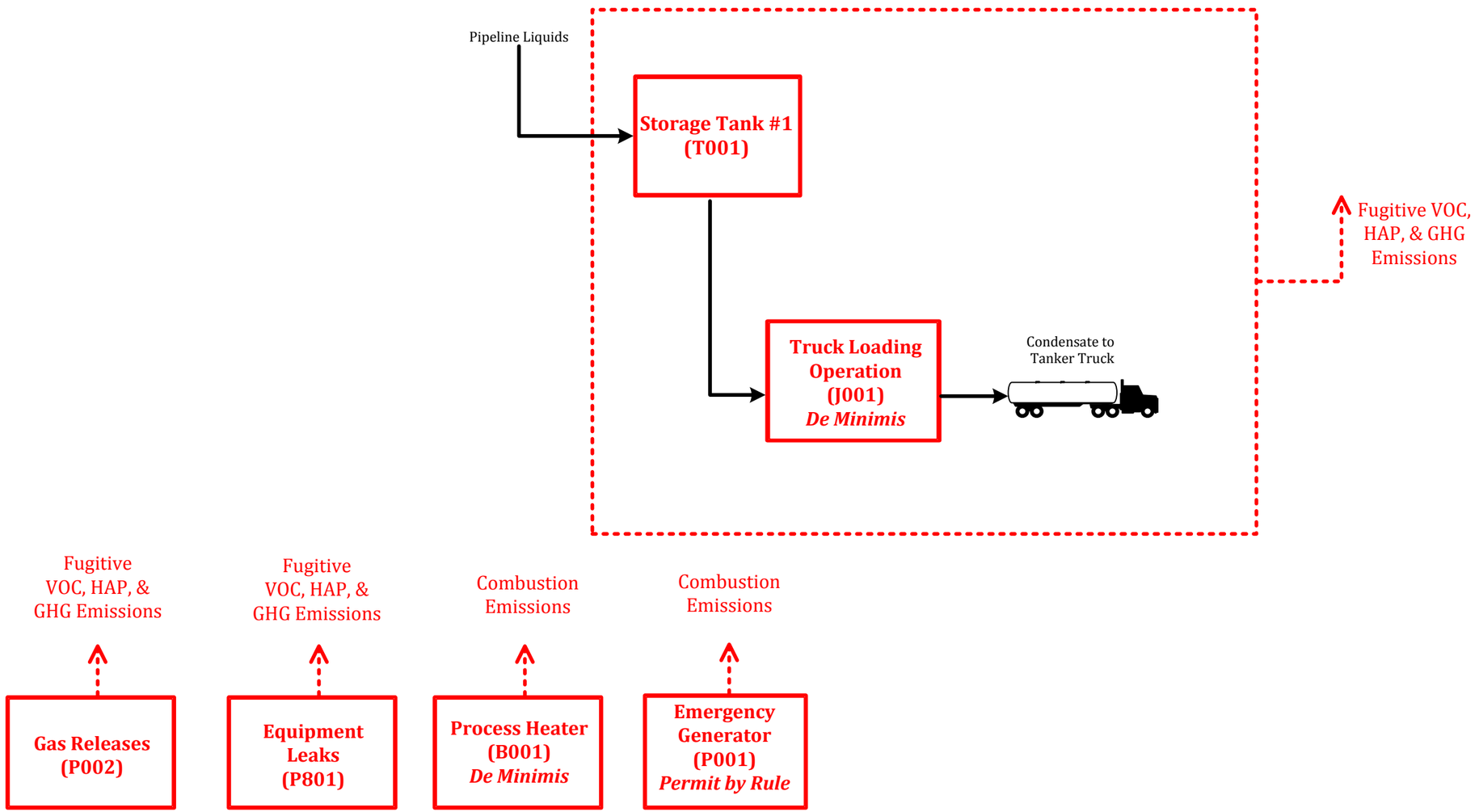
EU ID	Emission Unit Description	VOC (ton/month)[1]
P002	Gas Releases	0.03
P801	Equipment Leaks	0.18
T001	Storage Tank	0.05

1. The requested emission limits are averaged over 12-month rolling period.

APPENDIX A

Process Flow Diagram

APPENDIX A. PROCESS FLOW DIAGRAM FOR M&R 01



NEXUS Gas Transmission, LLC M&R 01	
Process Flow Diagram	
Trinity Consultants	143601.0141 September 2015

PLOT PLAN BOUND SEPARATELY UNDER VOLUME IV – CRITICAL ENERGY INFRASTRUCUTRE INFORMATION – NOT FOR PUBLIC RELEASE

APPENDIX B

PTIO & EAC Forms

Application for Permit to Install (PTI) and Permit to Install/Operate (PTIO)

Ohio Environmental Protection Agency
Lazarus Government Center
50 West Town Street, Suite 700
P.O. Box 1049
Columbus, Ohio 43216-1049

For EPA Use Only

Application Number_____

Date Received _____

Facility Information

Note: Application is incomplete if all **bolded** questions throughout the application are not completed.

Legal Facility Name	M&R 01			
Alternate Name (if any)				
Facility Physical Address	Approximately 2.5 miles east-southeast of Kensington on Mckaig Road			
City, ZIP code	Kensington, 44423			
County	Columbiana			
Facility ID				
Facility Description	Pipeline Metering and Regulating Site			
NAICS Code	486210			
Facility Latitude	40	degrees 43	minutes 29.20	seconds
Facility Longitude	80	degrees 54	minutes 46.89	seconds
Core Place ID (if known)				
SCSC ID (if known)				

Portable? ☐ Yes ■ No

Portable Type ☐ Asphalt Plant ☐ Concrete Plant ☐ Generator ☐ Aggregate Processing ☐ Concrete Crusher ☐ Grinder ☐ Other

Initial Location County If "Other", describe:

Contact Information

☐ No change to information on file.

❶	☑ Billing	☐ Owner	☑ Primary	☐ Operator	☐ On-Site	☐ Responsible Official		
First Name: Reagan	Last Name: Mayces		Phone: 713-627-4790	Fax:	E-mail: rmmayces@spectraenergy.com			
Address 1: P.O. Box 1642	Address 2:	City or Township: Houston	State: TX	Zip Code: 77251-1642				

❷	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☑ Responsible Official		
First Name: Brian	Last Name: McKerlie		Phone: 713-627-5400	Fax:	E-mail:			
Address 1: P.O. Box 1642	Address 2:	City or Township: Houston	State: TX	Zip Code: 77251-1642				

❸	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☐ Responsible Official		
First Name:	Last Name:		Phone:	Fax:	E-mail:			
Address 1:	Address 2:	City or Township:	State:	Zip Code:				

❹	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☐ Responsible Official		
First Name:	Last Name:		Phone:	Fax:	E-mail:			
Address 1:	Address 2:	City or Township:	State:	Zip Code:				

❺	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☐ Responsible Official		
First Name:	Last Name:		Phone:	Fax:	E-mail:			
Address 1:	Address 2:	City or Township:	State:	Zip Code:				

❻	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☐ Responsible Official		
First Name:	Last Name:		Phone:	Fax:	E-mail:			
Address 1:	Address 2:	City or Township:	State:	Zip Code:				

Division of Air Pollution Control
Application for Permit-to-Install or Permit-to-Install and Operate

Section I – General Application Information

This section should be filled out for each permit to install (PTI) or Permit to Install and Operate (PTIO) application. A PTI is required for all air contaminant sources (emissions units) installed or modified after January 1, 1974 that are subject to OAC Chapter 3745-77. A PTIO is required for all air contaminant sources (emissions units) that are not subject to OAC Chapter 3745-77 (Title V). See the application instructions for additional information.

For OEPA use only:	☐ Installation	☐ Request Federally enforceable restrictions
	☐ Modification	☐ General Permit
	☐ Renewal	☐ Other

1. Is the purpose of this application to transition from OAC Chapter 3745-77 (Title V) to OAC Chapter 3745-31 (PTIO)?

   ☐ yes ☒ no

2. **Establish PER Due Date** - Select an annual Permit Evaluation Report (PER) due date for this facility (does not apply to facilities subject to Title V, OAC Chapter 3745-77). If the PER has previously been established and a change is now desired, a PER Change Request form must be filed instead of selecting a date here.

Due Date:	For Time Period:
☒ February 15	January 1 through December 31
☐ May 15	April 1 through March 31
☐ August 15	July 1 through June 30
☐ November 15	October 1 through September 30

   ☐ PER not applicable (Title V) or due date already established
   ☐ PER Request Permit Change form attached

3. **Federal Rules Applicability** - Please check all of the appropriate boxes below.

New Source Performance Standards (NSPS) *New Source Performance Standards are listed under 40 CFR 60 - Standards of Performance for New Stationary Sources.*	☐ not affected ☒ subject to Subpart: JJJJ ☐ unknown ☐ exempt - explain below
National Emission Standards for Hazardous Air Pollutants (NESHAP) *National Emissions Standards for Hazardous Air Pollutants are listed under 40 CFR 61. (These include asbestos, benzene, beryllium, mercury, and vinyl chloride).*	☒ not affected ☐ subject to Subpart: _____ ☐ unknown ☐ subject, but exempt - explain below
Maximum Achievable Control Technology (MACT) *The Maximum Achievable Control Technology standards are listed under 40 CFR 63 and OAC rule 3745-31-28.*	☐ not affected ☒ subject to Subpart: ZZZZ ☐ unknown ☐ subject, but exempt - explain below
Prevention of Significant Deterioration (PSD) *These rules are found under OAC rule 3745-31-10 through OAC rule 3745-31-20.*	☒ not affected ☐ subject to regulation ☐ unknown
Non-Attainment New Source Review *These rules are found under OAC rule 3745-31-21 through OAC rule 3745-31-27.*	☒ not affected ☐ subject to regulation ☐ unknown
112 (r) - Risk Management Plan *These rules are found under 40 CFR 68.*	☒ not affected ☐ subject to regulation ☐ unknown
Title IV (Acid Rain Requirements) *These rules are found under 40 CFR 72 and 40 CFR 73.*	☒ not affected ☐ subject to regulation ☐ unknown

Please explain why you checked "exempt" in this question for one or more federal rules. Identify each exemption and whether the entire facility and/or the specific air contaminant sources included in this permit application is exempted. Attach an additional page if necessary.

_____

_____

4. Express PTI/PTIO - Do you qualify for express PTI or PTIO processing?

☐ yes ■ no

If yes, are you requesting express processing per OAC rule 3745-31-05?

☐ yes ■ no

5. **Air Contaminant Sources in this Application** - Identify the air contaminant source(s) for which you are applying below. Attach additional pages if necessary. Section II of this application and an EAC form should be completed for each air contaminant source.

Emissions Unit ID*	**Company Equipment ID** (company's name for air contaminant source)	**Equipment Description** (List all equipment that are a part of this air contaminant source)
	See Attached	See Attached

* This ID would have been created when a previous air permit was issued. If no previous permits have been issued for this air contaminant source, leave this field blank. If this air contaminant source was previously identified in STARShip applications as a "Z" source (e.g., Z001), please provide that identification and a new ID will be assigned when the PTI/PTIO is issued.

6. Trade Secret Information - Is any information included in this application being claimed as a trade secret per Ohio Revised Code (ORC) 3704.08?

☐ yes (A "non-confidential" version must also be submitted in order for this application to be deemed complete.)
■ no

7. Permit Application Contact - Person to contact for questions about this application:

Reagan Mayces	EHS Manager, US Operations
Name	Title
P.O. Box 1642, Houston, TX, 77251-1642	
Address (Street, City/Township, State and Zip Code)	
713-627-4790	rmmayces@spectraenergy.com
Phone Fax	E-mail

8. **Authorized Signature** – OAC rule 3745-31-04 states that applications for permits to install or permits to install and operate shall be signed:
   (1) In the case of a corporation, by a principal executive officer of at least the level of vice president, or his duly authorized representative, if such representative is responsible for the overall operation of the facility.
   (2) In the case of a partnership by a general partner.
   (3) In the case of sole proprietorship, by the proprietor, and
   (4) In the case of a municipal, state, federal or other governmental facility, by the principal executive officer, the ranking elected official, or other duly authorized employee.

   Under OAC rule 3745-31-04, this signature shall constitute personal affirmation that all statements or assertions of fact made in the application are true and complete, comply fully with applicable state requirements, and shall subject the signatory to liability under applicable state laws forbidding false or misleading statements.

Authorized Signature (for facility)	Date
Brian McKerlie	Vice President
Print Name	Title

5. **Air Contaminant Sources in this Application** - Identify the air contaminant source(s) for which you are applying below. Attach additional pages if necessary. Section II of this application and an EAC form should be completed for each air contaminant source.

Emissions Unit ID*	**Company Equipment ID** (company's name for air contaminant source)	**Equipment Description** (List all equipment that are a part of this air contaminant source)
	Gas Releases	Periodic maintenance, routine operations, and pigging activities will occasionally necessitate the evacuation of equipment directly to atmosphere
	Equipment Leaks	Various equipment components will be located throughout the compressor station that may result in fugitive emissions due to equipment leaks
	Storage Tank	One vertical fixed roof tank sized to a capacity of 1,000 gallons used to store condensate liquids collected from the pipeline and from station equipment.

* This ID would have been created when a previous air permit was issued. If no previous permits have been issued for this air contaminant source, leave this field blank. If this air contaminant source was previously identified in STARShip applications as a "Z" source (e.g., Z001), please provide that identification and a new ID will be assigned when the PTI/PTIO is issued.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P002
Company Equipment ID: Gas Releases

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P002
Company Equipment ID: Gas Releases

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

3-06-004-02 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.32
Volatile organic compounds (VOC)					0.32
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					0.03
Highest single HAP: Benzene					9.30E-03
Toxic Air Contaminants (see instructions):					0.03

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P002
Company Equipment ID: Gas Releases

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (^oF) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information			
❶ **Company ID or Name for the Egress Point** P002	Type* (check one) ■ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point Gas Releases	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❷ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location						
Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude			Egress Point Longitude		
P002	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3100 - General Process Operation

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
GENERAL PROCESS OPERATION

This form is to be completed for each process operation when there is no specific emissions activity category (EAC) form applicable. If there is more than one end product for this process, copy and complete this form for each additional product (see instructions). Several State/Federal regulations which may apply to process operations are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. P001) P002

2. Maximum Operating Schedule: 24 hours per day; 365 days per year

If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. End product of this process: N/A - Natural Gas released during maintenance and routine operations

4. Hourly production rates (indicate appropriate units). Please see the instructions for clarification of "Maximum" and "Average" for new versus existing operations:

Hourly	Rate	Units (e.g., widgets)
Average production	N/A	N/A
Maximum production	N/A	N/A

5. Annual production rates (indicate appropriate units) Please see the instructions for clarification of "Maximum" and "Actual" for new versus existing operations:

Annual	Rate	Units (e.g., widgets)
Actual production	N/A	N/A
Maximum production	N/A	N/A

6. Type of operation (please check one):

❒ Continuous
❒ Batch (please complete items below)

Minimum cycle* time (minutes): _____
Minimum time between cycles (minutes): _____
Maximum number of cycles per daily 24 hour period: _____
(Note: include cycle time and set up/clean up time.)

*"Cycle" refers to the time the equipment is in operation.

7. Materials used in process at maximum hourly production rate (add rows/pages as needed):

Material	Physical State at Standard Conditions	Principle Use	Amount**
Pipeline Gas	Gas	Venting during planned release events	37,827 lb/yr

** Please indicate the amount **and** rate (e.g., lbs/hr, gallons/hr, lbs/cycle, etc.).

8. Please provide a narrative description of the process below (e.g., coating of metal parts using high VOC content coatings for the manufacture of widgets; emissions controlled by thermal oxidizer...):

Gas releases associated with routine operation and periodic pipeline maintenance activities.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P801
Company Equipment ID: Equipment Leaks

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P801
Company Equipment ID: Equipment Leaks

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

3-10-002-20 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					2.17
Volatile organic compounds (VOC)					2.17
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					0.28
Highest single HAP: Xylenes					0.11
Toxic Air Contaminants (see instructions):					0.28

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P801
Company Equipment ID: Equipment Leaks

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P801	■ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)
Equipment Leaks			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude			Egress Point Longitude		
P801	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3100 - General Process Operation

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
GENERAL PROCESS OPERATION

This form is to be completed for each process operation when there is no specific emissions activity category (EAC) form applicable. If there is more than one end product for this process, copy and complete this form for each additional product (see instructions). Several State/Federal regulations which may apply to process operations are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. P001) P801

2. Maximum Operating Schedule: 24 hours per day; 365 days per year

If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. End product of this process: N/A - Fugitive Emissions from Equipment Leaks

4. Hourly production rates (indicate appropriate units). Please see the instructions for clarification of "Maximum" and "Average" for new versus existing operations:

Hourly	Rate	Units (e.g., widgets)
Average production	N/A	N/A
Maximum production	N/A	N/A

5. Annual production rates (indicate appropriate units) Please see the instructions for clarification of "Maximum" and "Actual" for new versus existing operations:

Annual	Rate	Units (e.g., widgets)
Actual production	N/A	N/A
Maximum production	N/A	N/A

6. Type of operation (please check one):

☑ Continuous
❒ Batch (please complete items below)

Minimum cycle* time (minutes): _____
Minimum time between cycles (minutes): _____
Maximum number of cycles per daily 24 hour period: _____
(Note: include cycle time and set up/clean up time.)

*"Cycle" refers to the time the equipment is in operation.

7. Materials used in process at maximum hourly production rate (add rows/pages as needed):

Material	Physical State at Standard Conditions	Principle Use	Amount**
N/A			

** Please indicate the amount **and** rate (e.g., lbs/hr, gallons/hr, lbs/cycle, etc.).

8. Please provide a narrative description of the process below (e.g., coating of metal parts using high VOC content coatings for the manufacture of widgets; emissions controlled by thermal oxidizer...):

Fugitive emissions from various equipment components, including valves, connectors, and flanges.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: T001
Company Equipment ID: Storage Tank

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: T001
Company Equipment ID: Storage Tank

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.61
Volatile organic compounds (VOC)					0.61
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					3.66E-02
Highest single HAP: n-Hexane					2.47E-02
Toxic Air Contaminants (see instructions):					3.66E-02

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: T001
Company Equipment ID: Storage Tank

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
T001	■ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Storage Tank			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude			Egress Point Longitude		
T001	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) T001

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 1,000 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: _____ gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 6 ft.
Tank shell diameter or width: 5.33 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 56.78 °F and Maximum 82.20 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 6.6239 psia at average storage temperature
10.3398 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ ^{o}F

14. The vapor molecular weight: 62 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 1,000 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 4,000 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: _____ ft

24. The average height of the liquid material stored within the tank during the year: 3 ft.

25. The maximum height of the liquid material stored within the tank during the year: 6 ft.

26. The average liquid surface temperature: 56.78 ^{o}F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area	❒ Gasketed	❒ Ungasketed	❒ Sock
_____ Adjustable, center area	❒ Gasketed	❒ Ungasketed	❒ Sock
_____ Adjustable, double-deck roofs			
_____ Fixed			

Roof drain (3-inch diameter)
_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)
_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

APPENDIX C

Emission Calculations Documentation

TABLE A-1
Potential to Emit
Basis
Project Increase

Emission Source				Material/Capacity		Operational Limits												Data Sources
ID	FIN	EPN	Description			Short-Term -- Material Flow			Short-Term -- Capacity			Annual Material Flow			Annual Utilization			
M&R01-PC	M&R01-PC-NG	M&R01-PC-NG	Piping Components	Natural Gas		Valves: 206; Connectors: 0; Flanges: 857; Open-Ended Lines: 39; Pump Seals: 0; Other (blowdown valves, relief valves, and compressor seals): 4												TABLE B-1
	M&R01-PC-PL	M&R01-PC-PL	Piping Components	Pipeline liquids-Condensate		Valves: 72; Connectors: 293; Flanges: 0; Open-Ended Lines: 16; Pump Seals: 0; Other (blowdown valves, relief valves, and compressor seals): 0												TABLE B-2
M&R01-GR	M&R01-GR-ST	M&R01-GR-ST	Gas Release Events	Natural Gas		Natural Gas	80,499	scfh				Natural Gas	815,039	scf/yr	Runtime	N/A		TABLE C-1
	M&R01-GR-PL	M&R01-GR-PL	Gas Release Events	Natural Gas														
MR01-V01	MR01-V01	MR01-V01	Storage Tank	1,000	gal	Pipeline Liquids	1,000	gal/hr				Pipeline Liquids	4,000	gal/yr	Runtime	N/A		TABLE E-2
M&R01-TL-PL	M&R01-TL-PL	M&R01-TL-PL	Truck Loading Area	1,000	gph	Pipeline Liquids	1,000	gal/hr				Pipeline Liquids	4,000	gal/yr	Runtime	N/A		TABLE E-3
M&R01-EGEN01	M&R01-EGEN01	M&R01-EGEN01	Emergency Generator	265	bhp	Natural Gas	2,245	scfh	Power Output	265	bhp	Natural Gas	1,122,440	scf/yr	Runtime	500	hrs/yr	TABLE F-1
M&R01-HIG-01	M&R01-HIG-01	M&R01-HIG-01	Heating Device	0.0006	MMBTU/hr (output)	Natural Gas	0.93	scfh	Heat Input	0.0009	MMBTU/hr	Natural Gas	7,729	scf/yr	Runtime	8,760	hrs/yr	TABLE G-1

TABLE A-1
Potential to Emit
Emissions
Project Increase

Emission Source				Material/Capacity		Potential to Emit																						Data Sources
ID	FIN	EPN	Description			CO_{2-e}		NO_X		CO		$PM_{10/2.5}$		SO_2		VOC (Total)		HAP (Total)		Benzene		Ethylbenzene		Hexane (n-)		Toluene		Xylenes		
						lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
M&R01-PC	M&R01-PC-NG	M&R01-PC-NG	Piping Components	Natural Gas		83.099	303.31									0.0611	0.2230	0.0051	0.0184	0.0018	0.0065	0.0000	0.0002	0.0018	0.0065	0.0011	0.0042	0.0003	0.0011	TABLE B-1
	M&R01-PC-PL	M&R01-PC-PL	Piping Components	Pipeline liquids-Condensate		3.4180	12.4758									0.5339	1.9487	0.0725	0.2645	0.0077	0.0283	0.0023	0.0083	0.0098	0.0358	0.0220	0.0804	0.0305	0.1113	TABLE B-2
M&R01-GR	M&R01-GR-ST	M&R01-GR-ST	Gas Release Events	Natural Gas		86,863	432.25									95.716	0.3178	7.9120	0.0263	2.7918	0.0093	0.0686	0.0002	2.7848	0.0092	1.7865	0.0059	0.4803	0.0016	TABLE C-1
	M&R01-GR-PL	M&R01-GR-PL	Gas Release Events	Natural Gas																									
MR01-V01	MR01-V01	MR01-V01	Storage Tank	Flash		6,244	12.4880									250.51	0.5010	14.9762	0.0300	3.0579	0.0061	0.1653	0.0003	10.7758	0.0216	3.7576	0.0075	2.2272	0.0045	TABLE D-4
				Storage		669.28	5.7092									12.3981	0.1058	0.7722	0.0066	0.1868	0.0016	0.0059	0.0001	0.3579	0.0031	0.1695	0.0014	0.0505	0.0004	TABLE E-2
M&R01-TL-PL	M&R01-TL-PL	M&R01-TL-PL	Truck Loading Area	1,000	gph	477.16	0.6414									8.8391	0.0119	0.5506	0.0007	0.1331	0.0002	0.0042	5.66E-06	0.2552	0.0003	0.1208	0.0002	0.0360	4.84E-05	TABLE E-3
M&R01-EGEN01	M&R01-EGEN01	M&R01-EGEN01	Emergency Generator	265	bhp	288.13	72.0319	11.982	2.9956	1.4781	0.3695	0.1106	0.0277	0.0013	0.0003	0.0717	0.0179	0.0476	0.0119	0.0012	0.0003	0.0001	1.62E-05	0.0003	0.0001	0.0006	0.0001	0.0002	4.01E-05	TABLE F-1
M&R01-HIG-01	M&R01-HIG-01	M&R01-HIG-01	Heating Device	0.0006	MMBTU/hr (output)	0.1130	0.4715	6.84E-05	0.0003	0.0011	0.0045	7.04E-06	2.94E-05	5.56E-07	2.32E-06	0.0002	0.0007	6.10E-05	0.0003	6.78E-08	2.83E-07			5.81E-05	0.0002	1.10E-07	4.58E-07			TABLE G-1
				TOTAL		**94,627.71**	**839.38**	**11.982**	**2.9958**	**1.4791**	**0.3740**	**0.1106**	**0.0277**	**0.0013**	**0.0003**	**368.13**	**3.1269**	**24.336**	**0.3587**	**6.1802**	**0.0522**	**0.2464**	**0.0091**	**14.1855**	**0.0768**	**5.8581**	**0.0998**	**2.8250**	**0.1190**	

TABLE B-1
Piping Components
Hourly and Annual Emission Estimates - Project

Source			M&R01-PC-NG			
Service			Gas			
			Natural Gas			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	206 components			
		Emission Factor	4.50E-03 kg/hr/component			
	Connectors	Count	0 components			
		Emission Factor	2.00E-04 kg/hr/component			
	Flanges	Count	857 components			
		Emission Factor	3.90E-04 kg/hr/component			
	Open-Ended Lines	Count	39 components			
		Emission Factor	2.00E-03 kg/hr/component			
	Pump Seals	Count	0 components			
		Emission Factor	2.40E-03 kg/hr/component			
	Other	Count	4 components	**Emissions**		
		Emission Factor	8.80E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}		2285.41% by weight	69.2489 lb/hr	303.3102 tpy	83.0987 lb/hr
	CO_2		1.33% by weight	0.0404 lb/hr	0.1768 tpy	0.0484 lb/hr
	TOC (Total)		97.62% by weight	2.9580 lb/hr	12.9562 tpy	3.5497 lb/hr
	Methane		91.36% by weight	2.7683 lb/hr	12.1253 tpy	3.3220 lb/hr
	Ethane		4.58% by weight	0.1388 lb/hr	0.6079 tpy	0.1665 lb/hr
	VOC (Total)		1.68% by weight	0.0509 lb/hr	0.2230 tpy	0.0611 lb/hr
	VOC (non-HAP)		1.54% by weight	0.0467 lb/hr	0.2046 tpy	0.0561 lb/hr
	HAP (Total)		0.14% by weight	0.0042 lb/hr	0.0184 tpy	0.0051 lb/hr
	Benzene		0.05% by weight	1.49E-03 lb/hr	6.51E-03 tpy	1.78E-03 lb/hr
	Ethylbenzene		0.00% by weight	3.65E-05 lb/hr	1.60E-04 tpy	4.38E-05 lb/hr
	Hexane (n-)		0.05% by weight	1.48E-03 lb/hr	6.49E-03 tpy	1.78E-03 lb/hr
	Methanol					
	Naphthalene					
	Toluene		0.03% by weight	9.50E-04 lb/hr	4.16E-03 tpy	1.14E-03 lb/hr
	Trimethylpentane (2,2,4-)					
	Xylenes		0.01% by weight	2.56E-04 lb/hr	1.12E-03 tpy	3.07E-04 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017).
The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings (P2).
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on gas analysis used to estimate gas release annual emissions (TABLE C-1).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.
6. Considered new fugitive components at M&R01

TABLE B-2(a)
Piping Components
Hourly and Annual Emission Estimates - Project

Source			M&R01-PC-PL			
Service			Light Oil			
			Condensate-liquid			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	45 components			
		Emission Factor	2.50E-03 kg/hr/component			
	Connectors	Count	206 components			
		Emission Factor	2.10E-04 kg/hr/component			
	Flanges	Count	0 components			
		Emission Factor	1.10E-04 kg/hr/component			
	Open-Ended Lines	Count	16 components			
		Emission Factor	1.40E-03 kg/hr/component			
	Pump Seals	Count	0 components			
		Emission Factor	1.30E-02 kg/hr/component			
	Other	Count	0 components	**Emissions**		
		Emission Factor	7.50E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}		0.96% by weight	0.0038 lb/hr	0.0165 tpy	0.0045 lb/hr
	CO_2		0.01% by weight	0.0001 lb/hr	0.0002 tpy	0.0001 lb/hr
	TOC (Total)		99.99% by weight	0.3927 lb/hr	1.7201 tpy	0.4713 lb/hr
	Methane		0.04% by weight	0.0001 lb/hr	0.0007 tpy	0.0002 lb/hr
	Ethane		0.09% by weight	0.0004 lb/hr	0.0015 tpy	0.0004 lb/hr
	VOC (Total)		99.86% by weight	0.3922 lb/hr	1.7179 tpy	0.4707 lb/hr
	VOC (non-HAP)					
	HAP (Total)		14.54% by weight	0.0571 lb/hr	0.2502 tpy	0.0685 lb/hr
	Benzene		1.44% by weight	5.66E-03 lb/hr	2.48E-02 tpy	6.79E-03 lb/hr
	Ethylbenzene		0.48% by weight	1.87E-03 lb/hr	8.19E-03 tpy	2.24E-03 lb/hr
	Hexane (n-)		1.69% by weight	6.65E-03 lb/hr	2.91E-02 tpy	7.98E-03 lb/hr
	Methanol					
	Naphthalene					
	Toluene		4.49% by weight	1.76E-02 lb/hr	7.73E-02 tpy	2.12E-02 lb/hr
	Trimethylpentane (2,2,4-)		0.03% by weight	1.01E-04 lb/hr	4.44E-04 tpy	1.22E-04 lb/hr
	Xylenes		6.42% by weight	2.52E-02 lb/hr	1.10E-01 tpy	3.02E-02 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017).
The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings (P2).
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on composition estimate (TABLE E-1).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.
6. Considered new fugitive components at M&R01

TABLE B-2(b)
Piping Components
Hourly and Annual Emission Estimates - Project

Source			M&R01-PC-PL			
Service			Light Oil			
			Condensate-vapor			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	27 components			
		Emission Factor	2.50E-03 kg/hr/component			
	Connectors	Count	87 components			
		Emission Factor	2.10E-04 kg/hr/component			
	Flanges	Count	0 components			
		Emission Factor	1.10E-04 kg/hr/component			
	Open-Ended Lines	Count	0 components			
		Emission Factor	1.40E-03 kg/hr/component			
	Pump Seals	Count	0 components			
		Emission Factor	1.30E-02 kg/hr/component			
	Other	Count	0 components	**Emissions**		
		Emission Factor	7.50E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}		1504.37% by weight	2.8446 lb/hr	12.4593 tpy	3.4135 lb/hr
	CO_2		2.18% by weight	0.0041 lb/hr	0.0181 tpy	0.0050 lb/hr
	TOC (Total)		97.82% by weight	0.1850 lb/hr	0.8101 tpy	0.2220 lb/hr
	Methane		60.09% by weight	0.1136 lb/hr	0.4976 tpy	0.1363 lb/hr
	Ethane		9.86% by weight	0.0186 lb/hr	0.0817 tpy	0.0224 lb/hr
	VOC (Total)		27.87% by weight	0.0527 lb/hr	0.2308 tpy	0.0632 lb/hr
	VOC (non-HAP)					
	HAP (Total)		1.74% by weight	0.0033 lb/hr	0.0144 tpy	0.0039 lb/hr
	Benzene		0.42% by weight	7.94E-04 lb/hr	3.48E-03 tpy	9.52E-04 lb/hr
	Ethylbenzene		0.01% by weight	2.51E-05 lb/hr	1.10E-04 tpy	3.01E-05 lb/hr
	Hexane (n-)		0.80% by weight	1.52E-03 lb/hr	6.66E-03 tpy	1.83E-03 lb/hr
	Methanol					
	Naphthalene					
	Toluene		0.38% by weight	7.20E-04 lb/hr	3.15E-03 tpy	8.64E-04 lb/hr
	Trimethylpentane (2,2,4-)		0.00% by weight	7.32E-06 lb/hr	3.20E-05 tpy	8.78E-06 lb/hr
	Xylenes		0.11% by weight	2.15E-04 lb/hr	9.40E-04 tpy	2.58E-04 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017). The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings (P2).
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on vapor composition estimate (TABLE E-1).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.
6. Considered new fugitive components at M&R01

TABLE C-1
Gas Releases
Hourly and Annual Emission Estimates
(Project)

Category	Station Operations					
Source	M&R01-GR-ST			M&R01-GR-PL		
	Avg. Hourly	Max. Annual	Max. Hourly	Avg. Hourly	Max. Annual	Max. Hourly
Gas Release	0 scfh	0 scf/yr	0 scfh	93.041 scfh	815,039 scf/yr	80,499 scfh
	0 lb/hr	0 lb/yr	0 lb/hr	4.3181 lb/hr	37,827 lb/yr	3,833 lb/hr
NO_X						
CO						
SO_2						
$PM_{10/2.5}$						
$CO_{2\text{-}e}$	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	98.687 lb/hr	432.25 tpy	86,863 lb/hr
CO_2	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0575 lb/hr	0.2520 tpy	51.0746 lb/hr
N_2O						
TOC (Total)	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	4.2155 lb/hr	18.4640 tpy	3,742 lb/hr
Methane	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	3.9452 lb/hr	17.2799 tpy	3,472 lb/hr
Ethane	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.1978 lb/hr	0.8663 tpy	174 lb/hr
VOC (Total)	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0726 lb/hr	0.3178 tpy	95.7165 lb/hr
VOC (non-HAP)	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0666 lb/hr	0.2916 tpy	87.8045 lb/hr
HAP (Total)	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0060 lb/hr	0.0263 tpy	7.9120 lb/hr
Acetaldehyde						
Acrolein						
Benzene	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0021 lb/hr	0.0093 tpy	2.7918 lb/hr
Biphenyl						
Butadiene (1,3-)						
Carbon Tetrachloride						
Chlorobenzene						
Chloroform						
Dichloropropene (1,3-)						
Ethylbenzene	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0001 lb/hr	0.0002 tpy	0.0686 lb/hr
Ethylene Dibromide						
Formaldehyde						
Hexane (n-)	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0021 lb/hr	0.0092 tpy	2.7848 lb/hr
Methanol						
Methylene Chloride						
Methylnaphthalene (2-)						
Naphthalene						
PAH						
Phenol						
Propylene Oxide						
Styrene						
Tetrachloroethane (1,1,2,2-)						
Toluene	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0014 lb/hr	0.0059 tpy	1.7865 lb/hr
Trichloroethane (1,1,2-)						
Trimethylpentane (2,2,4-)						
Vinyl Chloride						
Xylenes	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0004 lb/hr	0.0016 tpy	0.4803 lb/hr

NOTES

1. Gas release estimates based on data for a similar compressor station.
2. Gas density is the value extracted from physical property estimation spreadsheets

Density (Lab):	0.0441 lb/scf				Density:
Density (GC - Avg+):	0.0464 lb/scf	Safety Factor (GC):	103%	Average Plus:	0.0464 lb/scf
Density (GC - Max):	0.0476 lb/scf			Maximum:	0.0476 lb/scf

3. As it will be assumed that Gas Chromatograph (GC) is more representative, the following is used to scaled the extended analysis (Lab).

				Average Plus	Maximum	VOC Specie Scaling:	
VOC (Lab):	0.00128 lb/scf	VOC:	GC	0.00074 lb/scf	0.00110 lb/scf	Average Plus:	58%
	2.91% wt%		Use	1.68% wt%	2.50% wt%	Maximum:	86%
Methane (Lab):	90.19% wt%	Methane (Use):		91.36% wt%	90.59% wt%		
Ethane (Lab):	4.52% wt%	Ethane (Use):		4.58% wt%	4.54% wt%		

TABLE C-2
Summary of Gas Release Volumes - Project

Category	Event Information					Gas Release		
	Description		Gas Release	Frequency		Release	Hourly	Annual
	Type	ID	(scf/event)	(hr^{-1})	(yr^{-1})	Point	(scf/hr)	(scf/yr)
Blowdown	Pipeline	M&R	76,284	1	5	M&R	76,284	381,418
Purge	Pipeline	M&R	3,005	1	5	M&R	3,005	15,027
Actuation	Pipeline	0001-HG-D1-30" F/S	65	4	365	RCV305	258	23,572
Actuation	Pipeline	0001-HG-D1-30" F/S	28	4	365	GOV300-1	111	10,101
Actuation	Pipeline	0002-HG-D1-24" F/S	28	4	365	GOV301-1	111	10,101
Actuation	Pipeline	0016-HG-XX-36" Receiver	65	4	365	RCV129A	258	23,572
Actuation	Pipeline	2001-HG-XX-36" Receiver	65	4	365	RCV129A	258	23,572
Actuation	Pipeline	0501-HG-D1-24" F/S	28	4	365	GOV300-2	111	10,101
Actuation	Pipeline	0502-HG-D1-24" F/S	28	4	365	GOV301-2	111	10,101
Actuation	Pipeline	Regulator Run	2	4	365	PM122A	8	741
Actuation	Pipeline	Regulator Run	2	4	365	PCV122A	8	741
Actuation	Pipeline	Regulator Run	2	4	365	PM122B	8	741
Actuation	Pipeline	Regulator Run	2	4	365	PCV122B	8	741
Actuation	Pipeline	Meter run#1	148	4	365	RSV120A	592	54,050
Actuation	Pipeline	Meter run#2	148	4	365	RSV120B	592	54,050
Actuation	Pipeline	Meter run#3	148	4	365	RSV120C	592	54,050
Actuation	Pipeline	Regulator Run	148	4	365	RSIV123A	592	54,050
Actuation	Pipeline	Regulator Run	148	4	365	RSIV123B	592	54,050
Vent	Pipeline	Gas Chromatograph Building	1	4	35,040	GC Building	4	34,261
Station Operations							0	0
Pipeline Operations							80,499	815,039

NOTES

1. Data extracted from TABLE C-3, TABLE C-4, TABLE C-5, and TABLE C-6.
2. For pipeline and station yard blowdowns and purges it is assumed that only a blowdown or purge can take place at any segment of pipeline in any 1-hour period.

Pipeline Blowdown
Purge

TABLE C-3
Blowdown - Project

Piping Description						Initial Conditions			Final Conditions			Event[2]		Gas Release Data		
Location Description			Diameter (in)		Length	Volume	Press.	Temp.	Press.	Temp.	Volume[1]	Frequency		Hourly	Annual	Release
General	Location		nom.	act.	(ft)	(ft^3)	(psig)	(°F)	(psig)	(°F)	(scf)	(hr^{-1})	(yr^{-1})	(scf/hr)	(scf/yr)	Point
Pipeline	M&R	Pipeline from Meter Skid to Regulator	20	19.00	36.00	71	750	50	0	68	4,404	1	5	4,404	22,020	Pipeline - M&R
Pipeline	M&R	Meter Skids	16	15.00	48.00	59	750	50	0	68	3,660	1	5	3,660	18,299	
Pipeline	M&R	Regulator Skid	10	9.75	24.00	12	750	50	0	68	773	1	5	773	3,866	
Pipeline	M&R	Pipeline f/s to meter runs	36	35.00	24.00	160	750	50	0	68	9,963	1	5	9,963	49,813	
Pipeline	M&R	Pipeline from f/s to tank	2	1.94	30.00	1	750	50	0	68	38	1	5	38	191	
Pipeline	M&R	Filter/Separator				246	750	50	0	68	15,273	1	5	15,273	76,367	
Pipeline	M&R	Filter/Separator				246	750	50	0	68	15,273	1	5	15,273	76,367	
Pipeline	M&R	Receiver Barrel	36	35.00	64.80	433	750	50	0	68	26,899	1	5	26,899	134,496	
Pipeline	M&R	Equilizer Line	2	1.94	99.60	2	750	50	0	68	127	1	5	127	634	
Pipeline	M&R	Pipeline from/to Heater Skids	1	0.96	192.00	1	750	50	0	68	60	1	5	60	298	
Pipeline - M&R		TOTAL			226.80	1,227.81	750	50			76,284	1	5	76,283.65	381,418.26	

NOTES

1. Final volume calculated using ideal gas law $[(PV/ZT)_i = (PV/ZT)_f]$. $V_f = V_i\ (P_i/P_f)\ (T_f/T_i)\ (Z_f/Z_i)$, where Z is estimated using the following equation: $Z = 0.9994 - 0.0002P + 3E\text{-}08P^2$.
2. The frequency of events is based on operator experience as to what would reasonably constitute a worst-case scenario.
3. Blowdown of the affected Launcher/Receiver barrel is included with the blowdown of the piping in the Launcher/Receiver Area.
4. For conservatism assumed all lines are blown down simultaneously.
5. Blowdown emissions are from new sources located at M&R01 Station.

TABLE C-4
Purge and Drain - Project

Piping Description		Purge Valve Data		Gas Stream Data											Miscellaneous Factors[3,4,5]					Purge Data[6,7]		Event[8]			Gas Release Data		
General	Location	ID	Type	Throat Cross-Section			Upstream Data				Critical Flow Data[1,2]					Discharge	Adjustment Factors				Fractional	Gas Flow	Frequency		Duration	Hourly	Annual	Release
				Diameter		Area	Pressure		Temp.		Absolute Press.		Absolute Temp.		Velocity	Coefficien					Amount	Rate						
				nom.	act.	**A**	$\mathbf{P_o}$		$\mathbf{T_o}$		Ratio	$\mathbf{P_c}$	Ratio	$\mathbf{T_c}$	$\mathbf{v_c}$	$\mathbf{C_d}$	Valve	Pressure	Temp.	Expansion	Valve	(scf/sec)	(hr^{-1})	(yr^{-1})	(sec)	(scf/hr)	(scf/yr)	Point
				(in)	(in)	(ft^2)	(psig)	(psia)	(°F)	(°R)	$\mathbf{R_{cp}}$ $R_{ct}^{(k/(k-1))}$	P_oR_{cp} (psia)	$\mathbf{R_{ct}}$ 2/(k+1)	(T_o R_{ct}) (°F)	(°R)	(ft/sec)	(n.d.)	Type $\mathbf{F_{vt}}$	$\mathbf{F_P}$ (P_c/P_{STP})	$\mathbf{F_T}$ (T_{STP}/T_c)	$\mathbf{F_Z}$ (Z_{STP}/Z_c)	Opened $\mathbf{f_{open}}$						
											(n.d.)		(n.d.)				(n.d.)	(n.d.)	(n.d.)	(n.d.)	(n.d.)						
Pipeline	M&R	M&R	Plug	2.0	1.939	0.0205	13	27.7	50	510	0.5439	15.06	0.8658	-18.44	441.56	1,273.75	0.98	0.40	1.0227	1.1958	1.0001	100%	13	1	5	240	3,005	15,027	M&R

NOTES

1. The ratio of specific heats for natural gas is assumed to be 1.31 (n.d.).
2. Critical velocity is estimated using the following equation: $(k\,g_c R/M)^{0.5}$. Where,
   g = acceleration due to gravity = 32.174 ft/sec^2
   R = universal gas constant = 1,545 (ft lb)/(lb-mol °R)
   M = molecular weight of gas = 17.7224 lb/lb-mol {TABLE C-7}
3. Discharge coefficient.
4. Valve type adjustment factor.
5. Expansion adjustment factor is estimated using the following equation: $Z = 0.9994 - 0.0002P + 3E\text{-}08P^2$
6. The fractional amount that the valve is opened is based on operator experience as to what would reasonably constitute a worst-case scenario.
7. The purge gas flow rate is estimated using the following equation: $C_d A\, v_c\, F_p\, F_t\, Y\, f_{open}\, F_{vt}$.
8. The frequency and duration of events is based on operator experience as to what would reasonably constitute a worst-case scenario.
9. Gas releases from Low Point Drains are not included if there were no modifications to these drains/valves.

TABLE C-5
Pneumatic - Project

Description				Pneumatic Device				Power Gas					Event			Gas Release Data		
Location Description		Dia.	ID	Vendor	Description		Detail	Pressure		Gas per 90° Stroke		Flow	Frequency		Duration	Hourly	Annual	Release
General	Location	(in.)			Major	Minor		(psig)	(psia)	(scf/psia)	(scf)	(scfm)	(hr^{-1})	(yr^{-1})	(sec)	(scf/hr)	(scf/yr)	Point
Pipeline	0001-HG-D1-30" F/S	36	RCV305	Shafer	Actuator	26x22	26x22	125	140	0.4623	65		4	365	80	258	23572	RCV305
Pipeline	0001-HG-D1-30" F/S	24	GOV300-1	Shafer	Actuator	20x16	20x16	125	140	0.1981	28		4	365	40	111	10101	GOV300-1
Pipeline	0002-HG-D1-24" F/S	24	GOV301-1	Shafer	Actuator	20x16	20x16	125	140	0.1981	28		4	365	40	111	10101	GOV301-1
Pipeline	0016-HG-XX-36" Receiver	36	RCV129A	Shafer	Actuator	26x22	26x22	125	140	0.4623	65		4	365	80	258	23572	RCV129A
Pipeline	2001-HG-XX-36" Receiver	36	RCV129A	Shafer	Actuator	26x22	26x22	125	140	0.4623	65		4	365	80	258	23572	RCV129A
Pipeline	0501-HG-D1-24" F/S	24	GOV300-2	Shafer	Actuator	20x16	20x16	125	140	0.1981	28		4	365	40	111	10101	GOV300-2
Pipeline	0502-HG-D1-24" F/S	24	GOV301-2	Shafer	Actuator	20x16	20x16	125	140	0.1981	28		4	365	40	111	10101	GOV301-2
Pipeline	Regulator Run	16	PM122A	Becker	Actuator		QTCV-T1DB	125	140	0.0145	2		4	365		8	741	PM122A
Pipeline	Regulator Run	16	PCV122A	Becker	Actuator		QTCV-T1DB	125	140	0.0145	2		4	365		8	741	PCV122A
Pipeline	Regulator Run	16	PM122B	Becker	Actuator		QTCV-T1DB	125	140	0.0145	2		4	365		8	741	PM122B
Pipeline	Regulator Run	16	PCV122B	Becker	Actuator		QTCV-T1DB	125	140	0.0145	2		4	365		8	741	PCV122B
Pipeline	Meter run#1	16	RSV120A	Bettis	Actuator	G8040	G8040	125	140	1.0600	148		4	365		592	54050	RSV120A
Pipeline	Meter run#2	16	RSV120B	Bettis	Actuator	G8040	G8040	125	140	1.0600	148		4	365		592	54050	RSV120B
Pipeline	Meter run#3	16	RSV120C	Bettis	Actuator	G8040	G8040	125	140	1.0600	148		4	365		592	54050	RSV120C
Pipeline	Regulator Run	20	RSIV123A	Bettis	Actuator	G8040	G8040	125	140	1.0600	148		4	365		592	54050	RSIV123A
Pipeline	Regulator Run	20	RSIV123B	Bettis	Actuator	G8040	G8040	125	140	1.0600	148		4	365		592	54050	RSIV123B

NOTES

1. Vendor literature to support the estimation of gas consumption and event duration. A 90° stroke is sufficient to open or close a valve.
2. For regulators that are the spring and diaphragm type, gas venting would only occur if spring tears diaphragm.
3. The frequency of events is based on a conservative overestimation.
4. Assuming that valves with 24" and 36" diameters have typical Shafer model number 20x16 and 26x22 operators respectively

TABLE C-6
Gas Chromatograph - Project

Description			Chromatog	Initial Conditions			Final Conditions			Event		Gas Release Data		
Location Description			Vendor	Volume	Press.	Temp.	Press.	Temp.	Volume	Frequency		Hourly	Annual	Release
General	Location	ID		(ft3)	(psig)	(°F)	(psig)	(°F)	(scf)	(hr^{-1})	(yr^{-1})	(scf/hr)	(scf/yr)	Point
Pipeline	Gas Chromatograph Building	TBD	ABB	0.0092	1,200	50	0	68	1	4	35,040	4	34,261	GC Building

NOTES

1. Gas Chromatograph emissions are based on vendor provided total vent volume (includes purge and sample release).

TABLE C-7
Natural Gas
Physical Property Estimations

Component				Molecular Weight M_i $(lb/lb\text{-}mol)_i$	Vapor Density ρ_i $(lb/scf)_i$	Stream		
Name (i)	Formula	Type	HAP			Mole Fraction $f_{n\text{-}i}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $f_{m\text{-}i}$ $(f_{n\text{-}i}M_i)/\sum(f_{n\text{-}i}M_i)$ (lb_i/lb_T)	Volume Fraction $f_{v\text{-}i}$ $f_{m\text{-}i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Nitrogen	N2			28.013	0.0727	0.632%	1.044%	0.633%
Carbon Dioxide	CO2	GHG		44.010	0.1143	0.514%	1.332%	0.514%
Methane	C01H04	GHG		16.042	0.0417	95.390%	90.193%	95.447%
Ethane	C02H06			30.069	0.0781	2.551%	4.522%	2.553%
Propane	C03H08	VOC		44.096	0.1145	0.449%	1.167%	0.449%
Butane (i-)	C04H10	VOC		58.122	0.1509	0.097%	0.333%	0.097%
Butane (n-)	C04H10	VOC		58.122	0.1509	0.114%	0.391%	0.114%
Cyclopentane	C05H10	VOC		70.133	0.1821	0.002%	0.007%	0.002%
Pentane (i-)	C05H12	VOC		72.149	0.1873			
Pentane (i-)	C05H12	VOC		72.149	0.1873			
Pentane (n-)	C05H12	VOC		72.149	0.1873	0.041%	0.176%	0.041%
Benzene	C06H06	VOC	X	78.112	0.2028	0.018%	0.085%	0.018%
Cyclohexane	C06H12	VOC		84.159	0.2185	0.007%	0.035%	0.007%
Methylcyclopentane	C06H12	VOC		84.159	0.2185	0.005%	0.026%	0.005%
Dimethylbutane (2,2-)	C06H14	VOC		86.175	0.2238	0.004%	0.019%	0.004%
Dimethylbutane (2,3-)	C06H14	VOC		86.175	0.2238	0.003%	0.014%	0.003%
Hexane (n-)	C06H14	VOC	X	86.175	0.2238	0.017%	0.085%	0.017%
Methylpentane (2-)	C06H14	VOC		86.175	0.2238	0.014%	0.073%	0.014%
Methylpentane (3-)	C06H14	VOC		86.175	0.2238	0.009%	0.044%	0.009%
Toluene	C07H08	VOC	X	92.138	0.2392	0.010%	0.054%	0.010%
Cycloheptane	C07H14	VOC		98.186	0.2549			
Dimethylcyclopentane (1,1-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Dimethylcyclopentane (1,c-2-)	C07H14	VOC		98.186	0.2549			
Dimethylcyclopentane (1,c-3-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Dimethylcyclopentane (1,t-2-)	C07H14	VOC		98.186	0.2549	0.001%	0.006%	0.001%
Dimethylcyclopentane (1,t-3-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Ethylcyclopentane	C07H14	VOC		98.186	0.2549	0.000%	0.002%	0.000%
Methylcyclohexane	C07H14	VOC		98.186	0.2549	0.007%	0.042%	0.007%
Dimethylpentane (2,2-)	C07H16	VOC		100.202	0.2602	0.001%	0.006%	0.001%
Dimethylpentane (2,3-)	C07H16	VOC		100.202	0.2602	0.002%	0.010%	0.002%
Dimethylpentane (2,4-)	C07H16	VOC		100.202	0.2602	0.001%	0.006%	0.001%
Dimethylpentane (3,3-)	C07H16	VOC		100.202	0.2602	0.001%	0.004%	0.001%
Ethylpentane (3-)	C07H16	VOC		100.202	0.2602	0.000%	0.002%	0.000%
Heptane (n-)	C07H16	VOC		100.202	0.2602	0.009%	0.055%	0.009%
Methylhexane (2-)	C07H16	VOC		100.202	0.2602	0.005%	0.031%	0.005%
Methylhexane (3-)	C07H16	VOC		100.202	0.2602	0.005%	0.030%	0.005%
Trimethylbutane (2,2,3-)	C07H16	VOC		100.202	0.2602	0.001%	0.004%	0.001%
Ethylbenzene	C08H10	VOC	X	106.165	0.2757	0.000%	0.002%	0.000%
Xylene (m-)	C08H10	VOC	X	106.165	0.2757	0.001%	0.006%	0.001%
Xylene (o-)	C08H10	VOC	X	106.165	0.2757	0.000%	0.002%	0.000%
Xylene (p-)	C08H10	VOC	X	106.165	0.2757	0.001%	0.006%	0.001%
Cyclooctane	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,1-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,c-2-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Dimethylcyclohexane (1,c-3-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Dimethylcyclohexane (1,c-4-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,t-2-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Dimethylcyclohexane (1,t-3-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,t-4-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Ethylcyclohexane	C08H16	VOC		112.213	0.2914			

TABLE C-7
Natural Gas
Physical Property Estimations

Component				Molecular Weight	Vapor Density	Stream		
Name (i)	Formula	Type	HAP	$\mathbf{M_i}$ $(lb/lb\text{-}mol)_i$	$\boldsymbol{\rho_i}$ $(lb/scf)_i$	Mole Fraction $\mathbf{f_{n\text{-}i}}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $\mathbf{f_{m\text{-}i}}$ $(f_{n\text{-}i}M_i)/\sum(f_{n\text{-}i}M_i)$ (lb_i/lb_T)	Volume Fraction $\mathbf{f_{v\text{-}i}}$ $f_{m\text{-}i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Ethylcyclopentane (1-methyl-1-)	C08H16	VOC		112.213	0.2914			
Ethylcyclopentane (1-methyl-c-2-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	C08H16	VOC		112.213	0.2914			
Ethylcyclopentane (1-methyl-t-2-)	C08H16	VOC		112.213	0.2914			
Propylcyclopentane (i-)	C08H16	VOC		112.213	0.2914			
Propylcyclopentane (n-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,1,2-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,1,3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,c-3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,t-3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,t-4-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,t-2,c-3-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Trimethylcyclopentane (1,t-2,c-4-)	C08H16	VOC		112.213	0.2914			
Dimethylhexane (2,2-)	C08H18	VOC		114.229	0.2966			
Dimethylhexane (2,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (2,4-)	C08H18	VOC		114.229	0.2966			
Dimethylhexane (2,5-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (3,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (3,4-)	C08H18	VOC		114.229	0.2966	0.001%	0.004%	0.001%
Ethylhexane (3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Methylheptane (2-)	C08H18	VOC		114.229	0.2966	0.002%	0.013%	0.002%
Methylheptane (3-)	C08H18	VOC		114.229	0.2966	0.003%	0.018%	0.003%
Methylheptane (4-)	C08H18	VOC		114.229	0.2966			
Octane (n-)	C08H18	VOC		114.229	0.2966	0.005%	0.034%	0.005%
Trimethylpentane (1,1,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Trimethylpentane (2,2,3-)	C08H18	VOC		114.229	0.2966			
Trimethylpentane (2,2,4-)	C08H18	VOC	X	114.229	0.2966			
Trimethylpentane (2,3,4-)	C08H18	VOC		114.229	0.2966			
Ethyltoluene (m-)	C09H12	VOC		120.192	0.3121			
Ethyltoluene (o-)	C09H12	VOC		120.192	0.3121			
Ethyltoluene (p-)	C09H12	VOC		120.192	0.3121			
Propylbenzene (i-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Propylbenzene (n-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Trimethylbenzene (1,2,4-)	C09H12	VOC		120.192	0.3121			
Trimethylbenzene (1,3,5-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Butylcyclopentane (n-)	C09H18	VOC		126.239	0.3278			
Methylcyclooctane	C09H18	VOC		126.239	0.3278			
Propylcyclohexane (i-)	C09H18	VOC		126.239	0.3278			
Propylcyclohexane (n-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,2-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,c-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,c-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,t-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,c-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,c-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,t-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-3,c-5-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-3,t-5-)	C09H18	VOC		126.239	0.3278			

TABLE C-7
Natural Gas
Physical Property Estimations

Component				Molecular Weight	Vapor Density	Stream		
Name (i)	Formula	Type	HAP	$\mathbf{M_i}$ $(lb/lb\text{-}mol)_i$	$\boldsymbol{\rho_i}$ $(lb/scf)_i$	Mole Fraction $\mathbf{f_{n-i}}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $\mathbf{f_{m-i}}$ $(f_{n-i}M_i)/\sum(f_{n-i}M_i)$ (lb_i/lb_T)	Volume Fraction $\mathbf{f_{v-i}}$ $f_{m-i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Dimethylheptane (2,2-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,3-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,5-)	C09H20	VOC		128.255	0.3330			
Dimethylheptane (2,6-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (3,3-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (3,4-)	C09H20	VOC		128.255	0.3330			
Dimethylheptane (3,5-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Methyloctane (2-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Methyloctane (3-)	C09H20	VOC		128.255	0.3330	0.001%	0.005%	0.001%
Methyloctane (4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Nonane (n-)	C09H20	VOC		128.255	0.3330	0.002%	0.018%	0.002%
Trimethylhexane (2,2,3-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,2,4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Trimethylhexane (2,2,5-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Trimethylhexane (2,3,3-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,3,4-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,3,5-)	C09H20	VOC		128.255	0.3330			
Butylbenzene (t-)	C10H14	VOC		134.218	0.3485			
Butylcyclohexane (i-)	C10H20	VOC		140.266	0.3642			
Butylcyclohexane (t-)	C10H20	VOC		140.266	0.3642			
Decane (n-)	C10H22	VOC		142.282	0.3694	0.001%	0.008%	0.001%
Dimethyloctane (2,2-)	C10H22	VOC		142.282	0.3694			
Dimethyloctane (2,3-)	C10H22	VOC		142.282	0.3694			
Dimethyloctane (3,3-)	C10H22	VOC		142.282	0.3694	0.000%	0.003%	0.000%
Ethyloctane (3-)	C10H22	VOC		142.282	0.3694			
Methylnonane (2-)	C10H22	VOC		142.282	0.3694	0.000%	0.003%	0.000%
Methylnonane (3-)	C10H22	VOC		142.282	0.3694			
Methylnonane (4-)	C10H22	VOC		142.282	0.3694			
Methylnonane (5-)	C10H22	VOC		142.282	0.3694			
Trimethylheptane (2,3,4-)	C10H22	VOC		142.282	0.3694			
Trimethylheptane (2,5,5-)	C10H22	VOC		142.282	0.3694			
Undecane (n-)	C11H24	VOC		156.308	0.4059	0.000%	0.003%	0.000%
Dodecane (n-)	C12H26	VOC		170.335	0.4423	0.000%	0.003%	0.000%
Tridecane (n-)	C13H28	VOC		184.361	0.4787			
Tetradecane (n-)	C14H30	VOC		198.388	0.5151			
Natural Gas				16.977	0.0441	99.940%	100.000%	100.000%
TOC (Total)				16.766	0.0435	98.794%	97.624%	98.853%
VOC (Total)				57.866	0.1503	0.853%	2.910%	0.854%
HAP (Total)				85.428	0.2218	0.048%	0.241%	0.048%
Xylenes				106.165	0.2757	0.002%	0.015%	0.002%

NOTES

1. Vapor density is estimated using the ideal gas law ($PV = nRT = (m/M)RT$ OR $\rho = RPT/M$), where R = 10.73164 (psia ft^3)/(lb-mol °R).
2. Standard conditions 68 °F
   14.696 psia
3. Mole percentages from analysis on Various of sample collected at Meter Station Avg. Results (3 Most Representative Samples).
The sample is assumed to be representative of the actual gas composition at M&&R01 Station

TABLE D-1
Flash Analysis
Summary of Laboratory Analysis

	FEED Pressurized Liquid	VAPOR Flash Gas	LIQUID Residual Liquid
Pressure	575.000 psig	0.034 psig	0.034 psig
	589.696 psia	14.730 psia	14.730 psia
Temperature	72 °F	60 °F	60 °F
API Gravity at 60°F	73.960 n.d.	788.526 n.d.	61.227 n.d.
Specific Gravity at 60°F	0.6887 n.d. (water)	0.1538 n.d. (water)	0.7342 n.d. (water)
	3.3880 n.d. (air)	0.9301 n.d. (air)	4.4320 n.d. (air)
Molecular Weight	98.125 lb/lb-mol	26.938 lb/lb-mol	128.362 lb/lb-mol
Density at 60°F and 14.730 psia	5.747 lb/gal	1.283 lb/gal	6.126 lb/gal
	0.2593 lb/ft^3	0.0712 lb/ft^3	0.3392 lb/ft^3
	22.1622 ft^3/gal	18.0282 ft^3/gal	18.0610 ft^3/gal
	930.8120 ft^3/bbl	757.1853 ft^3/bbl	758.5600 ft^3/bbl
	378.4123 $ft^3/lb\text{-}mol$	378.4123 $ft^3/lb\text{-}mol$	378.4123 $ft^3/lb\text{-}mol$
	17.0747 gal/lb-mol	20.9900 gal/lb-mol	20.9520 gal/lb-mol
	2.4598 lb-mol/bbl	2.0010 lb-mol/bbl	2.0046 lb-mol/bbl
Density at 68°F and 14.696 psia	947.3299 scf/bbl	770.6220 scf/bbl	772.0211 scf/bbl
	385.1275 scf/lb-mol	385.1275 scf/lb-mol	385.1275 scf/lb-mol
	2.4598 lb-mol/bbl	2.0010 lb-mol/bbl	2.0046 lb-mol/bbl
Vapor to Liquid Mole Ratio (V/L)	0.4249 n.d. ($lb\text{-}mol_{VAPOR}/lb\text{-}mol_{LIQUID}$)		
Mole Balance	1.0000 bbl	0.3666 bbl	0.8612 bbl
	2.4598 lb-mol	0.7335 lb-mol	1.7263 lb-mol
	947.3299 scf	282.4903 scf	664.8396 scf
Flash Factor (FF)	328.0318 scf_{VAPOR}/bbl_{LIQUID}		

NOTES

1. Sample Data: Location: Atlanta, TX
   Date: 04/15/09
   Time: Not Recorded
2. Reference Conditions: SPL Standard
   T = 60 °F 68 °F
   P = 14.730 psia 14.696 psia
   Water 8.344 lb/gal 8.338 lb/gal
   Air 0.0765 lb/ft^3 0.0752 lb/ft^3
3. V + L = F => F = (1 + V/L)L {Overall Mole Balance}.

TABLE D-2
Flash Analysis
Extrapolation of Specie Mole Percentages

						Liquid Dump Flash Data				
						Input			Output	
						Liquid	Scaled	*Calculated*	Vapor	Liquid
Component						z_i		z_i	y_i	x_i
Name (i)	GC Postition	SPL Class	Formula	Type	HAP	(mol_{i-F}/mol_F)		(mol_{i-F}/mol_F)	(mol_{i-V}/mol_V)	(mol_{i-L}/mol_L)
Nitrogen	1		N2			0.034%	0.034%	0.030%	0.101%	0.000%
Carbon Dioxide	3		CO2	GHG		0.968%	0.968%	0.970%	3.163%	0.038%
Methane	2		C01H04	GHG		20.922%	20.922%	20.921%	69.445%	0.303%
Ethane	4		C02H06			3.391%	3.391%	3.390%	10.467%	0.383%
Propane	5		C03H08	VOC		2.183%	2.183%	2.180%	5.339%	0.838%
Butane (i-)	6		C04H10	VOC		1.232%	1.232%	1.230%	2.126%	0.849%
Butane (n-)	7		C04H10	VOC		1.721%	1.721%	1.720%	2.495%	1.391%
Pentane (i-)	8		C05H12	VOC		2.354%	2.354%	2.350%	1.895%	2.543%
Pentane (n-)	9		C05H12	VOC		1.622%	1.622%	1.620%	1.056%	1.859%
Dimethylbutane (2,2-)	10	Hexanes	C06H14	VOC		0.174%	0.174%	0.174%	0.050%	0.227%
Dimethylbutane (2,3-)	11	Hexanes	C06H14	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Cyclopentane	12	Hexanes	C05H10	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylpentane (2-)	13	Hexanes	C06H14	VOC		1.218%	1.218%	1.218%	0.352%	1.586%
Methylpentane (3-)	14	Hexanes	C06H14	VOC		0.912%	0.912%	0.912%	0.264%	1.187%
Hexane (n-)	15	Hexanes	C06H14	VOC	X	1.937%	1.937%	1.937%	0.561%	2.522%
Dimethylpentane (2,2-)	16	Heptanes	C07H16	VOC		0.311%	0.311%	0.311%	0.032%	0.430%
Methylcyclopentane	17	Heptanes	C06H12	VOC		1.134%	1.134%	1.134%	0.116%	1.566%
Dimethylpentane (2,4-)	18	Heptanes	C07H16	VOC		0.128%	0.128%	0.128%	0.013%	0.177%
Trimethylbutane (2,2,3-)	19	Heptanes	C07H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Benzene	20	Heptanes	C06H06	VOC	X	1.713%	1.713%	1.713%	0.175%	2.366%
Dimethylpentane (3,3-)	21	Heptanes	C07H16	VOC		0.221%	0.221%	0.221%	0.023%	0.305%
Cyclohexane	22	Heptanes	C06H12	VOC		1.106%	1.106%	1.106%	0.113%	1.528%
Methylhexane (2-)	23	Heptanes	C07H16	VOC		2.292%	2.292%	2.292%	0.235%	3.166%
Dimethylpentane (2,3-)	24	Heptanes	C07H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclopentane (1,1-)	25	Heptanes	C07H14	VOC		0.603%	0.603%	0.603%	0.062%	0.833%
Methylhexane (3-)	26	Heptanes	C07H16	VOC		2.379%	2.379%	2.379%	0.244%	3.286%
Dimethylcyclopentane (1,t-3-)	27	Heptanes	C07H14	VOC		0.163%	0.163%	0.163%	0.017%	0.225%
Dimethylcyclopentane (1,c-3-)	28	Heptanes	C07H14	VOC		0.266%	0.266%	0.266%	0.027%	0.367%
Ethylpentane (3-)	29	Heptanes	C07H16	VOC		0.029%	0.029%	0.029%	0.003%	0.040%
Dimethylcyclopentane (1,t-2-)	30	Heptanes	C07H14	VOC		0.222%	0.222%	0.222%	0.023%	0.307%
Trimethylpentane (2,2,4-)	31	Heptanes	C08H18	VOC	X	0.021%	0.021%	0.021%	0.002%	0.029%
Heptane (n-)	32	Heptanes	C07H16	VOC		3.742%	3.742%	3.742%	0.383%	5.169%
Methylcyclohexane	33	Octanes	C07H14	VOC		3.301%	3.301%	3.301%	0.136%	4.646%
Trimethylcyclopentane (1,1,3-)	34	Octanes	C08H16	VOC		0.225%	0.225%	0.225%	0.009%	0.317%
Dimethylhexane (2,2-)	35	Octanes	C08H18	VOC		0.095%	0.095%	0.095%	0.004%	0.134%
Dimethylcyclopentane (1,c-2-)	36	Octanes	C07H14	VOC		0.848%	0.848%	0.848%	0.035%	1.193%
Dimethylhexane (2,5-)	37	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,4-)	38	Octanes	C08H18	VOC		0.143%	0.143%	0.143%	0.006%	0.201%
Ethylcyclopentane	39	Octanes	C07H14	VOC		0.464%	0.464%	0.464%	0.019%	0.653%
Trimethylpentane (2,2,3-)	40	Octanes	C08H18	VOC		0.028%	0.028%	0.028%	0.001%	0.039%
Trimethylcyclopentane (1,t-2,c-4-)	41	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (3,3-)	42	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	43	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylpentane (2,3,4-)	44	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,3-)	45	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Toluene	46	Octanes	C07H08	VOC	X	4.444%	4.444%	4.444%	0.183%	6.255%
Trimethylcyclopentane (1,1,2-)	47	Octanes	C08H16	VOC		0.371%	0.371%	0.371%	0.015%	0.522%
Dimethylhexane (3,4-)	48	Octanes	C08H18	VOC		3.505%	3.505%	3.505%	0.144%	4.933%
Methylheptane (2-)	49	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylheptane (4-)	50	Octanes	C08H18	VOC		2.896%	2.896%	2.896%	0.119%	4.076%
Dimethylhexane (3,4-)	51	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylheptane (3-)	52	Octanes	C08H18	VOC		0.416%	0.416%	0.416%	0.017%	0.585%
Ethylhexane (3-)	53	Octanes	C08H18	VOC		0.111%	0.111%	0.111%	0.005%	0.156%
Trimethylcyclopentane (1,c-2,t-4-)	54	Octanes	C08H16	VOC		0.028%	0.028%	0.028%	0.001%	0.039%
Dimethylcyclohexane (1,c-3-)	55	Octanes	C08H16	VOC		0.170%	0.170%	0.170%	0.007%	0.239%
Trimethylcyclopentane (1,c-2,t-3-)	56	Octanes	C08H16	VOC		0.170%	0.170%	0.170%	0.007%	0.239%
Dimethylcyclohexane (1,t-4-)	57	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,5-)	58	Octanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,1-)	59	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	60	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	61	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	62	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,4-)	63	Octanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	64	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Cycloheptane	65	Octanes	C07H14	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Octane (n-)	66	Octanes	C08H18	VOC		4.372%	4.372%	4.372%	0.180%	6.153%
Trimethylhexane (2,4,4-)	67	Nonanes	C09H20	VOC		0.190%	0.190%	0.190%	0.003%	0.269%
Tetramethylpentane (2,2,4,4-)	68	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	69	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Dimethylcyclohexane (1,c-4-)	70	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Trimethylcyclopentane (1,c-2,c-3-)	71	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Propylcyclopentane (i-)	72	Nonanes	C08H16	VOC		0.348%	0.348%	0.348%	0.006%	0.493%
Trimethylhexane (2,3,5-)	73	Nonanes	C09H20	VOC		0.006%	0.006%	0.006%	0.000%	0.009%
Dimethylheptane (2,2-)	74	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,4-)	75	Nonanes	C09H20	VOC		0.158%	0.158%	0.158%	0.003%	0.224%
Methylcyclopentane (1-ethyl-c-2-)	76	Nonanes	C08H16	VOC		0.181%	0.181%	0.181%	0.003%	0.257%
Trimethylhexane (2,2,3-)	77	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%

TABLE D-2
Flash Analysis
Extrapolation of Specie Mole Percentages

Component						Liquid Dump Flash Data				
						Input			Output	
						Liquid	Scaled	*Calculated*	Vapor	Liquid
Name (i)	GC Postition	SPL Class	Formula	Type	HAP	z_i ($mol_{i\text{-}F}/mol_F$)		z_i ($mol_{i\text{-}F}/mol_F$)	y_i ($mol_{i\text{-}V}/mol_V$)	x_i ($mol_{i\text{-}L}/mol_L$)
Dimethylcyclohexane (1,c-2-)	78	Nonanes	C08H16	VOC		0.510%	0.510%	0.510%	0.009%	0.723%
Dimethylheptane (2,6-)	79	Nonanes	C09H20	VOC		0.112%	0.112%	0.112%	0.002%	0.159%
Propylcyclopentane (n-)	80	Nonanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	81	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclohexane	82	Nonanes	C08H16	VOC		1.365%	1.365%	1.365%	0.023%	1.935%
Dimethylheptane (2,5-)	83	Nonanes	C09H20	VOC		0.067%	0.067%	0.067%	0.001%	0.095%
Dimethylheptane (3,5-)	84	Nonanes	C09H20	VOC		0.067%	0.067%	0.067%	0.001%	0.095%
Trimethylcyclohexane (1,1,3-)	85	Nonanes	C09H18	VOC		0.077%	0.077%	0.077%	0.001%	0.109%
Trimethylhexane (2,3,3-)	86	Nonanes	C09H20	VOC		0.038%	0.038%	0.038%	0.001%	0.054%
Dimethylheptane (3,3-)	87	Nonanes	C09H20	VOC		0.038%	0.038%	0.038%	0.001%	0.054%
Trimethylcyclohexane (1,1,4-)	88	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Tetramethylpentane (2,2,3,3-)	89	Nonanes	C09H20	VOC		0.261%	0.261%	0.261%	0.004%	0.370%
Ethylbenzene	90	Nonanes	C08H10	VOC	X	0.406%	0.406%	0.406%	0.007%	0.576%
Trimethylhexane (2,3,4-)	91	Nonanes	C09H20	VOC		0.007%	0.007%	0.007%	0.000%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	92	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,3-)	93	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	94	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Xylene (m-)	95	Nonanes	C08H10	VOC	X	2.462%	2.462%	2.462%	0.042%	3.490%
Xylene (p-)	96	Nonanes	C08H10	VOC	X	2.462%	2.462%	2.462%	0.042%	3.490%
Dimethylheptane (3,4-)	97	Nonanes	C09H20	VOC		0.092%	0.092%	0.092%	0.002%	0.130%
Methyloctane (2-)	98	Nonanes	C09H20	VOC		0.782%	0.782%	0.782%	0.013%	1.109%
Methyloctane (4-)	99	Nonanes	C09H20	VOC		0.782%	0.782%	0.782%	0.013%	1.109%
Dimethylheptane (3,4-)	100	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methyloctane (3-)	101	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Butylcyclopentane (i-)	102	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	103	Nonanes	C09H18	VOC		0.231%	0.231%	0.231%	0.004%	0.327%
Trimethylcyclohexane (1,t-2,c-4-)	104	Nonanes	C09H18	VOC		0.231%	0.231%	0.231%	0.004%	0.327%
Xylene (o-)	105	Nonanes	C08H10	VOC	X	0.547%	0.547%	0.547%	0.009%	0.775%
Trimethylcyclohexane (1,1,2-)	106	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	107	Nonanes	C09H18	VOC		0.200%	0.200%	0.200%	0.003%	0.284%
Trimethylcyclohexane (1,c-2,c-4-)	108	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Nonane (n-)	109	Nonanes	C09H20	VOC		2.884%	2.884%	2.884%	0.050%	4.088%
Unknowns	110	Decanes+	C10+	VOC		10.753%	10.753%	10.753%	0.079%	15.288%
TOTAL						100.001%	100.000%	99.984%	100.001%	99.976%
TOC (Total)						98.999%	98.998%	98.984%	96.737%	99.938%
VOC (Total)						74.686%	74.685%	74.673%	16.825%	99.252%
Hexanes						4.241%	4.240%	4.241%	1.227%	5.521%
Heptanes						14.330%	14.310%	14.330%	1.468%	19.795%
Octanes						21.587%	21.610%	21.587%	0.888%	30.382%
Nonanes						14.663%	14.660%	14.663%	0.252%	20.786%
Decanes+						10.753%	10.770%	10.753%	0.079%	15.288%
HAP (Total)						13.992%	13.992%	13.992%	1.022%	19.503%
Xylenes						1.209%	1.209%	1.209%	0.021%	1.714%

NOTES

1. Sample Data: Location: Atlanta, TX; Date: 04/15/09; Dimethyloctane (2,3-); Time: Not Recorded
2. $v_i + l_i = f_i$; $y_i = v_i/V$; $x_i = l_i/L$; $z_i = f_i/F$ => $y_iV + x_iL = z_iF$ => $y_i(V/L)L + x_iL = z_i(1 + V/L)L$ => $z_i = [y_i(V/L) + x_i]/[1 + (V/L)]$ {Mole Balance}.
3. V/L = 0.4249; 1 + V/L = 1.4249
4. z_i is refined to the same number if significant digits as y_i and x_i using the component mole balance and laboratory results for V/L.
5. z_i is scale using the hydrocarbon (e.g., hexanes+) z_i percentage in the flash analysis results, with the exception of HAP species.
6. $[y_i ; x_i]$ mole percent for species of hydrocarbons is estimated using scaled lab mole percent results for z_i and $[y ; x]_{HC}$ for the hydrocarbon.

(assumes v_i/l_i is same for all hydrocarbon species)

$(v/l)_{hexanes}$ = 0.2219

$y_{hexanes}$ = 1.227%; $x_{hexanes}$ = 5.520%; $z_{hexanes}$ = 4.240%

$y_i = z_i(y/z)_{hexanes}$ = 0.2894 z_i

$x_i = z_i(x/z)_{hexanes}$ = 1.3019 z_i

TABLE D-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular Weight	Density	Mole Percent	Weight Percent
Name (i)	Type	HAP	$(lb/mol)_i$	$(lb/scf)_i$	(mol_i/mol_T)	(lb_i/lb_T)
Nitrogen			28.013	0.0727	0.030%	0.009%
Carbon Dioxide	GHG		44.010	0.1143	0.970%	0.435%
Methane	GHG		16.042	0.0417	20.924%	3.421%
Ethane			30.069	0.0781	3.391%	1.039%
Propane	VOC		44.096	0.1145	2.181%	0.980%
Butane (i-)	VOC		58.122	0.1509	1.230%	0.729%
Butane (n-)	VOC		58.122	0.1509	1.720%	1.019%
Pentane (i-)	VOC		72.149	0.1873	2.350%	1.728%
Pentane (n-)	VOC		72.149	0.1873	1.620%	1.191%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.174%	0.153%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	1.218%	1.070%
Methylpentane (3-)	VOC		86.175	0.2238	0.912%	0.801%
Hexane (n-)	VOC	X	86.175	0.2238	1.937%	1.701%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.311%	0.318%
Methylcyclopentane	VOC		84.159	0.2185	1.134%	0.973%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.128%	0.131%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	1.713%	1.364%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.221%	0.226%
Cyclohexane	VOC		84.159	0.2185	1.106%	0.949%
Methylhexane (2-)	VOC		100.202	0.2602	2.292%	2.341%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.603%	0.603%
Methylhexane (3-)	VOC		100.202	0.2602	2.379%	2.430%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.163%	0.163%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.266%	0.266%
Ethylpentane (3-)	VOC		100.202	0.2602	0.029%	0.030%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.222%	0.222%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.021%	0.024%
Heptane (n-)	VOC		100.202	0.2602	3.743%	3.822%
Methylcyclohexane	VOC		98.186	0.2549	3.302%	3.304%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.225%	0.257%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.095%	0.111%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	0.848%	0.849%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.143%	0.166%
Ethylcyclopentane	VOC		98.186	0.2549	0.464%	0.464%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.028%	0.033%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE D-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	4.445%	4.174%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.371%	0.424%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	3.506%	4.081%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	2.896%	3.372%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.416%	0.484%
Ethylhexane (3-)	VOC		114.229	0.2966	0.111%	0.129%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.028%	0.032%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.170%	0.194%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.170%	0.194%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	4.373%	5.090%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.190%	0.248%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.053%	0.061%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.053%	0.061%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.053%	0.061%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.348%	0.398%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.006%	0.008%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.158%	0.207%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.181%	0.207%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.510%	0.583%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.112%	0.146%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	1.365%	1.561%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.067%	0.088%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.067%	0.088%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.077%	0.099%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.038%	0.050%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.038%	0.050%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE D-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.261%	0.341%
Ethylbenzene	VOC	X	106.165	0.2757	0.406%	0.439%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.007%	0.009%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	2.462%	2.664%
Xylene (p-)	VOC	X	106.165	0.2757	2.462%	2.664%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.092%	0.120%
Methyloctane (2-)	VOC		128.255	0.3330	0.782%	1.022%
Methyloctane (4-)	VOC		128.255	0.3330	0.782%	1.022%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.231%	0.297%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.231%	0.297%
Xylene (o-)	VOC	X	106.165	0.2757	0.547%	0.592%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.200%	0.257%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	2.884%	3.770%
Unknowns	VOC		**283.704**	0.7366	10.755%	31.094%
Pressurized Liquid			98.125	0.2548	100.000%	100.000%
TOC (Total)			98.677	0.2562	99.000%	99.556%
VOC (Total)			124.943	0.3244	74.685%	95.096%
HAP (Total)			92.449	0.2400	7.356%	6.931%
Xylenes			106.165	0.2757	5.472%	5.920%

NOTES

1. Normalized mole percentages from TABLE D-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE D-1.

MW = 98.125 lb/lb-mol

TABLE D-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular Weight	Density	Mole Percent	Weight Percent
Name (i)	Type	HAP	$(lb/mol)_i$	$(lb/scf)_i$	(mol_i/mol_T)	(lb_i/lb_T)
Nitrogen			28.013	0.0727	0.101%	0.105%
Carbon Dioxide	GHG		44.010	0.1143	3.163%	5.167%
Methane	GHG		16.042	0.0417	69.444%	41.356%
Ethane			30.069	0.0781	10.467%	11.683%
Propane	VOC		44.096	0.1145	5.339%	8.739%
Butane (i-)	VOC		58.122	0.1509	2.126%	4.587%
Butane (n-)	VOC		58.122	0.1509	2.495%	5.383%
Pentane (i-)	VOC		72.149	0.1873	1.895%	5.075%
Pentane (n-)	VOC		72.149	0.1873	1.056%	2.828%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.050%	0.161%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	0.352%	1.128%
Methylpentane (3-)	VOC		86.175	0.2238	0.264%	0.844%
Hexane (n-)	VOC	X	86.175	0.2238	0.561%	1.793%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.032%	0.119%
Methylcyclopentane	VOC		84.159	0.2185	0.116%	0.363%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.013%	0.049%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	0.175%	0.509%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.023%	0.084%
Cyclohexane	VOC		84.159	0.2185	0.113%	0.354%
Methylhexane (2-)	VOC		100.202	0.2602	0.235%	0.873%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.062%	0.225%
Methylhexane (3-)	VOC		100.202	0.2602	0.244%	0.907%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.017%	0.061%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.027%	0.099%
Ethylpentane (3-)	VOC		100.202	0.2602	0.003%	0.011%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.023%	0.083%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.002%	0.009%
Heptane (n-)	VOC		100.202	0.2602	0.383%	1.426%
Methylcyclohexane	VOC		98.186	0.2549	0.136%	0.495%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.009%	0.039%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.004%	0.017%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	0.035%	0.127%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.006%	0.025%
Ethylcyclopentane	VOC		98.186	0.2549	0.019%	0.070%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.001%	0.005%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE D-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular Weight	Density	Mole Percent	Weight Percent
Name (i)	Type	HAP	$(lb/mol)_i$	$(lb/scf)_i$	(mol_i/mol_T)	(lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	0.183%	0.625%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.015%	0.064%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.144%	0.611%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	0.119%	0.505%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.017%	0.073%
Ethylhexane (3-)	VOC		114.229	0.2966	0.005%	0.019%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.001%	0.005%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.007%	0.029%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.007%	0.029%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	0.180%	0.763%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.003%	0.016%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.001%	0.004%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.001%	0.004%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.001%	0.004%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.006%	0.025%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.003%	0.013%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.003%	0.013%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.009%	0.037%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.002%	0.009%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	0.023%	0.098%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.001%	0.005%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.001%	0.005%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.001%	0.006%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.001%	0.003%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.001%	0.003%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE D-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.004%	0.021%
Ethylbenzene	VOC	X	106.165	0.2757	0.007%	0.028%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.000%	0.001%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	0.042%	0.167%
Xylene (p-)	VOC	X	106.165	0.2757	0.042%	0.167%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.002%	0.008%
Methyloctane (2-)	VOC		128.255	0.3330	0.013%	0.064%
Methyloctane (4-)	VOC		128.255	0.3330	0.013%	0.064%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.004%	0.019%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.004%	0.019%
Xylene (o-)	VOC	X	106.165	0.2757	0.009%	0.037%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.003%	0.016%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	0.050%	0.236%
Unknowns	VOC		**473.700**	1.2300	0.079%	1.387%
Flash Gas			26.938	0.0699	100.000%	100.000%
TOC (Total)			26.379	0.0685	96.736%	94.728%
VOC (Total)			66.745	0.1733	16.825%	41.688%
HAP (Total)			88.115	0.2288	0.762%	2.492%
Xylenes			106.165	0.2757	0.094%	0.371%

NOTES

1. Normalized mole percentages from TABLE D-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE D-1, unless value negative.

MW = 26.938 lb/lb-mol

TABLE D-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular Weight	Density	Mole Percent	Weight Percent
Name (i)	Type	HAP	$(lb/mol)_i$	$(lb/scf)_i$	(mol_i/mol_T)	(lb_i/lb_T)
Nitrogen			28.013	0.0727	0.000%	0.000%
Carbon Dioxide	GHG		44.010	0.1143	0.038%	0.013%
Methane	GHG		16.042	0.0417	0.303%	0.038%
Ethane			30.069	0.0781	0.383%	0.090%
Propane	VOC		44.096	0.1145	0.838%	0.288%
Butane (i-)	VOC		58.122	0.1509	0.849%	0.385%
Butane (n-)	VOC		58.122	0.1509	1.391%	0.630%
Pentane (i-)	VOC		72.149	0.1873	2.544%	1.430%
Pentane (n-)	VOC		72.149	0.1873	1.859%	1.045%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.227%	0.152%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	1.586%	1.065%
Methylpentane (3-)	VOC		86.175	0.2238	1.188%	0.797%
Hexane (n-)	VOC	X	86.175	0.2238	2.522%	1.693%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.430%	0.335%
Methylcyclopentane	VOC		84.159	0.2185	1.567%	1.027%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.177%	0.138%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	2.367%	1.440%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.305%	0.238%
Cyclohexane	VOC		84.159	0.2185	1.528%	1.002%
Methylhexane (2-)	VOC		100.202	0.2602	3.167%	2.472%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.833%	0.637%
Methylhexane (3-)	VOC		100.202	0.2602	3.287%	2.566%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.225%	0.172%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.368%	0.281%
Ethylpentane (3-)	VOC		100.202	0.2602	0.040%	0.031%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.307%	0.235%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.029%	0.026%
Heptane (n-)	VOC		100.202	0.2602	5.170%	4.036%
Methylcyclohexane	VOC		98.186	0.2549	4.647%	3.555%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.317%	0.277%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.134%	0.119%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	1.194%	0.913%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.201%	0.179%
Ethylcyclopentane	VOC		98.186	0.2549	0.653%	0.500%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.039%	0.035%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE D-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	6.256%	4.491%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.522%	0.457%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	4.934%	4.391%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	4.077%	3.628%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.586%	0.521%
Ethylhexane (3-)	VOC		114.229	0.2966	0.156%	0.139%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.039%	0.034%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.239%	0.209%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.239%	0.209%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	6.155%	5.477%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.269%	0.269%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.075%	0.066%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.075%	0.066%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.075%	0.066%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.493%	0.431%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.009%	0.009%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.224%	0.224%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.257%	0.224%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.723%	0.632%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.159%	0.159%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	1.935%	1.692%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.095%	0.095%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.095%	0.095%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.109%	0.107%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.054%	0.054%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.054%	0.054%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE D-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.370%	0.370%
Ethylbenzene	VOC	X	106.165	0.2757	0.576%	0.476%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.010%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	3.491%	2.887%
Xylene (p-)	VOC	X	106.165	0.2757	3.491%	2.887%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.130%	0.130%
Methyloctane (2-)	VOC		128.255	0.3330	1.109%	1.108%
Methyloctane (4-)	VOC		128.255	0.3330	1.109%	1.108%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.328%	0.322%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.328%	0.322%
Xylene (o-)	VOC	X	106.165	0.2757	0.776%	0.641%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.284%	0.279%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	4.089%	4.086%
Unknowns	VOC		**283.170**	0.7353	15.292%	33.734%
Residual Liquid			128.362	0.3333	100.000%	100.000%
TOC (Total)			128.394	0.3334	99.962%	99.987%
VOC (Total)			129.116	0.3353	99.276%	99.859%
HAP (Total)			92.587	0.2404	10.159%	7.327%
Xylenes			106.165	0.2757	7.757%	6.416%

NOTES

1. Normalized mole percentages from TABLE D-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE D-1.

MW = 128.362 lb/lb-mol

TABLE D-4
Flash Analysis
Maximum Hourly and Annual Emission Estimates

Station ID	MR01-V01				
Service	Pipeline Liquids				
Liquids Holding Capacity	1,000 gal			1,000 gal	
Liquids Input Rate	4,000 gal/yr			1,000 gal/hr	
Flash Gas Density	0.0769 lb/scf			0.0769 lb/scf	
Flash Factor	328.03 scf/bbl			328.03 scf/bbl	
Flash Gas Rate	31,241 scf/yr			7,810 scfh	
Flash Losses	2,404 lb/yr	Average	Maximum	601 lb/hr	Maximum
Flash Gas	100.00% by weight	0.2744 lb/hr	1.2018 tpy	100.00% by weight	600.9213 lb/hr
CO_{2-e}	1039.07% by weight	2.8511 lb/hr	12.4880 tpy	1039.07% by weight	6,244.0081 lb/hr
CO_2	5.17% by weight	0.0142 lb/hr	0.0621 tpy	5.17% by weight	31.0522 lb/hr
TOC (Total)	94.73% by weight	0.2599 lb/hr	1.1385 tpy	94.73% by weight	569.2380 lb/hr
Methane	41.36% by weight	0.1135 lb/hr	0.4970 tpy	41.36% by weight	248.5182 lb/hr
Ethane	11.68% by weight	0.0321 lb/hr	0.1404 tpy	11.68% by weight	70.2082 lb/hr
VOC (Total)	41.69% by weight	0.1144 lb/hr	0.5010 tpy	41.69% by weight	250.5115 lb/hr
VOC (non-HAP)	39.20% by weight	0.1076 lb/hr	0.4711 tpy	9.19% by weight	55.2321 lb/hr
HAP (Total)	2.49% by weight	0.0068 lb/hr	0.0300 tpy	2.49% by weight	14.9762 lb/hr
Benzene	0.5089% by weight	0.0014 lb/hr	0.0061 tpy	0.5089% by weight	3.0579 lb/hr
Ethylbenzene	0.0275% by weight	0.0001 lb/hr	0.0003 tpy	0.0275% by weight	0.1653 lb/hr
Hexane (n-)	1.7932% by weight	0.0049 lb/hr	0.0216 tpy	1.7932% by weight	10.7758 lb/hr
Methanol					
Naphthalene					
Toluene	0.6253% by weight	0.0017 lb/hr	0.0075 tpy	0.6253% by weight	3.7576 lb/hr
Trimethylpentane (2,2,4-)	0.0091% by weight	0.0000 lb/hr	0.0001 tpy	0.0091% by weight	0.0548 lb/hr
Xylenes	0.3706% by weight	0.0010 lb/hr	0.0045 tpy	0.3706% by weight	2.2272 lb/hr

NOTES

1. Separator Characteristics:
   - Orientation: Vertical Fixed Roof Tank
   - Height/Length: 6.00 ft
   - Diameter: 5.33 ft
   - Capacity (physical): 1,000 gal
   - Capacity (liquid): 1,000 gal
2. Liquid input rates:
   - a. maximum hourly based on operator experience; 1,000 gal
   - b. maximum annual based on operating experience and safety factor; and 4,000 gal
   - c. average hourly is just the maximum annual divided by 8,760 hrs/yr.
3. Flash gas density is 110% of the value extracted from TABLE D-3b.
   Density (TABLE D-3b): 0.0699 lb/scf Safety Factor: 110%
4. Flash factor extracted from TABLE D-1.
5. Speciated emissions vapor weight percentages extracted from TABLE D-3b.
6. Included a conservative estimate of volume of liquids gathered at M&R01 station, from maintenance activities

TABLE E-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum			mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ M_i	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	**T** (°F)	P_i (psia)		(mol_i/mol_L) $f_{v\text{-}i}$	(lb_i/lb_L) $f_{m\text{-}i}$	(mol_i/mol_V)	(lb_i/lb_V)
Nitrogen			28.013	3.7362	2.6465E+02	-6.7880E+00	0.0000E+00	0.0000E+00	-345.75	-232.60	68.00			0.000%	0.000%	0.000%	0.000%
Carbon Dioxide	GHG		44.010	35.0169	-1.5119E+03	-1.1334E+01	9.3368E-03	1.7136E-09	-68.80	87.80	68.00	833.1743		0.038%	0.013%	1.087%	2.183%
Methane	GHG		16.042	14.6667	-5.7097E+02	-3.3373E+00	-2.1999E-09	1.3096E-05	-295.60	-115.60	68.00	7,889.8148		0.303%	0.038%	82.053%	60.088%
Ethane			30.069	20.6973	-1.1341E+03	-5.2514E+00	-9.8774E-11	6.7329E-06	-297.40	89.60	68.00	546.5426		0.383%	0.090%	7.185%	9.862%
Propane	VOC		44.096	21.4469	-1.4627E+03	-5.2610E+00	3.2820E-11	3.7349E-06	-306.40	206.60	68.00	121.5870		0.838%	0.288%	3.497%	7.039%
Butane (i-)	VOC		58.122	31.2541	-1.9532E+03	-8.8060E+00	8.9246E-11	5.7501E-06	-254.20	275.00	68.00	44.2751		0.849%	0.385%	1.290%	3.423%
Butane (n-)	VOC		58.122	27.0441	-1.9049E+03	-7.1805E+00	-6.6845E-11	4.2190E-06	-216.40	305.60	68.00	30.1688		1.391%	0.630%	1.440%	3.821%
Pentane (i-)	VOC		72.149	29.2963	-2.1762E+03	-7.8830E+00	-4.6512E-11	3.8997E-06	-256.00	368.60	68.00	11.1082		2.544%	1.430%	0.970%	3.193%
Pentane (n-)	VOC		72.149	33.3239	-2.4227E+03	-9.2354E+00	9.0199E-11	4.1050E-06	-202.00	386.60	68.00	8.1938		1.859%	1.045%	0.523%	1.722%
Dimethylbutane (2,2-)	VOC		86.175	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.227%	0.152%	0.039%	0.155%
Dimethylbutane (2,3-)	VOC		86.175	33.6319	-2.5524E+03	-9.3142E+00	1.4759E-10	3.9140E-06	-223.60	500.00	68.00	3.6998		0.000%	0.000%	0.000%	0.000%
Cyclopentane	VOC		70.133	29.1547	-2.3512E+03	-7.6965E+00	-1.6212E-10	3.1250E-06	-137.20	462.20	68.00	5.0181		0.000%	0.000%	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	30.7477	-2.4888E+03	-8.2295E+00	-2.3723E-11	3.2402E-06	-243.40	437.00	68.00	3.3041		1.586%	1.065%	0.180%	0.707%
Methylpentane (3-)	VOC		86.175	35.2848	-2.6773E+03	-9.8546E+00	2.2352E-11	4.0277E-06	-261.40	447.80	68.00	2.9617		1.188%	0.797%	0.121%	0.475%
Hexane (n-)	VOC	X	86.175	69.7378	-3.6278E+03	-2.3927E+01	1.2810E-02	-1.6844E-16	-139.00	453.20	68.00	2.3626		2.522%	1.693%	0.204%	0.804%
Dimethylpentane (2,2-)	VOC		100.202	6.2875	-2.1682E+03	2.6936E+00	-1.5525E-02	1.0917E-05	-191.20	478.40	68.00	1.6191		0.430%	0.335%	0.024%	0.109%
Methylcyclopentane	VOC		84.159	32.4766	-2.6434E+03	-8.7933E+00	2.0749E-11	3.2158E-06	-223.60	500.00	68.00	2.1257		1.567%	1.027%	0.114%	0.439%
Dimethylpentane (2,4-)	VOC		100.202	35.9436	-2.8460E+03	-9.9938E+00	8.0693E-11	3.6419E-06	-182.20	476.60	68.00	1.5074		0.177%	0.138%	0.009%	0.042%
Trimethylbutane (2,2,3-)	VOC		100.202	32.3633	-2.6614E+03	-8.7743E+00	-7.6870E-10	3.2006E-06	-11.20	496.40	68.00	1.5789		0.000%	0.000%	0.000%	0.000%
Benzene	VOC	X	78.112	31.7718	-2.7254E+03	-8.4443E+00	-5.3534E-09	2.7187E-06	42.80	552.20	68.00	1.4495		2.367%	1.440%	0.118%	0.420%
Dimethylpentane (3,3-)	VOC		100.202	30.2570	-2.6313E+03	-7.9839E+00	4.6848E-13	2.7170E-06	-209.20	505.40	68.00	1.2681		0.305%	0.238%	0.013%	0.061%
Cyclohexane	VOC		84.159	48.5529	-3.0874E+03	-1.5521E+01	7.3830E-03	6.3563E-12	44.60	537.80	68.00	1.5112		1.528%	1.002%	0.079%	0.304%
Methylhexane (2-)	VOC		100.202	54.1075	-3.3785E+03	-1.7547E+01	8.2594E-03	-3.4967E-14	-180.40	494.60	68.00	0.9987		3.167%	2.472%	0.109%	0.496%
Dimethylpentane (2,3-)	VOC		100.202	39.7737	-2.9050E+03	-1.2012E+01	5.1334E-03	-2.3807E-14	-171.40	507.20	68.00	1.0467		0.000%	0.000%	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	58.1943	-3.4151E+03	-1.9294E+01	9.6704E-03	-2.4361E-15	-94.00	525.20	68.00	1.1616		0.833%	0.637%	0.033%	0.149%
Methylhexane (3-)	VOC		100.202	35.2535	-2.9310E+03	-9.6667E+00	-5.2026E-11	3.2107E-06	-182.20	503.60	68.00	0.9291		3.287%	2.566%	0.105%	0.479%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	53.1912	-3.3121E+03	-1.7277E+01	8.3107E-03	5.0896E-14	-209.20	536.00	68.00	0.9791		0.225%	0.172%	0.008%	0.034%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	35.4255	-2.7286E+03	-1.0444E+01	4.6608E-03	1.7565E-14	-209.20	532.40	68.00	1.0075		0.368%	0.281%	0.013%	0.057%
Ethylpentane (3-)	VOC		100.202	8.5463	-2.2979E+03	1.5503E+00	-1.2233E-02	8.2670E-06	-180.40	514.40	68.00	0.8755		0.040%	0.031%	0.001%	0.006%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	36.8109	-2.9536E+03	-1.0275E+01	-4.6212E-12	3.6730E-06	-178.60	536.00	68.00	0.9713		0.307%	0.235%	0.010%	0.046%
Trimethylpentane (2,2,4-)	VOC	X	114.229	50.3422	-3.2789E+03	-1.6111E+01	7.4260E-03	-9.1804E-14	-160.60	519.80	68.00	0.7453		0.029%	0.026%	0.001%	0.004%
Heptane (n-)	VOC		100.202	65.0257	-3.8188E+03	-2.1684E+01	1.0387E-02	1.0206E-14	-130.00	512.60	68.00	0.6808		5.170%	4.036%	0.121%	0.552%
Methylcyclohexane	VOC		98.186	38.0955	-3.0738E+03	-1.0684E+01	-5.1766E-11	3.5282E-06	-194.80	570.20	68.00	0.6925		4.647%	3.555%	0.110%	0.495%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.317%	0.277%	0.000%	0.001%
Dimethylhexane (2,2-)	VOC		114.229	38.7670	-3.1841E+03	-1.0857E+01	1.9275E-12	3.4797E-06	-185.80	530.60	68.00	0.5066		0.134%	0.119%	0.002%	0.012%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	36.3623	-3.0025E+03	-1.0070E+01	-1.0435E-09	3.3726E-06	-65.20	557.60	68.00	0.7110		1.194%	0.913%	0.029%	0.131%
Dimethylhexane (2,5-)	VOC		114.229	40.0260	-3.2647E+03	-1.1282E+01	-6.5408E-10	3.6200E-06	-131.80	530.60	68.00	0.4490		0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	56.2877	-3.6225E+03	-1.8225E+01	8.1864E-03	8.7232E-12	30.20	537.80	68.00	0.4499		0.201%	0.179%	0.003%	0.016%
Ethylcyclopentane	VOC		98.186	36.3631	-3.0448E+03	-1.0038E+01	3.5007E-11	3.2347E-06	-216.40	566.60	68.00	0.5963		0.653%	0.500%	0.013%	0.060%
Trimethylpentane (2,2,3-)	VOC		114.229	35.9540	-3.0569E+03	-9.8896E+00	-7.2916E-11	3.1060E-06	-169.60	555.80	68.00	0.4788		0.039%	0.035%	0.001%	0.003%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	38.0712	-3.1736E+03	-1.0617E+01	6.3090E-11	3.3817E-06	-194.80	552.20	68.00	0.4250		0.000%	0.000%	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	34.1565	-3.0232E+03	-9.2267E+00	2.7691E-11	2.7828E-06	-164.20	559.40	68.00	0.4029		0.000%	0.000%	0.000%	0.000%

TABLE E-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum			mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ M_i	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	**T** (°F)	P_i (psia)		(mol_i/mol_L) $f_{v\text{-}i}$	(lb_i/lb_L) $f_{m\text{-}i}$	(mol_i/mol_V)	(lb_i/lb_V)
Dimethylhexane (2,3-)	VOC		114.229	57.3778	-3.7143E+03	-1.8599E+01	8.2907E-03	-2.8441E-12	30.20	554.00	68.00	0.3451		0.000%	0.000%	0.000%	0.000%
Toluene	VOC	X	92.138	34.0775	-3.0379E+03	-9.1635E+00	1.0289E-11	2.7035E-06	-139.00	606.20	68.00	0.4219		6.256%	4.491%	0.091%	0.381%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.522%	0.457%	0.000%	0.001%
Dimethylhexane (3,4-)	VOC		114.229	38.6119	-3.2685E+03	-1.0752E+01	3.6386E-09	3.2771E-06	30.20	564.80	68.00	0.3186		4.934%	4.391%	0.054%	0.281%
Methylheptane (2-)	VOC		114.229	37.6930	-3.2611E+03	-1.0391E+01	-1.0524E-12	3.0560E-06	-164.20	548.60	68.00	0.3028		0.000%	0.000%	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	40.2080	-3.3661E+03	-1.1279E+01	-8.7855E-11	3.4055E-06	-185.80	552.20	68.00	0.3001		4.077%	3.628%	0.042%	0.219%
Dimethylhexane (3,4-)	VOC		114.229	38.6119	-3.2685E+03	-1.0752E+01	3.6386E-09	3.2771E-06	30.20	564.80	68.00	0.3186		0.000%	0.000%	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	52.8828	-3.6231E+03	-1.6804E+01	7.1828E-03	7.4077E-14	-184.00	555.80	68.00	0.2869		0.586%	0.521%	0.006%	0.030%
Ethylhexane (3-)	VOC		114.229	40.2079	-3.3651E+03	-1.1285E+01	-5.4180E-09	3.4199E-06	30.20	557.60	68.00	0.2931		0.156%	0.139%	0.002%	0.008%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.039%	0.034%	0.000%	0.000%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	32.4775	-3.0067E+03	-8.5896E+00	7.0258E-11	2.1739E-06	-103.00	604.40	68.00	0.3176		0.239%	0.209%	0.003%	0.013%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.239%	0.209%	0.000%	0.001%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	32.5731	-2.9872E+03	-8.6494E+00	-2.1355E-09	2.2946E-06	-34.60	602.60	68.00	0.3364		0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	7.8816	-2.6422E+03	2.3902E+00	-1.5376E-02	9.7931E-06	-158.80	563.00	68.00	0.2426		0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	33.1329	-3.0084E+03	-8.8498E+00	-4.3621E-10	2.3704E-06	-27.40	604.40	68.00	0.3361		0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Cycloheptane	VOC		98.186	54.0858	-3.6109E+03	-1.7331E+01	7.5272E-03	1.7553E-12	17.60	627.80	68.00	0.3185		0.000%	0.000%	0.000%	0.000%
Octane (n-)	VOC		114.229	29.0948	-3.0114E+03	-7.2653E+00	-2.2696E-11	1.4680E-06	-70.60	564.80	68.00	0.2040		6.155%	5.477%	0.043%	0.225%
Trimethylhexane (2,4,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.269%	0.269%	0.047%	0.275%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	-3.8184	-2.2442E+03	7.0671E+00	-1.9644E-02	1.1435E-05	-86.80	568.40	68.00	0.2957		0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	32.4384	-3.0550E+03	-8.5372E+00	2.2892E-10	2.0099E-06	-130.00	617.00	68.00	0.2590		0.075%	0.066%	0.001%	0.003%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	31.9151	-3.0253E+03	-8.3613E+00	5.7055E-12	1.9673E-06	-124.60	617.00	68.00	0.2640		0.075%	0.066%	0.001%	0.003%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.075%	0.066%	0.000%	0.000%
Propylcyclopentane (i-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.493%	0.431%	0.000%	0.001%
Trimethylhexane (2,3,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.009%	0.009%	0.001%	0.009%
Dimethylheptane (2,2-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.224%	0.224%	0.039%	0.228%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.257%	0.224%	0.000%	0.001%
Trimethylhexane (2,2,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	32.1635	-3.0728E+03	-8.4344E+00	6.8943E-10	1.9558E-06	-58.00	631.40	68.00	0.2121		0.723%	0.632%	0.005%	0.027%
Dimethylheptane (2,6-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.159%	0.159%	0.028%	0.162%
Propylcyclopentane (n-)	VOC		112.213	33.9220	-3.2097E+03	-8.9914E+00	-3.2992E-11	2.0684E-06	-178.60	626.00	68.00	0.1793		0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	32.7090	-3.1283E+03	-8.6023E+00	-3.9268E-11	1.9935E-06	-167.80	636.80	68.00	0.1870		1.935%	1.692%	0.012%	0.064%
Dimethylheptane (2,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.095%	0.095%	0.017%	0.097%
Dimethylheptane (3,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.095%	0.095%	0.017%	0.097%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.109%	0.107%	0.000%	0.000%
Trimethylhexane (2,3,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.054%	0.054%	0.009%	0.055%
Dimethylheptane (3,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.054%	0.054%	0.009%	0.055%

TABLE E-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum			mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ $\mathbf{M_i}$	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	**T** (°F)	P_i (psia)		(mol_i/mol_L) $\mathbf{f_{v-i}}$	(lb_i/lb_L) $\mathbf{f_{m-i}}$	(mol_i/mol_V)	(lb_i/lb_V)
Trimethylcyclohexane (1,1,4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Tetramethylpentane (2,2,3,3-)	VOC		128.255	35.4216	-3.2760E+03	-9.5678E+00	9.0298E-10	2.4355E-06	14.00	640.40	68.00	0.1369		0.370%	0.370%	0.002%	0.010%
Ethylbenzene	VOC	X	106.165	36.1998	-3.3402E+03	-9.7970E+00	-1.1467E-11	2.5758E-06	-139.00	651.20	68.00	0.1388		0.576%	0.476%	0.003%	0.013%
Trimethylhexane (2,3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.010%	0.010%	0.002%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	34.6803	-3.2981E+03	-9.2570E+00	-4.3563E-10	-2.4103E-06	-54.40	649.40	68.00	0.0468		3.491%	2.887%	0.006%	0.027%
Xylene (p-)	VOC	X	106.165	60.0531	-4.0159E+03	-1.9441E+01	8.2881E-03	-2.3647E-12	55.40	649.40	68.00	0.1277		3.491%	2.887%	0.015%	0.074%
Dimethylheptane (3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.130%	0.130%	0.023%	0.133%
Methyloctane (2-)	VOC		128.255	6.0191	-2.8579E+03	3.4068E+00	-1.6572E-02	9.8047E-06	-112.00	597.20	68.00	0.0881		1.109%	1.108%	0.003%	0.020%
Methyloctane (4-)	VOC		128.255	11.2012	-2.9467E+03	1.2133E+00	-1.4423E-02	9.1770E-06	-171.40	599.00	68.00	0.0974		1.109%	1.108%	0.004%	0.022%
Dimethylheptane (3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.000%	0.000%	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	9.8147	-2.9609E+03	1.9061E+00	-1.5675E-02	9.7961E-06	-160.60	602.60	68.00	0.0889		0.000%	0.000%	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.328%	0.322%	0.000%	0.001%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.328%	0.322%	0.000%	0.001%
Xylene (o-)	VOC	X	106.165	37.2413	-3.4573E+03	-1.0126E+01	9.0676E-11	2.6123E-06	-13.00	674.60	68.00	0.0946		0.776%	0.641%	0.003%	0.012%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.284%	0.279%	0.000%	0.001%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Nonane (n-)	VOC		128.255	8.8817	-2.8042E+03	1.5262E+00	-1.0464E-02	5.7972E-06	-63.40	613.40	68.00	0.0627		4.089%	4.086%	0.009%	0.051%
Unknowns	VOC		283.170	116.5157	-8.0140E+03	-3.8799E+01	1.3398E-02	-4.4444E-13	50.00	813.20	68.00	0.0000		15.292%	33.734%	0.000%	0.000%
Residual Liquid	Liquid		128.362 lb/lb-mol	Vapor	68.00 °F		29.1420 psia		21.907 lb/lb-mol					100.000%	100.000%	100.000%	100.000%
TOC (Total)			128.394 lb/lb-mol		68.00 °F		28.8362 psia		21.664 lb/lb-mol					99.962%	99.987%	98.913%	97.817%
VOC (Total)			129.116 lb/lb-mol		68.00 °F		2.8403 psia		63.095 lb/lb-mol					99.276%	99.859%	9.676%	27.868%
HAP (Total)			95.690 lb/lb-mol		68.00 °F		0.6569 psia		86.481 lb/lb-mol					19.507%	14.542%	0.440%	1.736%
Xylenes			106.165 lb/lb-mol		68.00 °F		0.0880 psia		106.165 lb/lb-mol					7.757%	6.416%	0.023%	0.114%

NOTES

1. Liquid composition of residual liquid based on SPL flash analysis (see TABLE D-3c).
2. Vapor pressure data for unknowns based on: Pentadecane (n-)

TABLE E-2
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		MR01-V01				
Service		Pipeline Liquids				
Capacity		1,000 gal			1,000 gal	
Temperature of Stored Liquid		56.78 °F			82.20 °F	
Vapor Pressure		6.6239 psia			10.3398 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		4.00 turnover/yr				
		4,000 gal/yr			1,000 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					30.1205 lbs/month	
		172.4088 lb/yr			0.0405 lb/hr	
Working Losses		**9.78E-03** lb/gal			**1.24E-02** lb/gal	
		39.1126 lb/yr	Average	Maximum	12.3576 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.0706 lb/hr	0.3093 tpy	358.84% by weight	0.1453 lb/hr
	Work		0.0160 lb/hr	0.0702 tpy		44.3438 lb/hr
	Total		0.0866 lb/hr	0.3795 tpy		44.4890 lb/hr
CO_{2-e}		5398.27% by weight	1.3035 lb/hr	5.7092 tpy	5398.27% by weight	669.2812 lb/hr
CO_2		7.83% by weight	0.0019 lb/hr	0.0083 tpy	7.83% by weight	0.9712 lb/hr
TOC (Total)		351.00% by weight	0.0848 lb/hr	0.3712 tpy	351.00% by weight	43.5178 lb/hr
Methane		215.62% by weight	0.0521 lb/hr	0.2280 tpy	215.62% by weight	26.7324 lb/hr
Ethane		35.39% by weight	0.0085 lb/hr	0.0374 tpy	35.39% by weight	4.3873 lb/hr
VOC (Total)		100.00% by weight	0.0241 lb/hr	0.1058 tpy	100.00% by weight	12.3981 lb/hr
VOC (non-HAP)		93.77% by weight	0.0226 lb/hr	0.0992 tpy	93.77% by weight	11.6258 lb/hr
HAP (Total)		6.23% by weight	0.0015 lb/hr	0.0066 tpy	6.23% by weight	0.7722 lb/hr
Benzene		1.5063% by weight	3.64E-04 lb/hr	1.59E-03 tpy	1.5063% by weight	1.87E-01 lb/hr
Ethylbenzene		0.0477% by weight	1.15E-05 lb/hr	5.04E-05 tpy	0.0477% by weight	5.91E-03 lb/hr
Hexane (n-)		2.8866% by weight	6.97E-04 lb/hr	3.05E-03 tpy	2.8866% by weight	3.58E-01 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	3.30E-04 lb/hr	1.45E-03 tpy	1.3668% by weight	1.69E-01 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	3.35E-06 lb/hr	1.47E-05 tpy	0.0139% by weight	1.72E-03 lb/hr
Xylenes		0.4073% by weight	9.84E-05 lb/hr	4.31E-04 tpy	0.4073% by weight	5.05E-02 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	6.00 ft	Shell/Roof Color	Gray/Medium (or less solar)
Diameter	5.33 ft	Shell Condition	Good (absorptance)
Capacity (estimated)	1,000 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	1,000 gal	Pressure Setting	0.03 psig

2. Stored Liquid Characteristics:

Basis: USEPA TANKS 4.09d MET Station: Cleveland, Ohio
Material: Gasoline (RVP 13) Selection based on VOC vapor pressure (see TABLE E-1).
Liquid Molecular Weight: 92.00 lb/lb-mol Vapor Molecular Weight: 62.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	4.9635	5.4542	42.60	47.36	4.1347	2.4424	333
February	28	5.1913	5.8469	44.85	50.93	5.1909	2.5545	333
March	31	5.8266	6.7600	50.75	58.54	9.0869	2.8671	333
April	30	6.5962	7.9320	57.24	67.20	14.2682	3.2458	333
May	31	7.3823	9.0680	63.27	74.67	21.3223	3.6325	333
June	30	8.1036	10.0563	68.38	80.59	27.3599	3.9875	333
July	31	8.3713	10.3398	70.18	82.20	30.1205	4.1192	333
August	31	8.0860	9.7860	68.26	79.02	24.7150	3.9788	333
September	30	7.4312	8.7542	63.63	72.68	16.5379	3.6566	333
October	31	6.5426	7.4810	56.81	63.99	10.3828	3.2194	333
November	30	5.8011	6.3837	50.52	55.51	5.4940	2.8545	333
December	31	5.1911	5.6253	44.85	48.94	3.7956	2.5543	333
ALL	365	6.6239	10.3398	56.78	82.20	172.4088	39.1126	4,000

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. Speciation of emissions is based on vapor weight percentages in TABLE E-1 normalized on VOC to assure methodology is conservative.
5. Included a conservative estimate of volume of liquids gathered at M&R01 station, from maintenance activities

TABLE E-3
Volatile Organic Liquids Loading (Tanker Trucks)
Hourly and Annual Emission Estimates

Source	M&R01-TL-PL				
Supply Vessel	MR01-V01				
	Pipeline Liquids				
	1,000 gal			1,000 gal	
Tanker Truck Service	Dedicated Normal			Dedicated Normal	
Loading Method	Submerged			Submerged	
Saturation Factor	0.60 n.d.			0.60 n.d.	
Vapor Molecular Weight	62.00 lb/lb-mol			62.00 lb/lb-mol	
Bulk Liquid Temperature	56.78 °F			82.20 °F	
	516.78 R			542.20 R	
Vapor Pressure	6.6239 psia			10.3398 psia	
Loading Loss Factor	5.9411 lb/kgal			8.8391 lb/kgal	
Pumping Rate				150 gpm	
Throughput	4.00 turnover/yr				
	4,000 gal/yr			1,000 gal/hr	
Loading Losses	23.7646 lb/yr	Average	Maximum	8.8391 lb/hr	Maximum
Residual Liquid	358.84% by weight	0.0097 lb/hr	0.0426 tpy	358.84% by weight	31.7182 lb/hr
CO_{2-e}	5398.27% by weight	0.1464 lb/hr	0.6414 tpy	5398.27% by weight	477.1601 lb/hr
CO_2	7.83% by weight	0.0002 lb/hr	0.0009 tpy	7.83% by weight	0.6924 lb/hr
TOC (Total)	351.00% by weight	0.0095 lb/hr	0.0417 tpy	351.00% by weight	31.0258 lb/hr
Methane	215.62% by weight	0.0058 lb/hr	0.0256 tpy	215.62% by weight	19.0587 lb/hr
Ethane	35.39% by weight	0.0010 lb/hr	0.0042 tpy	35.39% by weight	3.1279 lb/hr
VOC (Total)	100.00% by weight	0.0027 lb/hr	0.0119 tpy	100.00% by weight	8.8391 lb/hr
VOC (non-HAP)	93.77% by weight	0.0025 lb/hr	0.0111 tpy	93.77% by weight	8.2886 lb/hr
HAP (Total)	6.23% by weight	0.0002 lb/hr	0.0007 tpy	6.23% by weight	0.5506 lb/hr
Benzene	1.5063% by weight	4.09E-05 lb/hr	1.79E-04 tpy	1.5063% by weight	1.33E-01 lb/hr
Ethylbenzene	0.0477% by weight	1.29E-06 lb/hr	5.66E-06 tpy	0.0477% by weight	4.21E-03 lb/hr
Hexane (n-)	2.8866% by weight	7.83E-05 lb/hr	3.43E-04 tpy	2.8866% by weight	2.55E-01 lb/hr
Methanol					
Naphthalene					
Toluene	1.3668% by weight	3.71E-05 lb/hr	1.62E-04 tpy	1.3668% by weight	1.21E-01 lb/hr
Trimethylpentane (2,2,4-)	0.0139% by weight	3.77E-07 lb/hr	1.65E-06 tpy	0.0139% by weight	1.23E-03 lb/hr
Xylenes	0.4073% by weight	1.11E-05 lb/hr	4.84E-05 tpy	0.4073% by weight	3.60E-02 lb/hr

NOTES

1. Emissions calculated using methods provided in USEPA, AP-42 Section 5.2 dated 6/2008. $L_L = 12.46[(S)M_V P/T]$
2. Physical property, throughput and speciation data based data from supply vessel emission calculation spreadsheet.
3. Included a conservative estimate of volume of liquids gathered at M&R01 station, from maintenance activities

TABLE F-1
2-Stroke Lean-Burn Reciprocating Engines
Hourly and Annual Emission Estimates
Uncontrolled

Type		2slb				
Service		Emergency				
JJJJ Relevant Date		Manufactured: On or After 01/01/2009				
ZZZZ Status		New RICE at Area HAP Source				
Make		Cummins				
Model		GTA12/GTA743				
Fuel		Natural Gas				
Fuel Higher Heating Value(HHV)		1,020 BTU/scf			1,020 BTU/scf	
Ambient Temperature		80 °F			80 °F	
Power Output		265 bhp (mech.)			265 bhp (mech.)	
		18 kW (elec.)			18 kW (elec.)	
Heat Rate at HHV		8,641 BTU/hp-hr			8,641 BTU/hp-hr	
Operating Hours		500 hrs/yr				
Fuel Consumption		2,245 scfh			2,245 scfh	
		1.122 MMscf/yr				
Heat Input at HHV		2.29 MMBTU/hr			2.29 MMBTU/hr	
		1,145 MMBTU/yr	Uncontrolled			Uncontrolled
Pollutant	Control Efficiency	Uncontrolled	Average Hourly	Maximum Annual	Uncontrolled	Maximum Hourly
NO_X		5,337.59 lb/MMscf	11.9823 lb/hr	2.9956 tpy	5,337.59 lb/MMscf	11.9823 lb/hr
CO		658.42 lb/MMscf	1.4781 lb/hr	0.3695 tpy	658.42 lb/MMscf	1.4781 lb/hr
SO_2		0.60 lb/MMscf	0.0013 lb/hr	0.0003 tpy	0.60 lb/MMscf	0.0013 lb/hr
$PM_{10/2.5}$		49.28 lb/MMscf	0.1106 lb/hr	0.0277 tpy	49.28 lb/MMscf	0.1106 lb/hr
CO_{2-e}		128,349 lb/MMscf	288 lb/hr	72 tpy	128,349 lb/MMscf	288 lb/hr
CO_2		120,161 lb/MMscf	270 lb/hr	67 tpy	120,161 lb/MMscf	270 lb/hr
N_2O		0.23 lb/MMscf	0.0005 lb/hr	0.0001 tpy	0.23 lb/MMscf	0.0005 lb/hr
TOC (Total)		437.21 lb/MMscf	0.9815 lb/hr	0.2454 tpy	437.21 lb/MMscf	0.9815 lb/hr
Methane		386.56 lb/MMscf	0.8678 lb/hr	0.2169 tpy	386.56 lb/MMscf	0.8678 lb/hr
Ethane		18.70 lb/MMscf	0.0420 lb/hr	0.0105 tpy	18.70 lb/MMscf	0.0420 lb/hr
VOC (Total)		31.95 lb/MMscf	0.0717 lb/hr	0.0179 tpy	31.95 lb/MMscf	0.0717 lb/hr
VOC (non-HAP)		10.74 lb/MMscf	0.0241 lb/hr	0.0060 tpy	10.74 lb/MMscf	0.0241 lb/hr
HAP (Total)		21.20 lb/MMscf	0.0476 lb/hr	0.0119 tpy	21.20 lb/MMscf	0.0476 lb/hr
Acetaldehyde		2.07E+00 lb/MMscf	4.64E-03 lb/hr	1.16E-03 tpy	2.07E+00 lb/MMscf	4.64E-03 lb/hr
Acrolein		2.07E+00 lb/MMscf	4.66E-03 lb/hr	1.16E-03 tpy	2.07E+00 lb/MMscf	4.66E-03 lb/hr
Benzene		5.17E-01 lb/MMscf	1.16E-03 lb/hr	2.90E-04 tpy	5.17E-01 lb/MMscf	1.16E-03 lb/hr
Biphenyl		1.05E-03 lb/MMscf	2.36E-06 lb/hr	5.91E-07 tpy	1.05E-03 lb/MMscf	2.36E-06 lb/hr
Butadiene (1,3-)		2.19E-01 lb/MMscf	4.91E-04 lb/hr	1.23E-04 tpy	2.19E-01 lb/MMscf	4.91E-04 lb/hr
Carbon Tetrachloride		1.62E-02 lb/MMscf	3.63E-05 lb/hr	9.08E-06 tpy	1.62E-02 lb/MMscf	3.63E-05 lb/hr
Chlorobenzene		1.18E-02 lb/MMscf	2.66E-05 lb/hr	6.64E-06 tpy	1.18E-02 lb/MMscf	2.66E-05 lb/hr
Chloroform		1.26E-02 lb/MMscf	2.82E-05 lb/hr	7.05E-06 tpy	1.26E-02 lb/MMscf	2.82E-05 lb/hr
Dichloropropene (1,3-)		1.17E-02 lb/MMscf	2.62E-05 lb/hr	6.55E-06 tpy	1.17E-02 lb/MMscf	2.62E-05 lb/hr
Ethylbenzene		2.88E-02 lb/MMscf	6.46E-05 lb/hr	1.62E-05 tpy	2.88E-02 lb/MMscf	6.46E-05 lb/hr
Ethylene Dibromide		1.96E-02 lb/MMscf	4.39E-05 lb/hr	1.10E-05 tpy	1.96E-02 lb/MMscf	4.39E-05 lb/hr
Formaldehyde		1.47E+01 lb/MMscf	3.30E-02 lb/hr	8.26E-03 tpy	1.47E+01 lb/MMscf	3.30E-02 lb/hr
Hexane (n-)		1.19E-01 lb/MMscf	2.66E-04 lb/hr	6.66E-05 tpy	1.19E-01 lb/MMscf	2.66E-04 lb/hr
Methanol		6.61E-01 lb/MMscf	1.48E-03 lb/hr	3.71E-04 tpy	6.61E-01 lb/MMscf	1.48E-03 lb/hr
Methylene Chloride		3.92E-02 lb/MMscf	8.80E-05 lb/hr	2.20E-05 tpy	3.92E-02 lb/MMscf	8.80E-05 lb/hr
Methylnaphthalene (2-)		5.71E-03 lb/MMscf	1.28E-05 lb/hr	3.20E-06 tpy	5.71E-03 lb/MMscf	1.28E-05 lb/hr
Naphthalene		2.57E-02 lb/MMscf	5.76E-05 lb/hr	1.44E-05 tpy	2.57E-02 lb/MMscf	5.76E-05 lb/hr
PAH		3.57E-02 lb/MMscf	8.02E-05 lb/hr	2.00E-05 tpy	3.57E-02 lb/MMscf	8.02E-05 lb/hr
Phenol		1.12E-02 lb/MMscf	2.52E-05 lb/hr	6.30E-06 tpy	1.12E-02 lb/MMscf	2.52E-05 lb/hr
Propylene Oxide						
Styrene		1.46E-02 lb/MMscf	3.28E-05 lb/hr	8.20E-06 tpy	1.46E-02 lb/MMscf	3.28E-05 lb/hr
Tetrachloroethane (1,1,2,2-)		1.77E-02 lb/MMscf	3.97E-05 lb/hr	9.92E-06 tpy	1.77E-02 lb/MMscf	3.97E-05 lb/hr
Toluene		2.57E-01 lb/MMscf	5.76E-04 lb/hr	1.44E-04 tpy	2.57E-01 lb/MMscf	5.76E-04 lb/hr
Trichloroethane (1,1,2-)		1.40E-02 lb/MMscf	3.15E-05 lb/hr	7.88E-06 tpy	1.40E-02 lb/MMscf	3.15E-05 lb/hr
Trimethylpentane (2,2,4-)		2.26E-01 lb/MMscf	5.06E-04 lb/hr	1.27E-04 tpy	2.26E-01 lb/MMscf	5.06E-04 lb/hr
Vinyl Chloride		6.58E-03 lb/MMscf	1.48E-05 lb/hr	3.70E-06 tpy	6.58E-03 lb/MMscf	1.48E-05 lb/hr
Xylenes		7.14E-02 lb/MMscf	1.60E-04 lb/hr	4.01E-05 tpy	7.14E-02 lb/MMscf	1.60E-04 lb/hr

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Maximum hourly emissions based on 100% of rated capacity.
3. Vendor provided data on power output and heat rate.
4. NOX and CO emissions are estimated based on Vendor Data.
5. SO2 and PM10/2.5 emission factors based on AP-42, Section 3.2 (Revised 7/00), Table 3.2-1.
6. CO2 and N2O emission factors based on 40 CFR 98, Subpart C, Table C-1 and 40 CFR 98, Subpart C, Table C-2, respectively.
7. TOC (Total) and TOC species emissions are estimated based on Vendor Data.
   Emission factors based on: $EF_i = [EF_{(TOC)}]/[(EF_{TOC\text{-}AP42})]\ (EF_{i\text{-}AP42})$

TABLE G-1
Heaters
Natural Gas Combustion
Maximum Emission Estimates

Station ID	M&R01_HIG-01				
Agency ID	HIG-01				
Make	Bruest				
Model	SR-8				
Burner	N/A				
Fuel	Natural Gas				
Fuel Higher Heating Value (HHV)	1,020 BTU/scf			1,020 BTU/scf	
Heat Output at HHV	0.0006 MMBTU/hr			0.0007 MMBTU/hr	
Thermal Efficiency	70%			70%	
Operating Hours	8,760 hrs/yr				
Fuel Consumption	0.88 scfh			0.93 scfh	
	0.008 MMscf/yr				
Heat Input at HHV	0.0009 MMBTU/hr			0.0009 MMBTU/hr	
	8 MMBTU/yr	Avg. Hourly	Max. Annual		Max. Hourly
NO_X	73.82 lb/MMscf	0.0001 lb/hr	0.0003 tpy	73.8239 lb/MMscf	0.0001 lb/hr
CO	1,169.14 lb/MMscf	0.0010 lb/hr	0.0045 tpy	1,169.1403 lb/MMscf	0.0011 lb/hr
SO_2	0.60 lb/MMscf	0.0000 lb/hr	0.0000 tpy	0.6000 lb/MMscf	0.0000 lb/hr
$PM_{10/2.5}$	7.60 lb/MMscf	0.0000 lb/hr	0.0000 tpy	7.6000 lb/MMscf	0.0000 lb/hr
CO_{2-e}	121,999.15 lb/MMscf	0.1076 lb/hr	0.4715 tpy	121,999.15 lb/MMscf	0.1130 lb/hr
CO_2	119,926.98 lb/MMscf	0.1058 lb/hr	0.4635 tpy	119,926.98 lb/MMscf	0.1111 lb/hr
N_2O	0.23 lb/MMscf	0.0000 lb/hr	0.0000 tpy	0.23 lb/MMscf	0.0000 lb/hr
TOC (Total)	383.52 lb/MMscf	0.0003 lb/hr	0.0015 tpy	383.52 lb/MMscf	0.0004 lb/hr
Methane	80.19 lb/MMscf	0.0001 lb/hr	0.0003 tpy	80.19 lb/MMscf	0.0001 lb/hr
Ethane	108.08 lb/MMscf	0.0001 lb/hr	0.0004 tpy	108.08 lb/MMscf	0.0001 lb/hr
VOC (Total)	191.76 lb/MMscf	0.0002 lb/hr	0.0007 tpy	191.76 lb/MMscf	0.0002 lb/hr
HAP (Total)	65.82 lb/MMscf	0.0001 lb/hr	0.0003 tpy	65.82 lb/MMscf	0.0001 lb/hr
Acetaldehyde					
Acrolein					
Benzene	7.32E-02 lb/MMscf	6.46E-08 lb/hr	2.83E-07 tpy	7.32E-02 lb/MMscf	6.78E-08 lb/hr
Butadiene (1,3-)					
Carbon Tetrachloride					
Chlorobenzene					
Chloroethane					
Chloroform					
Dichloroethane (1,2-)					
Dichloropropane (1,2-)					
Dichloropropene (1,3-)					
Ethylbenzene					
Ethylene Dibromide					
Formaldehyde	2.61E+00 lb/MMscf	2.31E-06 lb/hr	1.01E-05 tpy	2.61E+00 lb/MMscf	2.42E-06 lb/hr
Hexane (n-)	6.28E+01 lb/MMscf	5.54E-05 lb/hr	2.43E-04 tpy	6.28E+01 lb/MMscf	5.81E-05 lb/hr
Methanol					
Methylene Chloride					
Methylnaphthalene (2-)	8.37E-04 lb/MMscf	7.38E-10 lb/hr	3.23E-09 tpy	8.37E-04 lb/MMscf	7.75E-10 lb/hr
Naphthalene	2.13E-02 lb/MMscf	1.88E-08 lb/hr	8.22E-08 tpy	2.13E-02 lb/MMscf	1.97E-08 lb/hr
PAH	3.08E-03 lb/MMscf	2.71E-09 lb/hr	1.19E-08 tpy	3.08E-03 lb/MMscf	2.85E-09 lb/hr
Phenol					
Propylene Oxide					
Styrene					
Tetrachloroethane (1,1,2,2-)					
Toluene	1.19E-01 lb/MMscf	1.05E-07 lb/hr	4.58E-07 tpy	1.19E-01 lb/MMscf	1.10E-07 lb/hr
Trichloroethane (1,1,2-)					
Trimethylpentane (2,2,4-)					
Vinyl Chloride					
Xylenes					

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Manufacturer provided data on rated capacity and fuel consumption (model SR-8 = model 1800).
3. Maximum output is assumed to be 105% of rated capacity.
4. Manufacturer provided NOx; CO; and HC emission test results (60 ppmvd at 3% O2; 1,560 ppmvd at 3% O2; and 470 ppmvd at 3% O2, respectively).
Based on data in the North American Combustion Handbook published by North American, Mfg., Co., the NO_X, CO and HC emission conversion factors are:
0.001206 (lb/MMBTU)/ppmvd at 3% O2; 0.000735(lb/MMBTU)/ppmvd at 3% O2; and 0.000400 (lb/MMBTU)/ppmvd at 3% O2, respectively.
5. CO2 emission factor based on 40 CFR 98, Subpart C, Table C-2 (1,026 BTU/scf; 53.02 kg/MMBTU ==> 119,926.98 lb/MMscf).
6. N2O emission factor based on 40 CFR 98, Subpart C, Table C-2 (1,026 BTU/scf; 0.0001 kg/MMBTU ==> 0.23 lb/MMscf).
7. Remaining emission factors were extracted from Section 1 of AP-42 (date 7/98): Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4.
Methane, Ethane, VOC, HAP, and Speciate VOC AP-42 emission factors were scaled based on the vendor data for HC: $EF_{Scaled} = (EF_{AP42})(EF_{HC}/EF_{THC\text{-}AP42})$

NEXUS GAS TRANSMISSION, LLC
5400 Westheimer Court
Houston, TX 77056-5310

713.627.5400 main

September 8, 2015

Mr. Kevin Fortune
Ohio EPA – Division of Air Pollution Control
Northeast District Office
2110 E Aurora Rd
Twinsburg, Ohio 44087

Re: NEXUS Gas Transmission, LLC – Kensington, OH
Permit-by-Rule (PBR) Notification – Natural Gas-Fired Emergency Generator

Dear Mr. Fortune:

NEXUS Gas Transmission, LLC (NEXUS) plans to construct a natural gas metering and regulating station (M&R 01) near Kensington, in Columbiana County, Ohio. NEXUS plans to install one (1) new natural gas-fired internal combustion engine rated at a maximum capacity of 265 horsepower (hp) intended to drive a generator to supply power to the facility during standby emergency situations. With this letter and the attached notification, NEXUS is requesting authorization for the emergency generator under the Permit-by-Rule (PBR) provided in Ohio Administrative Code (OAC) 3745-31-03(A)(4)(b).

The natural gas-fired emergency generator will operate at M&R 01 for no more than 500 hours per rolling twelve-month period. NEXUS will maintain monthly records that contain the rolling twelve-month hours of operation for the emergency engine. Therefore, the emergency engine is eligible for coverage under the PBR provided in OAC 3745-31-03(A)(4)(b).

The PBR notification form is attached to this letter.

***

NEXUS respectfully requests that Ohio EPA provide a written response to this notification confirming that operation of the emergency engine is authorized under the PBR provided in Ohio Administrative Code (OAC) 3745-31-03(A)(4)(b). If there are any questions concerning this PBR notification, please do not hesitate to contact Reagan Mayces at (713) 627-4790.

Sincerely,
NEXUS GAS TRANSMISSION, LLC

Brian McKerlie
Vice President

Enclosures

Attachment 1

Permit-by-Rule Notification

Ohio Environmental Protection Agency
Division of Air Pollution Control

Permit-by-Rule Notification Form
Emergency Generator/Pump/Compressor

Submission of this form constitutes notice that the party identified in Section I of this form intends to be authorized to install/operate a source of air pollution according to the permit-by-rule provisions of OAC 3745-31-03(A)(4)(b). By submitting this form, the applicant agrees to operate and maintain the facility and equipment in accordance with the applicable permit-by-rule provisions. An original signature is needed and forms transmitted by fax will not be accepted. Complete all information as indicated by the instructions.

I. Applicant Information / Mailing Address

Company (Applicant) Name: NEXUS Gas Transmission, LLC

Mailing (Applicant) Address: P.O. Box 1642

City: Houston State: TX Zip Code: 77251-1642

Contact Person: Reagan Mayces Phone: 713-627-4790 Fax: _____ E-mail: rmmayces@spectraenergy.com

II. Facility / Site Location Information

Facility Name: M&R 01

Facility Address / Location: Approximately 2.5 miles east-southeast of Kensington on McKaig Road

City: Kensington State: OH Zip Code 44423

Facility Contact: Reagan Mayces Phone: 713-627-4790 Fax: _____ E-mail: rmmayces@spectraenergy.com

Ohio EPA Facility ID Number (10-digit) – *if known; see Instructions* _____

III. Reason for Submitting Notification:

☒ Initial request ☐ Equipment modification ☐ Ownership change

☐ Request for revocation of current permit - *complete additional information below*

Permit to install (PTI) Number	Emission Unit ID (4-digit)
_____	_____
_____	_____

IV. Type of Unit for Emergency Use

☑ Electrical generator ☐ Water pump ☐ Air compressor

Manufacturer's engine output rating: 265 horsepower (HP) or _____ Kilowatts

Company identification or name of unit: 2-Stroke Lean-Burn Reciprocating Engine

V. Type of fuel burned (*check all that apply*)

☑ Natural gas ☐ Propane/LPG ☐ Gasoline ☐ Distillate oil (less than 0.5% wt. sulfur)

I certify under penalty of law that all statements or assertions of fact made in this notification are true and complete, and shall subject the signatory to liability under state laws forbidding false or misleading statements.

Applicant Name (Print): Brian McKerlie Title: Vice President

Applicant Signature: _____ Date: _____

RETAIN A COPY OF THIS FORM FOR YOUR RECORDS

Mail the original, signed form to the appropriate Air Permit Review Agency (District Office/Local Air Agency) for your county. (Please refer to the Agency map in the attached instructions for mailing addresses).

Rev 12/10

For Ohio EPA Use Only:

FAC ID: _____

Date received _____

PERMIT TO INSTALL AND OPERATE APPLICATION

NEXUS Gas Transmission, LLC > Kensington, OH

M&R 02&03

Prepared By:

TRINITY CONSULTANTS
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September 2015

Project 143601.0141

Trinity Consultants

Environmental solutions delivered uncommonly well

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APPENDIX A – PROCESS FLOW DIAGRAM

APPENDIX B – PTIO & EAC FORMS

APPENDIX C – EMISSION CALCULATIONS DOCUMENTATION

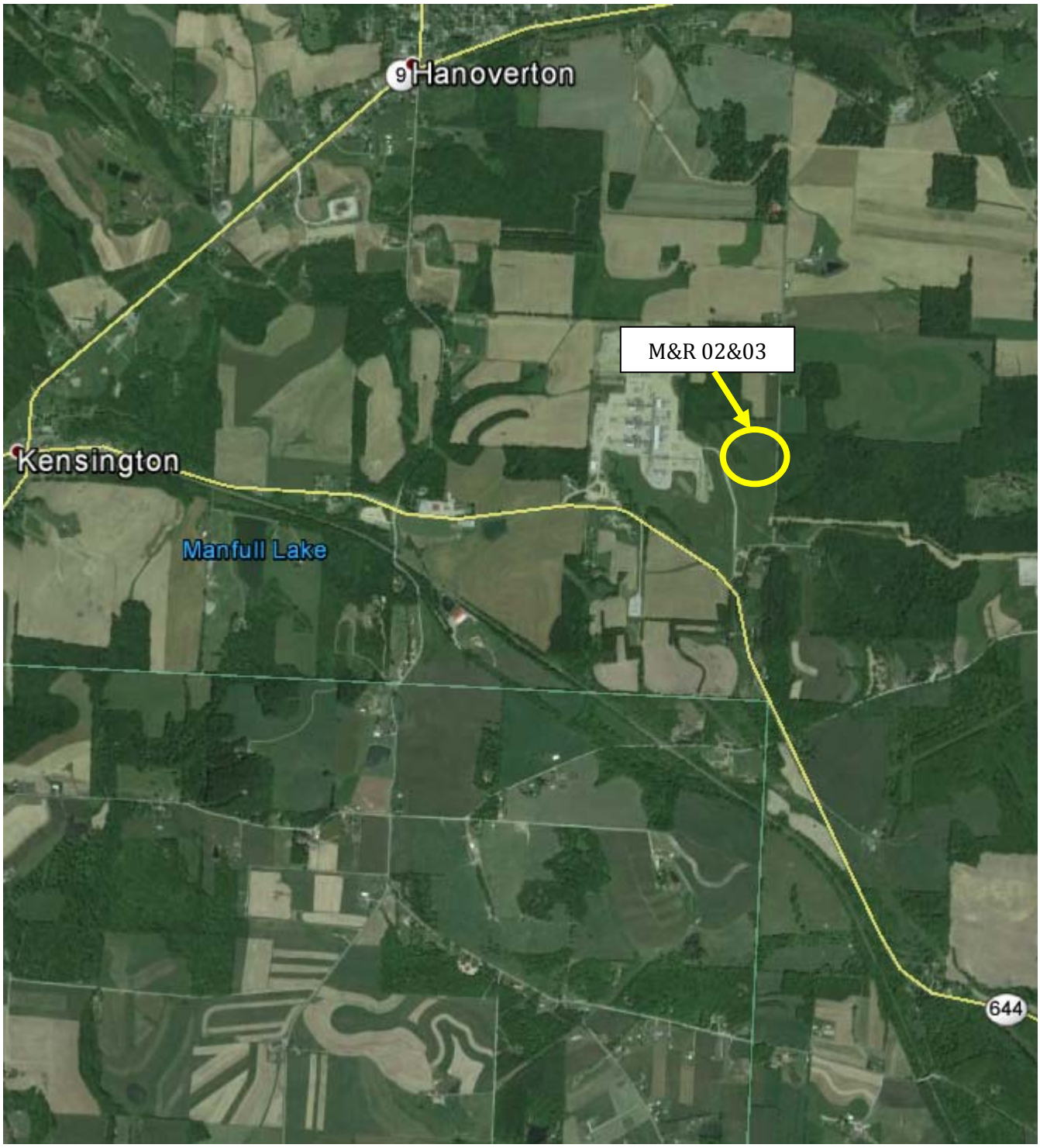
NEXUS Gas Transmission, LLC (NEXUS) plans to construct a new natural gas pipeline to facilitate the delivery of natural gas from Appalachian supplies to markets in Ohio, Michigan, Chicago, and Ontario. NEXUS proposes to construct and operate a pipeline metering and regulating site (M&R 02&03) located near Kensington, Ohio, in Columbiana County which monitors and measures the quality and quantity of natural gas delivered to regional customers along NEXUS's network of pipelines. With this Permit to Install and Operate (PTIO) application, NEXUS is requesting approval for the construction and operation of this M&R site.

The primary Standard Industrial Classification (SIC) code of the proposed M&R site is 4922 (Natural Gas Transmission and Distribution).

1.1. FACILITY LOCATION

M&R 02&03 is located approximately 2 miles east of the city of Kensington in Columbiana County. Figure 1-1 is an area map that shows the site location relative to predominant geographical features such as highways and railroads.

Figure 1-1. Area Map for M&R 02&03



1.2. PROJECT DESCRIPTION

M&R 02&03 will facilitate the delivery of natural gas along the NEXUS Gas Transmission, LLC (NEXUS) pipeline. NEXUS plans to install the following emission units during the construction of M&R 02&03. Each of the following emission units is listed with the proposed Ohio Environmental Protection Agency (Ohio EPA) Emission Unit Identification Number (EUID). Refer to Appendix A for a process flow diagram describing the organization of these emission units.

- Emergency Generator #1 and #2 (P001-P002) – Two (2) new natural gas-fired internal combustion engines each rated at a maximum capacity of 265 hp intended to drive a generator to supply power to the facility during emergency situations. Because these engines qualify for coverage under a Permit by Rule (PBR) in accordance with Ohio Administrative Code (OAC) 3745-31-03(A)(4)(b), the application described herein will not contain any application forms for this unit; rather, NEXUS will submit under separate cover a notification of intent to operate new emergency engines under Ohio EPA's PBR program.
- Gas Releases (P003) – Periodic maintenance, routine operations, and pigging activities will occasionally necessitate the evacuation of equipment (e.g., turbines, piping components) directly to atmosphere.
- Equipment Leaks (P801) – Various equipment components, including valves, flanges, and connectors will be located throughout the compressor station that may result in fugitive emissions due to equipment leaks.
- Storage Tank #1 and #2 (T001-T002) – Two vertical fixed roof tanks each sized to a capacity of 1,000 gallons used to store condensate liquids collected from the pipeline and from station equipment.
- Loading Operation (J001) – NEXUS will periodically transfer the condensate liquids collected in T001 and T002 to tanker trucks for shipment off-site.

M&R 02&03 will also include the following additional *de minimis* sources under Ohio Administrative Code (OAC) 3745-15-05.

- Process Heater #1 and #2 (B001-B002) – Two (2) new natural gas-fired heaters each rated at a heat input capacity of 0.0006 MMBtu/hr intended to provide heat to various streams at the facility.

NEXUS requests that the PTIO be issued for all non-exempt, non-*de minimis* emission units to be installed at M&R 02&03.

1.3. PROJECT EMISSIONS

Table 1-1 provides a summary of the facility-wide potential annual emissions attributable to the installation of M&R 02&03, including particulate matter, particulate matter with an aerodynamic diameter of less than 10 microns, and particulate matter with an aerodynamic diameter of less than 2.5 microns ($PM/PM_{10}/PM_{2.5}$); nitrogen oxides (NO_X); sulfur dioxide (SO_2); carbon monoxide (CO); volatile organic compounds (VOC); greenhouse gases (i.e., carbon dioxide [CO_2], methane [CH_4], and nitrous oxide [N_2O]) expressed as carbon dioxide equivalents (CO_2e); total hazardous air pollutants (HAP); and xylenes, which is the highest single HAP emitted by the station. Detailed emissions calculations are presented in Appendix C.

Table 1-1. Potential Emissions for M&R 02&03

EU ID	Emission Unit Description	Annual Emissions (tpy)							
		NO_X	CO	VOC	SO_2	$PM/PM_{10}/PM_{2.5}$	CO_2e [a]	Xylenes	Total HAP
P001	Emergency Generator #1[b]	3.00	0.37	0.02	3.00E-04	0.03	72	4.01E-05	1.19E-02
P002	Emergency Generator #2[b]	3.00	0.37	0.02	3.00E-04	0.03	72	4.01E-05	1.19E-02
P003	Gas Releases	-	-	0.44	-	-	604	2.20E-03	0.04
P801	Equipment Leaks	-	-	4.29	-	-	524	0.23	0.57
T001	Storage Tank #1	-	-	0.61	-	-	18	4.90E-03	0.04
T002	Storage Tank #2	-	-	0.61	-	-	18	4.90E-03	0.04
B001	Process Heater #1[c]	3.00E-04	4.50E-03	7.00E-04	2.32E-06	2.94E-05	0.47	-	3.00E-04
B002	Process Heater #2[c]	3.00E-04	4.50E-03	7.00E-04	2.32E-06	2.94E-05	0.47	-	3.00E-04
J001	Loading Operation	-	-	0.02	-	-	1	9.68E-05	1.40E-03
Totals		6.00	0.75	6.01	6.05E-04	0.06	1,310	0.24	0.71

a. Carbon dioxide equivalent (CO_2e) emissions. Represents the sum of carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4) emissions adjusted by each pollutant's global warming potential as identified in Table A-1 to 40 CFR 98, Subpart A.

b. This unit qualifies for coverage under a Permit by Rule pursuant to OAC 3745-31-03(A)(4)(b).

c. These units are classified as *de minimis* sources under OAC 3745-15-05.

This section of the permit application includes a discussion of potentially applicable federal and state air quality permitting and regulatory requirements.

2.1. FEDERAL REGULATORY APPLICABILITY

2.1.1. Prevention of Significant Deterioration Applicability

The applicability of the Prevention of Significant Deterioration (PSD) permitting program is evaluated for proposed construction, reconstruction, and modification projects that result in an emission increase of a regulated New Source Review (NSR) pollutant for which the area is in attainment with the National Ambient Air Quality Standards (NAAQS). Columbiana County has been designated as "attainment" or "unclassifiable" for all regulated NSR pollutants.[1] Natural gas pipeline facilities are not among the 28 listed source categories in OAC 3745-31-01(NNN)(2)(a); therefore the facility is subject to the PSD major source threshold of 250 tpy provided in OAC 3745-31-01(NNN)(2)(b). As demonstrated in Table 1-1, the proposed M&R 02&03 will be a minor source of criteria pollutants with respect to the PSD permitting program.

Additionally, the final PSD and Title V Greenhouse Gas (GHG) Tailoring Rule was published in the Federal Register on June 3, 2010 (75 FR 31514) but was ultimately overturned on June 23, 2014 by the US Supreme Court. Under the formerly effective rule, GHGs could, as of July 1, 2011, become "subject to regulation" under the PSD program for construction projects that would result in potential GHG emissions of 100,000 tpy carbon dioxide equivalents (CO_2e) or more. The June 23, 2014 Supreme Court Decision clarifies that construction projects cannot trigger major NSR for GHGs unless major NSR is otherwise triggered for criteria pollutants.

2.1.2. Title V Operating Permit Program Applicability

The Title V operating permit program consolidates state and federal requirements applicable to major sources into a single comprehensive operating permit for the purposes of facilitating ongoing compliance. In accordance with OAC 3745-77, sources with a PTE of 100 tpy or more for criteria pollutants, 25 tpy or more for total HAP, or 10 tpy or more for individual HAP are considered major sources for which applicants must obtain a Title V operating permit.

As mentioned previously, the final PSD and Title V Greenhouse Gas (GHG) Tailoring Rule was published in the Federal Register on June 3, 2010 (75 FR 31514) but was ultimately overturned on June 23, 2014 by the U.S. Supreme Court. Under the formerly effective rule, GHGs could, as of July 1, 2011, become "subject to regulation" under the Title V program for facilities that have a GHG potential to emit of 100,000 tpy CO_2e or more.

U.S. EPA has since issued guidance following the U.S. Supreme Court ruling indicating that, "EPA will no longer apply or enforce federal regulatory provisions or provisions of the EPA-approved Title V programs

[1] Attainment designations for Ohio counties are established in 40 CFR 81.336.

that require a stationary source to obtain a title V permit solely because the source emits or has the potential to emit greenhouse gases above the major source thresholds." EPA also clarifies in this guidance that, "The EPA also does not intend to continue applying regulations that would require Title V programs submitted for approval by the EPA to require that such sources obtain Title V permits."[2]

Table 1-1 shows that facility-wide emissions will not exceed Title V thresholds for criteria pollutants or HAP; therefore, NEXUS is not required to obtain a Title V operating permit for M&R 02&03.

2.1.3. New Source Performance Standards

NSPS require new, modified, or reconstructed sources in specified source categories to control emissions to the level achievable by the best demonstrated technology as specified in the applicable provisions. Any source subject to an NSPS is also subject to the general provisions of NSPS Subpart A, except as noted.

2.1.3.1. 40 CFR 60, Subpart A - General Provisions – Applicable

All affected sources subject to source specific NSPS are subject to the general provisions of NSPS Subpart A unless specifically excluded by the source-specific NSPS. Subpart A requires initial notification, performance testing, recordkeeping and monitoring, provides reference methods, and mandates general control device requirements for all other subparts as applicable.

2.1.3.2. 40 CFR 60, Subpart Dc – Small Industrial-Commercial-Institutional Steam Generating Units – Not Applicable

NSPS Subpart Dc applies to steam generating units for which construction, modification, or reconstruction is commenced after June 9, 1989 and that have a maximum design heat input capacity of greater than or equal to 10 MMBtu/hr and less than or equal to 100 MMBtu/hr. The Process Heaters (B001-B002) are each sized to a maximum heat input capacity less than 10 MMBtu/hr. As such, Subpart Dc is not applicable.

2.1.3.3. 40 CFR 60, Subpart Kb – Volatile Organic Liquid Storage Vessels Constructed, Reconstructed, or Modified after July 23, 1984 – Not Applicable

Affected sources under 40 CFR 60, Subpart Kb (NSPS Kb) include all storage vessels with capacities of at least 75 cubic meters (m^3) (19,813 gallons) storing volatile organic liquids (VOL) constructed, reconstructed, or modified after July 23, 1984.

The Storage Vessels (T001-T002) are each sized to a nominal storage capacity less than 19,813 gallons; therefore, Subpart Kb is not applicable.

2.1.3.4. 40 CFR 60, Subpart KKK – Equipment Leaks of VOC from Onshore Natural Gas Processing Plants – Not Applicable

NSPS Subpart KKK applies to equipment leaks from natural gas processing plants that were constructed after June 20, 1984 but before August 23, 2011. The facility is not a natural gas processing plant (as defined in 40 CFR 60.631). Therefore, this subpart does not apply.

[2] U.S. EPA memorandum from Ms. Janet G. McCabe to U.S. EPA Regional Administrators dated July 24, 2014.

2.1.3.5. 40 CFR 60, Subpart LLL – SO_2 Emissions from Onshore Natural Gas Processing Plants – Not Applicable

NSPS Subpart LLL applies to onshore natural gas processing facilities that contain sweetening units that commence construction or modification after January 20, 1984. M&R 02&03 is not a natural gas processing plant and will not contain any sweetening units, as defined in 40 CFR 60.641, and therefore is not subject to this subpart.

2.1.3.6. 40 CFR 60, Subpart JJJJ – Spark Ignition Internal Combustion Engines - Applicable

NSPS Subpart JJJJ establishes requirements for owners or operators of spark ignition internal combustion engines that commence construction, modification, or reconstruction after June 12, 2006 (the date the engine is ordered constitutes construction). The spark ignition internal combustion engines (P001-P002) used at this facility will be considered emergency stationary internal combustion engines, as defined by 40 CFR 60.4248, and will be constructed and manufactured after the dates mentioned above; therefore, these units are subject to the provisions of NSPS Subpart JJJJ.

Per 40 CFR 60.4233(e) these units will meet the emission standards specified in Table 1 of Subpart JJJJ. NEXUS will ensure that the engines satisfy the monitoring requirements specified in 40 CFR 60.4237(b) by installing a non-resettable hour meter. NEXUS will also ensure that the Emergency Generators (P001-P002) satisfy the compliance requirements for periodic testing and maintenance specified in 40 CFR 60.4243(b)(2), the operational restrictions for emergency engines in 40 CFR 60.4243(d), and the notification, reporting and recordkeeping requirements specified in 40 CFR 60.4245.

2.1.3.6.1. *Emission Limits*

The emergency generators will be subject to the following emissions standards from Table 1 of Subpart JJJJ (emergency engines greater than 130 hp):[3]

- NO_X: 2.0 g/hp-hr or 160 ppmvd @15% O_2
- CO: 4.0 g/hp-hr or 540 ppmvd @15% O_2
- VOC: 1.0 g/hp-hr or 86 ppmvd @15% O_2

2.1.3.6.2. *Testing*

NEXUS will comply with the requirements for a non-certified generator pursuant to 40 CFR 60.4243(a)(2)(ii), including conducting an initial performance test within one year of startup. 40 CFR 60.4245(d) requires the submittal of a copy of the performance test within 60 days of its completion.

2.1.3.6.3. *Monitoring, Recordkeeping, and Reporting*

Since the engines will be used as emergency generators, a non-resettable hour meter is required.[4] Per 40 CFR 60.4243(d), emergency engines are allowed to be operated according to the following time constraints:

[3] 40 CFR 60.4233(e) Emission standards for operators of stationary SI ICE with a maximum engine power greater than 100 HP
[4] 40 CFR 60.4237(b)

There is no time limit on use in emergency situations.
The emergency ICE can operate for up to 100 hours per year total for the following reasons:

- Maintenance checks and readiness testing, provided that the tests are recommended by federal, state, or local government, the manufacturer, the vendor, the regional transmission organization or equivalent balancing authority and transmission operator, or the insurance company associated with the engine;
- Emergency demand response for periods specified in 40 CFR 60.4243(d)(2)(ii); and
- Periods where there is a deviation of voltage or frequency of 4 percent or greater below standard voltage or frequency.

The emergency ICE can operate for up to 50 hours per year in non-emergency situations. The 50 hours of operation in non-emergency situations are counted as part of the 100 hours per year for maintenance and testing and emergency demand response described in the previous bullet point.

2.1.3.7. 40 CFR 60, Subpart OOOO – Crude Oil and Natural Gas Production, Transmission, and Distribution – Not Applicable

NSPS Subpart OOOO establishes emission standards and compliance schedules for the control of VOC and SO_2 emissions from affected facilities that commence construction, modification or reconstruction after August 23, 2011. Affected facilities include certain units and operations located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment. "Custody transfer" is defined under 40 CFR 60.5430 as the transfer of natural gas after processing and/or treatment in the producing operations, or from storage vessels or automatic transfer facilities or other such equipment, including product loading racks, to pipelines or any other forms of transportation. "Natural gas transmission" is defined under 40 CFR 60.5430 as the pipelines used for long distance transport of natural gas (excluding processing). Specific equipment used in natural gas transmission includes the land, mains, valves, meters, boosters, regulators, storage vessels, dehydrators, compressors, and their driving units and appurtenances, and equipment used for transporting gas from a production plant, delivery point of purchased gas, gathering system, storage area, or other wholesale source of gas to one or more distribution area(s). NEXUS will gain custody of natural gas from production operations, or at "the point of custody transfer." NEXUS and its operations, including M&R 02&03, will be located in the natural gas transmission segment.

Affected facilities include storage vessels located in the natural gas transmission and storage segment that have the potential for VOC emissions equal to or greater than 6 tpy per 40 CFR 60.5365(e). This requirement specifies that,

> *"The potential for VOC emissions must be calculated using a generally accepted model or calculation methodology, based on the maximum average daily throughput determined for a 30-day period of production prior to the applicable emission determination deadline specified in this section. The determination may take into account requirements under a legally and practically enforceable limit in an operating permit or other requirement established under a Federal, State, local or tribal authority."*

The Storage Tanks (T001-T002) will each have an annual potential to emit VOC that is less than 6 tpy and are therefore not subject to the requirements of this subpart.

2.1.3.8. 40 CFR 60, Subpart OOOOa – Crude Oil and Natural Gas Production, Transmission, and Distribution – Proposed – Not Applicable

The amendments to NSPS OOOO proposed on August 18, 2015 (i.e., NSPS OOOOa) include requirements for fugitive emissions from compressor stations. In accordance with 40 CFR 60.5430a, a compressor station site is defined as,

…any permanent combination of one or more compressors that move natural gas at increased pressure through gathering or transmission pipelines…

M&R 02&03 will not include any compressors and will not be subject to the requirements for fugitive emissions proposed in NSPS OOOOa. The Storage Tanks (T001-T002) will not be subject to the requirements of NSPS OOOOa for reasons consistent with the applicability determination provided in Section 2.1.3.7.

2.1.3.9. Non-Applicability of All Other NSPS

NSPS standards are developed for particular industrial source categories and the applicability of a particular NSPS to a facility can be readily ascertained based on the industrial source category covered. All other NSPS are categorically not applicable to the proposed project.

2.1.4. National Emission Standards for Hazardous Air Pollutants

NESHAPs, located in 40 CFR 63, are typically applicable to specific categories of sources that have the potential to emit HAP in levels greater than 10 tpy for any individual HAP or 25 tpy for any combination of HAP (i.e., major HAP sources). Emissions and operational limitations provided in the NESHAPs are established on the basis of a Maximum Achievable Control Technology (MACT) determination for a particular major source category.

Furthermore, generally available control technology (GACT)-based NESHAPs (located in 40 CFR 63) require area (i.e., non-major) sources to control emissions to the level achievable by the use of generally available control technologies or management practices to reduce emissions of HAP.

M&R 02&03 will operate as an area (i.e., non-major) source of HAP as demonstrated in Table 1-1. Each potentially applicable subpart of 40 CFR Part 63 is discussed in the subsections below.

2.1.4.1. 40 CFR 63, Subpart A – General Provisions - Applicable

NESHAP Subpart A, *General Provisions*, contains national emission standards for HAP defined in Section 112(b) of the Clean Air Act. All affected sources, which are subject to another NESHAP, are subject to the general provisions of NESHAP Subpart A, unless specifically excluded by the source-specific NESHAP.

2.1.4.2. 40 CFR 63, Subpart HH – Oil and Natural Gas Production Facilities – Not Applicable

MACT Subpart HH applies to emission points at oil and natural gas production facilities that are HAP major or HAP area sources and that process, upgrade, or store either hydrocarbon liquids or natural gas prior to the point of custody transfer. For area sources, the affected source includes each triethylene glycol (TEG) dehydration unit located at a facility that meets the criteria specified in paragraph (a) of the regulation.

Also, the natural gas production facility to which the rule applies ends at the point that the natural gas enters a facility in the natural gas transmission and storage category per 63.760(a)(3). M&R 02&03 will not operate a TEG dehydration unit and the station is considered a natural gas transmission and storage facility; therefore, NESHAP Subpart HH does not apply.

2.1.4.3. 40 CFR 63, Subpart HHH – Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities – Not Applicable

MACT Subpart HHH applies to natural gas transmission and storage facilities that transport or store natural gas prior to entering the pipeline to a local distribution company or to a final end user and are major sources of HAP emissions. The proposed M&R 02&03 is an area source for HAP; therefore this subpart is not applicable.

2.1.4.4. Subpart ZZZZ – Reciprocating Internal Combustion Engines (RICE) - Applicable

The NESHAP found in 40 CFR 63, Subpart ZZZZ (RICE NESHAP) was designed to regulate emissions from stationary reciprocating internal combustion engines at both major and area sources of hazardous air pollutants. The proposed emergency generator engines are classified as new RICE because the units will be constructed after June 12, 2006 and located at an area source of HAP [40 CFR 63.6590(a)(2)(iii)]. Subpart ZZZZ requires all new spark-ignition RICE located at an area source of HAP to comply with NSPS Subpart JJJJ with no additional applicable requirements under the RICE NESHAP [40 CFR 63.6590(c)(1)]. The Emergency Generators (P001-P002) will meet the requirements under the RICE NESHAP by complying with NSPS Subpart JJJJ for spark ignition RICE (refer to the discussion in Section 2.1.3.6).

2.1.4.5. Subpart DDDDD – Industrial, Commercial, and Institutional Boilers and Process Heaters at Major Sources of HAP Emissions – Not Applicable

MACT Subpart DDDDD establishes emission limits, operational standards, and compliance demonstration requirements for HAP emissions from industrial, commercial, and institutional boilers and process heaters at major sources of HAP emissions. M&R 02&03 is not a major source of HAP emissions; therefore, this regulation is not applicable.

2.1.4.6. Subpart JJJJJJ – Industrial, Commercial, and Institutional Boilers at Area Sources of HAP Emissions – Not Applicable

The provisions of 40 CFR 63, Subpart JJJJJJ establish emission limits, operational standards, and energy assessment requirements for HAP emissions from industrial, commercial, and institutional boilers at area sources of HAP emissions. According to 40 CFR 63.11194(a)(2), affected sources include the collection of all new industrial, commercial, and institutional boilers within a subcategory (e.g., coal, biomass, oil). Furthermore, Subpart JJJJJJ specifically excludes natural gas fired boilers [40 CFR 63.11195(e)]. The proposed Process Heaters (B001-B002) are natural gas fired catalytic style heaters and do not meet the definition of industrial, commercial, or institutional boilers as defined in 40 CFR 63.11237; therefore, this regulation is not applicable.

2.1.4.7. Non-Applicability of All Other NESHAP

NESHAP standards are developed for particular industrial source categories, and the applicability of a particular NESHAP to a facility can be readily ascertained based on the industrial source covered. All other NESHAP are categorically not applicable to the proposed project.

2.1. STATE REGULATORY APPLICABILITY

2.1.1. OAC 3745-17-07 – Control of Visible Particulate Emissions from Stationary Sources - *Applicable*

OAC 3745-17-07(A) limits visible particulate emissions from all stacks to less than 20 percent opacity, as a 6-minute average, except during periods of startup, shutdown, and malfunction. However, visible emissions may exceed 20 percent opacity, as a 6-minute average, but not for more than 6 consecutive minutes in any 1-hour period. Visible emissions may not exceed 60 percent opacity, as a 6-minute average, at any time. The exhaust stacks associated with the Emergency Generators (P001-P002) will be subject to this visible emissions standards.

2.1.2. OAC 3745-17-10 – Restrictions on Particulate Emissions from Fuel Burning Equipment – *Not Applicable*

Pursuant to OAC 3745-17-10(A), OAC 3745-17-10 applies to facilities in which fuel, including any product or by-product of a manufacturing process, is burned for the primary purpose of producing heat or power by indirect heat transfer. The proposed Emergency Generators (P001-P002) will not be subject to the requirements of this rule given that these units do not produce heat or power by indirect heat transfer.

2.1.3. OAC 3745-17-11 – Restrictions of Particulate Emissions from Industrial Processes - *Applicable*

The emission limits of OAC 3745-17-11 apply to any operation, process, or activity that releases or may release particulate emissions into the ambient air. OAC 3745-17-11(B)(5)(a) limits particulate emissions from small (i.e., less than 600 hp) stationary internal combustion engines to 0.310 lb/MMBtu of heat input. The Emergency Generators (P001-P002) will be subject to this emissions standard.

2.1.4. OAC 3745-18-06 – General SO_2 Emission Limit Provisions – *Not Applicable*

The emission limits of OAC 3745-18-06 apply to any operation, process, or activity that releases or may release SO_2 emissions into the ambient air. Per OAC 3745-18-06(A), stationary gas turbines and stationary IC engines are exempt from OAC 3745-18-06(D), (F), and (G) during any calendar day in which natural gas is the only fuel burned. The proposed Emergency Generators (P001-P002) will burn pipeline quality natural gas only, and are therefore exempt from the requirements of OAC 3745-18-06.

2.1.5. OAC 3745-21-09(L) – Storage of Petroleum Liquids in Fixed Roof Tanks – *Not Applicable*

The provisions of OAC 3745-21-09(L) prohibit the storage of any petroleum liquid with a true vapor pressure (TVP) greater than 1.52 actual pounds per square inch (psia) in fixed roof tanks unless such tanks meet the specified design requirements. Fixed roof tanks with capacities less than 40,000 gallons are exempt from the requirements of OAC 3745-21-09(L)(1) pursuant to OAC 3745-21-09(L)(2)(a). The Storage Vessels (T001-T002) are each sized to a nominal storage capacity less than 40,000 gallons. Therefore, OAC 3741-21-09(L) is not applicable.

2.1.6. OAC 3745-21-21 – Storage of Volatile Organic Liquids in Fixed Roof Tanks and External Floating Roof Tanks – *Not Applicable*

M&R 02&03 is not located in any of the counties affected by this rule; therefore, the storage vessel is not subject to the standards of OAC 3745-21-21.

2.1.7. OAC 3745-110-03 – RACT Requirements and/or Limitations for Emissions of NO_X from Stationary Sources – *Not Applicable*

The emission limitations in OAC 3745-110-03 apply to any new stationary source of NO_X emissions that meets the conditions in OAC 3745-110-02(A)(2). The Emergency Generators (P001-P002) will be new stationary sources that meet the conditions in OAC 3745-110-02(A)(2).

In accordance with OAC 3745-110-03(K)(3), the Emergency Generators (P001-P002) will be exempt from the emission standards of OAC 3745-110-03 given that the engines are rated at a capacity less than 2,000 hp.

Pursuant to the provisions added to Ohio Revised Code (ORC) 3704 as a result of Senate Bill 265 (SB 265), sources modified or constructed after August 3, 2009, are to have rule-based best available technology (BAT) limits established by Ohio EPA for specific source categories. However, Ohio EPA has yet to promulgate the rule-based BAT limits. To address this regulatory gap, the Ohio EPA's Division of Air Pollution Control (DAPC) released a memo on February 7, 2014 (February 2014 Memo), indicating that permits issued on or after August 3, 2009, must go through an interim case-by-case BAT procedure for non-exempt sources (i.e., sources with emission limitations greater than 10 tpy).[5]

The first step in determining BAT, according to the February 2014 Memo, is to review MACT, GACT, BACT, and LAER applicability. The next step is to determine whether the operations are of the type and size that are regulated by Reasonable Available Control Technology (RACT) requirements for VOC emissions.

The third step in the BAT analysis is to determine BAT on a case-by-case basis by: 1) reviewing past BAT determinations, and 2) determining the format for the BAT limit, which should be expressed in one of the following ways:

(1) Work practices;
(2) Source design characteristics or design efficiency of applicable air contaminant control devices;
(3) Raw material specifications or throughput limitations averaged over a 12-month rolling period; or
(4) Monthly allowable emissions averaged over a 12-month rolling period.

Furthermore, the existing "less than 10 tpy" BAT exemption pursuant to OAC 3745-31-05(A)(3)(a)(ii) is not currently approved as part of Ohio's State Implementation Plan (SIP). Ohio EPA is currently in the process of revising the procedures for specifying BAT for sources that have potential emissions less than 10 tpy. In the interim, Ohio EPA is establishing BAT for these sources based on the guidance presented in the February 2014 memo.[6]

3.1. GAS RELEASES BAT

The evacuation of piping during maintenance and routine operations results in the release of gases directly to the atmosphere. In accordance with Item 4.f of the February 2014 memo, NEXUS requests as BAT for gas releases a monthly VOC limit as a rolling, 12-month average as specified in Table 3-1. As described in Item 4.f of the February 2014 Memo, monitoring, recordkeeping, and reporting requirements will not be necessary to support this BAT limit given that potential VOC emissions will not exceed 1 tpy.

[5] Ohio EPA Memo from Mike Hopkins, Assistant Chief, Permitting, DAPC, to Permit Writers and Reviewers "BAT Requirements for Permits Issued On or After February 7, 2014," dated February 7, 2014, which supersedes previous guidance that was issued on August 30, 2013. Ohio's BAT policy will be in place only until such time when the Ohio EPA develops and promulgates rules that define BAT in accordance with Ohio Revised Code (ORC) 3704.03(T) requirements.

[6] Question 34 of the February 2014 Memo.

3.2. EQUIPMENT LEAKS BAT

Piping components (e.g., valves, flanges, connectors) at M&R 02&03 may exhibit leaks resulting in emissions of VOC. In accordance with Item 4.f of the February 2014 memo, NEXUS requests as BAT for Equipment Leaks a monthly VOC limit as a rolling, 12-month average as specified in Table 3-1.

3.3. STORAGE TANK BAT

Flashing losses, working losses, and breathing losses from the storage tanks will generate emissions of VOC. In accordance with Item 4.f of the February 2014 memo, NEXUS requests as BAT for the Storage Tanks a monthly VOC limit as a rolling, 12-month average as specified in Table 3-1. As described in Item 4.f of the February 2014 Memo, monitoring, recordkeeping, and reporting requirements will not be necessary to support this BAT limit given that potential VOC emissions from each tank will not exceed 1 tpy.

3.4. LIQUID LOADING BAT

Vapors displaced during liquid loading activities will generate emissions of VOC. In accordance with Item 4.f of the February 2014 memo, NEXUS requests as BAT for liquid loading a monthly VOC limit as a rolling, 12-month average as specified in Table 3-1. As described in Item 4.f of the February 2014 Memo, monitoring, recordkeeping, and reporting requirements will not be necessary to support this BAT limit given that potential VOC emissions will not exceed 1 tpy.

3.5. SUMMARY OF SELECTED BAT EMISSION LIMITS

Table 3-1 summarizes the requested BAT limits for each emission unit at M&R 02&03.

Table 3-1. Summary of Proposed BAT Limits

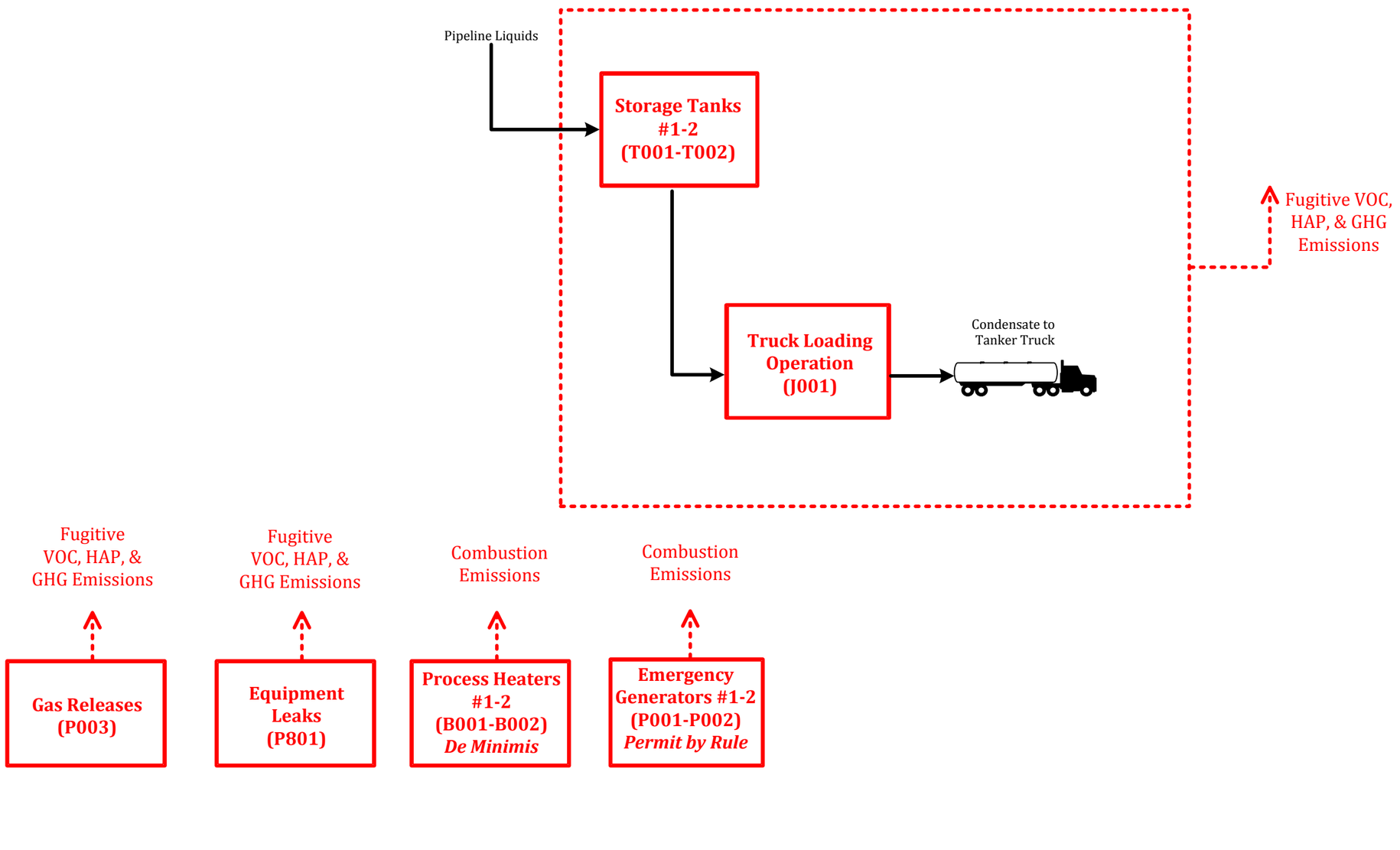
EU ID	Emission Unit Description	VOC (ton/month)[1]
P003	Gas Releases	0.04
P801	Equipment Leaks	0.36
T001	Storage Tank #1	0.05
T002	Storage Tank #2	0.05
J001	Liquid Loading	1.98E-03

1. The requested emission limits are averaged over 12-month rolling period.

APPENDIX A

Process Flow Diagram

APPENDIX A. PROCESS FLOW DIAGRAM FOR M&R 02&03



NEXUS Gas Transmission, LLC M&R 02&03
Process Flow Diagram
Trinity Consultants 143601.0141 September 2015

PLOT PLAN BOUND SEPARATELY UNDER VOLUME IV – CRITICAL ENERGY INFRASTRUCUTRE INFORMATION – NOT FOR PUBLIC RELEASE

APPENDIX B

PTIO & EAC Forms

Application for Permit to Install (PTI) and Permit to Install/Operate (PTIO)

Ohio Environmental Protection Agency
Lazarus Government Center
50 West Town Street, Suite 700
P.O. Box 1049
Columbus, Ohio 43216-1049

For EPA Use Only

Application Number_____

Date Received _____

Facility Information

Note: Application is incomplete if all **bolded** questions throughout the application are not completed.

Legal Facility Name	M&R 02&03			
Alternate Name (if any)				
Facility Physical Address	Approximately 2 miles east of Kensington on Tunnel Hill Road			
City, ZIP code	Kensington, 44423			
County	Columbiana			
Facility ID				
Facility Description	Pipeline Metering and Regulating Site			
NAICS Code	486210			
Facility Latitude	40	degrees 44	minutes 11.60	seconds
Facility Longitude	80	degrees 55	minutes 6.54	seconds
Core Place ID (if known)				
SCSC ID (if known)				

Portable? ☐ Yes ■ No

Portable Type ☐ Asphalt Plant ☐ Concrete Plant ☐ Generator ☐ Aggregate Processing ☐ Concrete Crusher ☐ Grinder ☐ Other

Initial Location County If "Other", describe:

Contact Information

☐ No change to information on file.

❶	☑ Billing	☐ Owner	☑ Primary	☐ Operator	☐ On-Site	☐ Responsible Official		
First Name: Reagan	Last Name: Mayces		Phone: 713-627-4790	Fax:	E-mail: rmmayces@spectraenergy.com			
Address 1: P.O. Box 1642	Address 2:		City or Township: Houston		State: TX	Zip Code: 77251-1642		

❷	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☑ Responsible Official		
First Name: Brian	Last Name: McKerlie		Phone: 713-627-5400	Fax:	E-mail:			
Address 1: P.O. Box 1642	Address 2:		City or Township: Houston		State: TX	Zip Code: 77251-1642		

❸	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☐ Responsible Official		
First Name:	Last Name:		Phone:	Fax:	E-mail:			
Address 1:	Address 2:		City or Township:		State:	Zip Code:		

❹	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☐ Responsible Official		
First Name:	Last Name:		Phone:	Fax:	E-mail:			
Address 1:	Address 2:		City or Township:		State:	Zip Code:		

❺	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☐ Responsible Official		
First Name:	Last Name:		Phone:	Fax:	E-mail:			
Address 1:	Address 2:		City or Township:		State:	Zip Code:		

❻	☐ Billing	☐ Owner	☐ Primary	☐ Operator	☐ On-Site	☐ Responsible Official		
First Name:	Last Name:		Phone:	Fax:	E-mail:			
Address 1:	Address 2:		City or Township:		State:	Zip Code:		

Division of Air Pollution Control
Application for Permit-to-Install or Permit-to-Install and Operate

Section I – General Application Information

This section should be filled out for each permit to install (PTI) or Permit to Install and Operate (PTIO) application. A PTI is required for all air contaminant sources (emissions units) installed or modified after January 1, 1974 that are subject to OAC Chapter 3745-77. A PTIO is required for all air contaminant sources (emissions units) that are not subject to OAC Chapter 3745-77 (Title V). See the application instructions for additional information.

For OEPA use only:	☐ Installation	☐ Request Federally enforceable restrictions
	☐ Modification	☐ General Permit
	☐ Renewal	☐ Other

1. Is the purpose of this application to transition from OAC Chapter 3745-77 (Title V) to OAC Chapter 3745-31 (PTIO)?

   ☐ yes ☒ no

2. **Establish PER Due Date** - Select an annual Permit Evaluation Report (PER) due date for this facility (does not apply to facilities subject to Title V, OAC Chapter 3745-77). If the PER has previously been established and a change is now desired, a PER Change Request form must be filed instead of selecting a date here.

Due Date:	For Time Period:
☒ February 15	January 1 through December 31
☐ May 15	April 1 through March 31
☐ August 15	July 1 through June 30
☐ November 15	October 1 through September 30

   ☐ PER not applicable (Title V) or due date already established
   ☐ PER Request Permit Change form attached

3. **Federal Rules Applicability** - Please check all of the appropriate boxes below.

	JJJJ
New Source Performance Standards (NSPS) *New Source Performance Standards are listed under 40 CFR 60 - Standards of Performance for New Stationary Sources.*	☐ not affected ☒ subject to Subpart: _____ ☐ unknown ☐ exempt - explain below
National Emission Standards for Hazardous Air Pollutants (NESHAP) *National Emissions Standards for Hazardous Air Pollutants are listed under 40 CFR 61. (These include asbestos, benzene, beryllium, mercury, and vinyl chloride).*	☒ not affected ☐ subject to Subpart: _____ ☐ unknown ☐ subject, but exempt - explain below
	ZZZZ
Maximum Achievable Control Technology (MACT) *The Maximum Achievable Control Technology standards are listed under 40 CFR 63 and OAC rule 3745-31-28.*	☐ not affected ☒ subject to Subpart: _____ ☐ unknown ☐ subject, but exempt - explain below
Prevention of Significant Deterioration (PSD) *These rules are found under OAC rule 3745-31-10 through OAC rule 3745-31-20.*	☒ not affected ☐ subject to regulation ☐ unknown
Non-Attainment New Source Review *These rules are found under OAC rule 3745-31-21 through OAC rule 3745-31-27.*	☒ not affected ☐ subject to regulation ☐ unknown
112 (r) - Risk Management Plan *These rules are found under 40 CFR 68.*	☒ not affected ☐ subject to regulation ☐ unknown
Title IV (Acid Rain Requirements) *These rules are found under 40 CFR 72 and 40 CFR 73.*	☒ not affected ☐ subject to regulation ☐ unknown

Please explain why you checked "exempt" in this question for one or more federal rules. Identify each exemption and whether the entire facility and/or the specific air contaminant sources included in this permit application is exempted. Attach an additional page if necessary.

_____

_____

4. Express PTI/PTIO - Do you qualify for express PTI or PTIO processing?

☐ yes ■ no

If yes, are you requesting express processing per OAC rule 3745-31-05?

☐ yes ■ no

5. **Air Contaminant Sources in this Application** - Identify the air contaminant source(s) for which you are applying below. Attach additional pages if necessary. Section II of this application and an EAC form should be completed for each air contaminant source.

Emissions Unit ID*	**Company Equipment ID** (company's name for air contaminant source)	**Equipment Description** (List all equipment that are a part of this air contaminant source)
	See Attached	See Attached

* This ID would have been created when a previous air permit was issued. If no previous permits have been issued for this air contaminant source, leave this field blank. If this air contaminant source was previously identified in STARShip applications as a "Z" source (e.g., Z001), please provide that identification and a new ID will be assigned when the PTI/PTIO is issued.

6. Trade Secret Information - Is any information included in this application being claimed as a trade secret per Ohio Revised Code (ORC) 3704.08?

☐ yes (A "non-confidential" version must also be submitted in order for this application to be deemed complete.)
■ no

7. Permit Application Contact - Person to contact for questions about this application:

Reagan Mayces	EHS Manager, US Operations
Name	Title
P.O. Box 1642, Houston, TX, 77251-1642	
Address (Street, City/Township, State and Zip Code)	
713-627-4790	rmmayces@spectraenergy.com
Phone Fax	E-mail

8. **Authorized Signature** – OAC rule 3745-31-04 states that applications for permits to install or permits to install and operate shall be signed:
   (1) In the case of a corporation, by a principal executive officer of at least the level of vice president, or his duly authorized representative, if such representative is responsible for the overall operation of the facility.
   (2) In the case of a partnership by a general partner.
   (3) In the case of sole proprietorship, by the proprietor, and
   (4) In the case of a municipal, state, federal or other governmental facility, by the principal executive officer, the ranking elected official, or other duly authorized employee.

   Under OAC rule 3745-31-04, this signature shall constitute personal affirmation that all statements or assertions of fact made in the application are true and complete, comply fully with applicable state requirements, and shall subject the signatory to liability under applicable state laws forbidding false or misleading statements.

Authorized Signature (for facility)	Date
Brian McKerlie	Vice President
Print Name	Title

5. **Air Contaminant Sources in this Application** - Identify the air contaminant source(s) for which you are applying below. Attach additional pages if necessary. Section II of this application and an EAC form should be completed for each air contaminant source.

Emissions Unit ID*	**Company Equipment ID** (company's name for air contaminant source)	**Equipment Description** (List all equipment that are a part of this air contaminant source)
	Gas Releases	Periodic maintenance, routine operations, and pigging activities will occasionally necessitate the evacuation of equipment directly to atmosphere
	Equipment Leaks	Various equipment components will be located throughout the compressor station that may result in fugitive emissions due to equipment leaks
	Storage Tank #1	One vertical fixed roof tank sized to a capacity of 1,000 gallons used to store condensate liquids collected from the pipeline and from station equipment.
	Storage Tank #2	One vertical fixed roof tank sized to a capacity of 1,000 gallons used to store condensate liquids collected from the pipeline and from station equipment.
	Liquid Loading	Liquids collected in Storage Tanks #1-2 will be loaded into tanker trucks for shipment off site

* This ID would have been created when a previous air permit was issued. If no previous permits have been issued for this air contaminant source, leave this field blank. If this air contaminant source was previously identified in STARShip applications as a "Z" source (e.g., Z001), please provide that identification and a new ID will be assigned when the PTI/PTIO is issued.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P003
Company Equipment ID: Gas Releases

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P003
Company Equipment ID: Gas Releases

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

3-06-004-02 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.44
Volatile organic compounds (VOC)					0.44
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					0.04
Highest single HAP: Benzene					1.29E-02
Toxic Air Contaminants (see instructions):					0.04

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P003
Company Equipment ID: Gas Releases

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (^oF) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ **Company ID or Name for the Egress Point**	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P003	■ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)
Gas Releases			

❷ **Company ID or Name for the Egress Point**	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ **Company ID or Name for the Egress Point**	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude			Egress Point Longitude		
P003	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3100 - General Process Operation

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
GENERAL PROCESS OPERATION

This form is to be completed for each process operation when there is no specific emissions activity category (EAC) form applicable. If there is more than one end product for this process, copy and complete this form for each additional product (see instructions). Several State/Federal regulations which may apply to process operations are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. P001) P003

2. Maximum Operating Schedule: 24 hours per day; 365 days per year

If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. End product of this process: N/A - Natural Gas released during maintenance and routine operations

4. Hourly production rates (indicate appropriate units). Please see the instructions for clarification of "Maximum" and "Average" for new versus existing operations:

Hourly	Rate	Units (e.g., widgets)
Average production	N/A	N/A
Maximum production	N/A	N/A

5. Annual production rates (indicate appropriate units) Please see the instructions for clarification of "Maximum" and "Actual" for new versus existing operations:

Annual	Rate	Units (e.g., widgets)
Actual production	N/A	N/A
Maximum production	N/A	N/A

6. Type of operation (please check one):

❒ Continuous
❒ Batch (please complete items below)

Minimum cycle* time (minutes): _____
Minimum time between cycles (minutes): _____
Maximum number of cycles per daily 24 hour period: _____
(Note: include cycle time and set up/clean up time.)

*"Cycle" refers to the time the equipment is in operation.

7. Materials used in process at maximum hourly production rate (add rows/pages as needed):

Material	Physical State at Standard Conditions	Principle Use	Amount**
Pipeline Gas	Gas	Venting during planned release events	52,858 lb/yr

** Please indicate the amount **and** rate (e.g., lbs/hr, gallons/hr, lbs/cycle, etc.).

8. Please provide a narrative description of the process below (e.g., coating of metal parts using high VOC content coatings for the manufacture of widgets; emissions controlled by thermal oxidizer...):

Gas releases associated with routine operation and periodic pipeline maintenance activities.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P801
Company Equipment ID: Equipment Leaks

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P801
Company Equipment ID: Equipment Leaks

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

3-10-002-20 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					4.29
Volatile organic compounds (VOC)					4.29
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					0.57
Highest single HAP: Xylenes					0.23
Toxic Air Contaminants (see instructions):					0.57

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: P801
Company Equipment ID: Equipment Leaks

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
P801	■ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)
Equipment Leaks			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude			Egress Point Longitude		
P801	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3100 - General Process Operation

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
GENERAL PROCESS OPERATION

This form is to be completed for each process operation when there is no specific emissions activity category (EAC) form applicable. If there is more than one end product for this process, copy and complete this form for each additional product (see instructions). Several State/Federal regulations which may apply to process operations are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. P001) P801

2. Maximum Operating Schedule: 24 hours per day; 365 days per year

If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. End product of this process: N/A - Fugitive Emissions from Equipment Leaks

4. Hourly production rates (indicate appropriate units). Please see the instructions for clarification of "Maximum" and "Average" for new versus existing operations:

Hourly	Rate	Units (e.g., widgets)
Average production	N/A	N/A
Maximum production	N/A	N/A

5. Annual production rates (indicate appropriate units) Please see the instructions for clarification of "Maximum" and "Actual" for new versus existing operations:

Annual	Rate	Units (e.g., widgets)
Actual production	N/A	N/A
Maximum production	N/A	N/A

6. Type of operation (please check one):

☑ Continuous
❒ Batch (please complete items below)

Minimum cycle* time (minutes): _____
Minimum time between cycles (minutes): _____
Maximum number of cycles per daily 24 hour period: _____
(Note: include cycle time and set up/clean up time.)

*"Cycle" refers to the time the equipment is in operation.

7. Materials used in process at maximum hourly production rate (add rows/pages as needed):

Material	Physical State at Standard Conditions	Principle Use	Amount**
N/A			

** Please indicate the amount **and** rate (e.g., lbs/hr, gallons/hr, lbs/cycle, etc.).

8. Please provide a narrative description of the process below (e.g., coating of metal parts using high VOC content coatings for the manufacture of widgets; emissions controlled by thermal oxidizer...):

Fugitive emissions from various equipment components, including valves, connectors, and flanges.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: T001
Company Equipment ID: Storage Tank #1

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: T001
Company Equipment ID: Storage Tank #1

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.61
Volatile organic compounds (VOC)					0.61
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					3.66E-02
Highest single HAP: n-Hexane					2.47E-02
Toxic Air Contaminants (see instructions):					3.66E-02

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: T001
Company Equipment ID: Storage Tank #1

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
T001	■ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Storage Tank #1			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude			Egress Point Longitude		
T001	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: T002
Company Equipment ID: Storage Tank #2

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: T002
Company Equipment ID: Storage Tank #2

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-003-11 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					0.61
Volatile organic compounds (VOC)					0.61
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					3.66E-02
Highest single HAP: n-Hexane					2.47E-02
Toxic Air Contaminants (see instructions):					3.66E-02

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: T002
Company Equipment ID: Storage Tank #2

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
T002	■ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Storage Tank #2			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude			Egress Point Longitude		
T002	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3104 - Storage Tank

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
STORAGE TANK

This form is to be completed for each storage tank for which a permit is required. State/Federal regulations which may apply to storage tanks are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ❒ Renewal or Modification of Air Permit Number(s) (e.g. T001) T001-T002

2. Type of tank: ☑ Fixed roof tank ❒ Variable vapor space tank ❒ Pressure tank
❒ External floating roof tank ❒ Internal floating roof tank

3. Location of tank: ☐ Indoors ☑ Outdoors ❒ Underground

4. a) Tank capacity: 1,000 gallons or _____ barrels

If capacity is provided in barrels, enter the number of gallons per barrel: _____

b) Working volume, if different from tank capacity: _____ gallons or _____ barrels

5. Shape and dimensions:

☑ Cylindrical ☐ Spherical ❒ Other, specify _____

❒ Horizontal tanks:
Tank shell length: _____ ft.
Tank shell diameter or width _____ ft.

☑ Vertical tanks:
Tank shell height: 6 ft.
Tank shell diameter or width: 5.33 ft.

6. Tank shell material: ☐ Steel ☐ Aluminum ❒ Other, specify _____

7. If this tank is located outdoors and above ground, provide the paint color of the tank's shell and roof and indicate the condition of the paint.

Shell:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)
❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Roof:
❒ Aluminum (specular) ❒ Gray (dark) ❒ White ❒ Red (primer)

❒ Aluminum (diffuse) ❒ Gray (light) ☑ Other, specify Gray/Medium

Condition of paint: ☑ Good ❒ Poor

8. If this tank is a variable vapor space tank or is interconnected to a variable vapor space tank, complete the following:

a) Capacity of vapor expansion system: _____ gallons or _____ barrels

b) Identify all tanks and other vapor sources interconnected to the vapor expansion system:

_____

9. If this tank is subject to the following federal rules, complete the following:

❒ New Source Performance Standards under 40 CFR 60, Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984"

a) Date of initial fill with petroleum liquid_____

b) Was tank out of service for a period of a year or more? ❒ Yes ❒ No
If yes, identify the date of subsequent refilling with petroleum liquid after the most recent out-of-service period of a year or more. _____

❒ Maximum Achievable Control Technology (MACT) Standards under 40 CFR 63, Subpart G (HON Tanks)

a) This tank is defined as a: ❒ Group 1 storage vessel ❒ Group 2 storage vessel

b) At the storage temperature, maximum true vapor pressure of total HAPs:_____

10. Supplemental data, check all that apply:

❒ Tank was converted from an external floating roof tank or a fixed roof tank to an internal floating roof tank; provide type and date of conversion: _____

☐ Tank is used to store produced crude oil or condensate prior to custody transfer.

❒ Tank is insulated; describe: _____

❒ Tank is heated and indicate temperature (in degrees Fahrenheit): _____

11. Material stored Pipeline Liquids Trade Name _____

Density: 6.126 lbs/gal or _____ °API Producer _____

12. Temperature of stored material: Average 56.78 °F and Maximum 82.20 °F

13. Vapor pressure of stored material:

a) Actual vapor pressure: 6.6239 psia at average storage temperature
10.3398 psia at maximum storage temperature

b) Reid vapor pressure, in psia:
Average _____
Minimum _____
Maximum _____

c) If material stored is a gas or liquified gas, provide the pressure at which it is stored:
_____ psi gauge at _____ °F

14. The vapor molecular weight: 62 lbs/lb-mole

15. If the material is a liquid other than gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the questions below:

Is it a photochemically reactive material? ❒ Yes ☐ No

16. Is the material a hazardous waste? ❒ Yes ☑ No
If yes, identify type (EPA hazardous waste number) _____

17. Type of filling: ❒ Splash ☑ Submerged ❒ Other, specify _____

18. Indicate the year (or 12-month period) for which throughput is provided in items 19 and 20:_____

19. The maximum daily throughput of material stored: 1,000 gal/hr gallons or _____ barrels.

20. Maximum annual throughput of material stored: 4,000 gallons or _____ barrels.

21. Identify the control equipment associated with this tank.

a) Type of vapor control system None

b) Date tank was equipped with or vented to vapor control system (month/year) N/A

22. Complete the table below for any pressure or vacuum relief vent valve.

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control system, identify the vapor control system
N/A			

If this is a Fixed Roof, Variable Vapor Space or Pressure Tank, complete items 23 through 27:

23. If the tank is vertical, what type of roof does it have?

❒ Cone roof Height: _____ ft ☑ Dome roof Height: _____ ft

24. The average height of the liquid material stored within the tank during the year: 3 ft.

25. The maximum height of the liquid material stored within the tank during the year: 6 ft.

26. The average liquid surface temperature: 56.78 °F

27. Is this tank bolted or riveted construction? ❒ Yes ☑ No

If this tank is an External Floating Roof Tank, complete items 28 through 34:

28. Is the external floating roof domed? ❒ Yes ❒ No

29. Type of floating roof: ❒ Double Deck ❒ Pontoon ❒ Other, specify _____

30. Type of shell construction: ❒ Welded ❒ Riveted or bolted

31. Are all openings in the external floating roof, except automatic bleeder vents, rim space vents, leg sleeves, main roof drain, emergency roof drains and slotted gauging/sampling wells, equipped with both a cover, seal or lid without visible gaps and a projection into the tank below the liquid surface?

❒ Yes ❒ No

If no, explain: _____

32. Is there a slotted gauging/sampling well?

❒ Yes ❒ No

If yes, is it equipped with an object which floats on the liquid surface within the well and which covers at least 90 percent of the area of the well opening?

❒ Yes ❒ No

33. On the blank lines to the left of the various types of roof fittings shown below, indicate the number, if any, of each fitting.

Access hatch (24-inch diameter well)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Vacuum breaker (10-inch diameter well)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Unslotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover ❒ With sleeve
_____ Gasketed sliding cover ❒ With sleeve ❒ With wiper

Slotted guide-pole/sample well (8-inch diameter unslotted pole, 21-inch diameter well)
_____ Ungasketed sliding cover, without float _____ Gasketed sliding cover, without float
_____ Gasketed sliding cover, with float

Gauge-float well (20-inch diameter)
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed
_____ Bolted cover, gasketed

Gauge-hatch/sample well (8-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

Roof leg (3-inch diameter)

_____ Adjustable, pontoon area	❒ Gasketed	❒ Ungasketed	❒ Sock
_____ Adjustable, center area	❒ Gasketed	❒ Ungasketed	❒ Sock

_____ Adjustable, double-deck roofs
_____ Fixed

Roof drain (3-inch diameter)
_____ Open
_____ 90% closed

Roof leg (2-1/2-inch diameter)
_____ Adjustable, pontoon area
_____ Adjustable, center area
_____ Adjustable, double-deck roofs
_____ Fixed

Rim vent (6-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

34. The average wind speed at the tank site: _____ mph.

If this tank is an <u>Internal</u> Floating Roof Tank, complete items 35 through 41:

35. Type of floating decks:

❒ Contact deck ❒ Noncontact deck

36. Type of roof above floating decks: ❒ Column-supported ❒ Self-supporting

37. If roof is column-supported, identify the type of column construction:

❒ 9-inch by 7-inch built-up columns ❒ Other, specify _____
❒ 8-inch diameter pipe columns

38. Floating deck seam construction:

❒ Welded ❒ Bolted ❒ Other, specify _____

39. If deck seams are bolted, complete a) or b):

a) ❒ Continuous sheet construction; specify width of sheets (e.g., 5 ft, 6 ft, or 7 ft):_____

❒ Panel construction; specify size of panels (e.g., 5 ft x 7.5 ft, or 5 ft x 12 ft):_____

b) Total length of bolted deck seams: _____ ft

Total area of floating deck: _____ sq ft

40. On the blank lines to the left of the various types of floating deck fittings shown below, indicate the number, if any, of each fitting.

Access hatch (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Automatic gauge float well (usually one)
_____ Bolted cover, gasketed
_____ Unbolted cover, ungasketed
_____ Unbolted cover, gasketed

Deck supports (roof legs or hanger well)
_____ Adjustable
_____ Fixed
_____ Stub drains (1-inch diameter; not used on welded contact deck)

Ladder well (usually one)
_____ Sliding cover, gasketed
_____ Sliding cover, ungasketed

Column wells
_____ Pipe column, flexible fabric sleeve seal
_____ Pipe column, gasketed sliding cover
_____ Pipe column, ungasketed sliding cover
_____ Built-up column, gasketed sliding cover
_____ Built-up column, ungasketed sliding cover

Sample pipe or well (usually one)
_____ Slotted pipe, gasketed sliding cover
_____ Slotted pipe, ungasketed sliding cover
_____ Sample well, slit fabric seal (10% open area)

Vacuum breaker (10-inch diameter)
_____ Weighted mechanical actuation, gasketed
_____ Weighted mechanical actuation, ungasketed

41. Are all openings on the floating deck, except stub drains, equipped with a cover, seal or lid which is to be in a closed position at all times except when in actual use for tank gauging or sampling?

❒ Yes ❒ No

If no, explain:_____

If this tank is an <u>Internal or External</u> Floating Roof Tank, complete items 42 through 47:

42. Type of seal between floating roof and tank well:

❒ Single seal (primary seal only)
❒ Single seal with weather shield (primary seal with weather shield)
❒ Dual seals (primary seal with secondary shield mounted above it)

43. Primary seal information:

Manufacturer _____
Make or model _____
Date installed _____
(month/year)

Type:
❒ Liquid-mounted, liquid-filled
❒ Liquid-mounted, resilient foam-filled
❒ Vapor-mounted, resilient foam-filled
❒ Mechanical shoe (complete item below)
❒ Flexible wiper
❒ Other, specify _____

If the primary seal is a mechanical shoe, complete the following:

Vertical length of shoe _____ inches
Vertical length of shoe above stored liquid surface _____ inches

44. Secondary seal information:

Manufacturer _____ Type: ❒ Rim-mounted, flexible wiper
Make or model _____ ❒ Rim-mounted, resilient foam-filled
Date installed _____ ❒ Shoe-mounted
(month/year) ❒ Weather shield
❒ Other, specify _____

45. Most recent seal inspection for visible holes, tears or other openings in the seal or fabric:

Seal(s) inspected _____
Date of inspection _____
Inspected by (person and company) _____
Condition of seal(s) ❒ Good condition
❒ Needed repair or replacement, specify type and date of corrective action

46. Most recent seal gap measurements:

	Primary Seal	Secondary Seal
Date of measurement	_____	_____
By: (person)	_____	_____
(company)	_____	_____
Width of maximum gap	_____ inch	_____ inch
Total area of gaps	_____ sq in	_____ sq in
	_____ sq in/ft tank diameter	_____ sq in/ft tank diameter

47. Condition of the interior side of the tank shell:

❒ Little or no rust ❒ Dense rust ❒ Gunite-lining

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: J001
Company Equipment ID: Loading Operation

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☒ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) 02/2017 **OR** ☐ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _____ and the date operation began (month/year) _____

☐ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

When will you begin to modify the air contaminant source? (month/year) _____ **OR** ☐ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_____

Identify modification date or the date modification began (month/year) _____ and the date operation began (month/year) _____

☐ Reconstruction of an existing air contaminant source/facility. Please explain: _____

_____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) _____

☐ General Permit General Permit Category_____ General Permit Type _____

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: _____

2. **SCC Codes** - List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

4-04-001-50 _____ _____ _____ _____ _____

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)					N/A
PM • •10 microns in diameter (PE/PM_{10})					N/A
PM • •2.5 microns in diameter ($PE/PM_{2.5}$)					N/A
Sulfur dioxide (SO_2)					N/A
Nitrogen oxides (NO_x)					N/A
Carbon monoxide (CO)					N/A
Organic compounds (OC)					2.38E-02
Volatile organic compounds (VOC)					2.38E-02
Lead (Pb)					N/A
Total Hazardous Air Pollutants (HAPs)					1.40E-03
Highest single HAP: Hexane					6.00E-04
Toxic Air Contaminants (see instructions):					1.40E-03

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT)** - For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection:

Refer to application report for BAT analysis.

5. **Control Equipment** - Does this air contaminant source employ emissions control equipment?

☐ Yes - fill out the applicable information below.
☒ No - proceed to Question 6.

Section II - Specific Air Contaminant Source Information

Facility ID: _____
Emissions Unit ID: J001
Company Equipment ID: Loading Operation

Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations

PE/PM = Particulate emissions (formerly particulate matter)
$PE/PM_{2.5}$ = PM • •2.5 microns in diameter
VOC = Volatile organic compounds
NO_x = Nitrogen oxides
PE/PM_{10} = PM • •10 microns in diameter
OC = Organic compounds
SO_2 = Sulfur dioxide
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** _____
Adsorption Media: _____
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): _____
Media replacement frequency or regeneration cycle time (specify units): _____
Maximum temperature of the media bed, after regeneration (including any cooling cycle): _____
For Concentrator Only:
Design regeneration cycle time (minutes): _____
Minimum desorption air stream temperature (°F): _____
Rotational rate (revolutions/hour): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Converter
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Catalytic Incinerator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Combustion chamber residence time (seconds): _____
Minimum temperature difference (°F) across catalyst during air contaminant source operation: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Minimum inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Condenser
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** _____
Maximum exhaust gas temperature (^oF) during air contaminant source operation: _____
Coolant type: _____
Design coolant temperature (^oF): Minimum _____ Maximum _____
Design coolant flow rate (gpm): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Cyclone/Multiclone
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____
Operating pressure drop range (inches of water): Minimum: _____ Maximum: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Dry Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Reagent(s) used: Type: _____ **Injection rate(s):** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Electrostatic Precipitator
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC

☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** _____
Number of operating fields: _____
Secondary voltage (V) range (minimum – maximum): _____
Secondary current (milliamps) range (minimum – maximum): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fabric Filter/Baghouse
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other _____
Bag leak detection system: ☐ Yes ☐ No Type: _____
☐ **Lime injection or fabric coating agent used: Type:** _____ **Feed rate:** _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Flare
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** _____
Method of application: _____
Application rate (specify units): _____
Application frequency: _____
List all egress point IDs (from Table 7-B) associated with this control strategy: _____

☐ NOx Reduction Technology
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
NOx Reduction Type: ☐ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: _____ **Outlet temp.:** _____
Inlet gas flow rate (acfm): _____
For Selective types only:
Reagent type: _____
Reagent injection rate (specify units): _____
Reagent slip (acfm): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____ **Your ID for filter** _____
Design control efficiency (%): _____ Basis for efficiency: _____
Change frequency: _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Settling Chamber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Length x Width x Height: _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency: _____
Design control efficiency (%): _____ Basis for efficiency: _____
Operating control efficiency (%): _____ Basis for efficiency: _____
Minimum operating temp. (°F) and sensor location: _____ (See application instructions)
Combustion chamber residence time (seconds): _____
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Wet Scrubber
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
Operating pressure drop range (inches of water): Minimum: _____ **Maximum:** _____
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____
pH range for scrubbing liquid: Minimum: _____ Maximum: _____
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): _____
Scrubber liquid supply pressure (psig): _____ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): _____ Outlet gas flow rate (acfm) : _____
Inlet gas temperature (°F): _____ Outlet gas temperature (°F): _____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

☐ Other
Type: describe _____
Manufacturer: _____ Year installed: _____ **Your ID for control equipment** _____
Describe this control equipment: _____
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____
Estimated capture efficiency (%): _____ Basis for efficiency:_____
Design control efficiency (%): _____ Basis for efficiency:_____
Operating control efficiency (%): _____ Basis for efficiency:_____
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: _____
List all egress point IDs (from Table 7-A) associated with this control equipment: _____

6. **Process Flow Diagram** - Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information. See Appendix A

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ **Company ID for the Egress Point** N/A	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point N/A	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❷ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❹ **Company ID for the Egress Point**	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
J001	■ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)
Loading Operation			

❷ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

❸ Company ID or Name for the Egress Point	Type* (check one)	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
	☐ Area ☐ Volume		
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (°F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude			Egress Point Longitude		
J001	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec
	deg	min	sec	deg	min	sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: _____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☐ yes ☒ no

If yes, complete the following information.

Company Name or ID for the Egress Point _____

CEM Description_____

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☐ CO ☐ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☐ CO_2 ☐ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

EAC Form 3107 - Loading Rack for Liquid Materials

FOR OHIO EPA USE
FACILITY ID: _____

EMISSIONS ACTIVITY CATEGORY FORM
LOADING RACK FOR LIQUID MATERIALS

This form is to be completed for each loading rack for liquid materials. State/Federal regulations which may apply to loading racks for liquid materials are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☑ New Permit ☐ Renewal or Modification of Air Permit Number(s) (e.g. J001) J001 _____

2. Maximum Operating Schedule: 24 _____ hours per day; 365 _____ days per year

If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. Complete the following table for each bay:

Bay Identification	Number of Loading Arms	Type of Vehicle Loaded (check one or more)	Loading Method (check one or more)
J001	N/A	☑ Tank Truck ❒ Barge ❒ RR Car ❒ Ship ❒ Other (describe):	❒ Top Load, Splash Fill ❒ Bottom Load ☑ Top Load, fully Submerged ❒ Top Load, Partial Submerged
		❒ Tank Truck ❒ Barge ❒ RR Car ❒ Ship ❒ Other (describe):	❒ Top Load, Splash Fill ❒ Bottom Load ❒ Top Load, fully Submerged ❒ Top Load, Partial Submerged
		❒ Tank Truck ❒ Barge ❒ RR Car ❒ Ship ❒ Other (describe):	❒ Top Load, Splash Fill ❒ Bottom Load ❒ Top Load, fully Submerged ❒ Top Load, Partial Submerged

4. Complete this section for each material loaded.

Liquid Material Loaded	Bay ID	Average Material Vapor Pressure at Loading Temperature (millimeters mercury)	Is liquid a photo-chemically reactive material?*	Maximum Daily Throughput (gallons)	Proposed Maximum Annual Throughput (gallons)
Pipeline Liquids	J001	342.56	❒Yes ☑ No	2,000	8,000
			❒Yes ☐ No		
			❒Yes ☐ No		
			❒Yes ❒ No		

* Photochemically reactive material is defined in OAC rule 3745-21-01(C)(5).

5. Complete this section for each vapor control system.

Type of Vapor Control System (check one):	Minimum Control Efficiency (% by weight):	Maximum Controlled Mass Emissions Rate (pounds/1,000 gallons):	Basis for Mass Emissions Rate Data (check one):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ☑ None ❒ Other (describe):	N/A	N/A	❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ❒ None ❒ Other (describe):			❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ❒ None ❒ Other (describe):			❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):
❒ Vapor Balance ❒ Adsorption ❒ Incineration ❒ Condenser ❒ None ❒ Other (describe):			❒ Design criteria ❒ Equipment vendor guarantee ❒ Emissions test at this facility ❒ Emissions test at another facility with similar vapor control system ❒ Other (describe):

APPENDIX C

Emission Calculations Documentation

TABLE A-1
Potential to Emit
Basis
Project Increase

Emission Source				Material/Capacity		Operational Limits												Data Sources
						Short-Term -- Material Flow			Short-Term -- Capacity			Annual Material Flow			Annual Utilization			
ID	FIN	EPN	Description															
M&R02-PC	M&R02-PC-NG	M&R02-PC-NG	Piping Components	Natural Gas		Valves: 185; Connectors: 0; Flanges: 782; Open-Ended Lines: 39; Pump Seals: 0; Other (blowdown valves, relief valves, and compressor seals): 3												TABLE B-1
	M&R02-PC-PL	M&R02-PC-PL	Piping Components	Pipeline liquids-Condensate		Valves: 74; Connectors: 291; Flanges: 0; Open-Ended Lines: 15; Pump Seals: 0; Other (blowdown valves, relief valves, and compressor seals): 2												TABLE B-2
M&R02-GR	M&R02-GR-ST	M&R02-GR-ST	Gas Release Events	Natural Gas		Natural Gas	65,745	scfh				Natural Gas	766,788	scf/yr	Runtime	N/A		TABLE C-1
	M&R02-GR-PL	M&R02-GR-PL	Gas Release Events	Natural Gas														
MR02-V01	MR02-V01	MR02-V01	Storage Tank	1,000	gal	Pipeline Liquids	1,000	gal/hr				Pipeline Liquids	4,000	gal/yr	Runtime	N/A		TABLE E-2
M&R02-TL-PL	M&R02-TL-PL	M&R02-TL-PL	Truck Loading Area	1,000	gph	Pipeline Liquids	1,000	gal/hr				Pipeline Liquids	4,000	gal/yr	Runtime	N/A		TABLE E-3
M&R02-EGEN01	M&R02-EGEN01	M&R02-EGEN01	Emergency Generator	265	bhp	Natural Gas	2,245	scfh	Power Output	265	bhp	Natural Gas	1,122,440	scf/yr	Runtime	500	hrs/yr	TABLE F-1
M&R02-HIG-01	M&R02-HIG-01	M&R02-HIG-01	Heating Device	0.0006	MMBTU/hr (output)	Natural Gas	0.93	scfh	Heat Input	0.0009	MMBTU/hr	Natural Gas	7,729	scf/yr	Runtime	8,760	hrs/yr	TABLE G-1

TABLE A-1
Potential to Emit
Emissions
Project Increase

Emission Source				Material/Capacity		Potential to Emit																						Data Sources
ID	FIN	EPN	Description			CO_{2-e}		NO_X		CO		$PM_{10/2.5}$		SO_2		VOC (Total)		HAP (Total)		Benzene		Ethylbenzene		Hexane (n-)		Toluene		Xylenes		
						lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
M&R02-PC	M&R02-PC-NG	M&R02-PC-NG	Piping Components	Natural Gas		75.085	274.06									0.0552	0.2015	0.0046	0.0167	0.0016	0.0059	0.0000	0.0001	0.0016	0.0059	0.0010	0.0038	0.0003	0.0010	TABLE B-1
	M&R02-PC-PL	M&R02-PC-PL	Piping Components	Pipeline liquids-Condensate		4.4136	16.1096									0.5343	1.9501	0.0710	0.2591	0.0078	0.0283	0.0022	0.0080	0.0100	0.0366	0.0215	0.0784	0.0294	0.1074	TABLE B-2
M&R02-GR	M&R02-GR-ST	M&R02-GR-ST	Gas Release Events	Natural Gas		70,942	406.66									78.173	0.2990	6.4618	0.0247	2.2801	0.0087	0.0560	0.0002	2.2744	0.0087	1.4590	0.0056	0.3923	0.0015	TABLE C-1
	M&R02-GR-PL	M&R02-GR-PL	Gas Release Events	Natural Gas																									
MR02-V01	MR02-V01	MR02-V01	Storage Tank	Flash		6,244	12.4880									250.51	0.5010	14.9762	0.0300	3.0579	0.0061	0.1653	0.0003	10.7758	0.0216	3.7576	0.0075	2.2272	0.0045	TABLE D-4
				Storage		669.28	5.7092									12.3981	0.1058	0.7722	0.0066	0.1868	0.0016	0.0059	0.0001	0.3579	0.0031	0.1695	0.0014	0.0505	0.0004	TABLE E-2
M&R02-TL-PL	M&R02-TL-PL	M&R02-TL-PL	Truck Loading Area	1,000	gph	477.16	0.6414									8.8391	0.0119	0.5506	0.0007	0.1331	0.0002	0.0042	5.66E-06	0.2552	0.0003	0.1208	0.0002	0.0360	4.84E-05	TABLE E-3
M&R02-EGEN01	M&R02-EGEN01	M&R02-EGEN01	Emergency Generator	265	bhp	288.13	72.0319	11.982	2.9956	1.4781	0.3695	0.1106	0.0277	0.0013	0.0003	0.0717	0.0179	0.0476	0.0119	0.0012	0.0003	0.0001	1.62E-05	0.0003	0.0001	0.0006	0.0001	0.0002	4.01E-05	TABLE F-1
M&R02-HIG-01	M&R02-HIG-01	M&R02-HIG-01	Heating Device	0.0006	MMBTU/hr (output)	0.1130	0.4715	6.84E-05	0.0003	0.0011	0.0045	7.04E-06	2.94E-05	5.56E-07	2.32E-06	0.0002	0.0007	6.10E-05	0.0003	6.78E-08	2.83E-07			5.81E-05	0.0002	1.10E-07	4.58E-07			TABLE G-1
				TOTAL		**78,699.71**	**788.17**	**11.982**	**2.9958**	**1.4791**	**0.3740**	**0.1106**	**0.0277**	**0.0013**	**0.0003**	**350.58**	**3.0880**	**22.884**	**0.3499**	**5.6684**	**0.0511**	**0.2337**	**0.0088**	**13.6752**	**0.0764**	**5.5300**	**0.0970**	**2.7358**	**0.1148**	

TABLE B-1
Piping Components
Hourly and Annual Emission Estimates - Project

Source			M&R02-PC-NG			
Service			Gas			
			Natural Gas			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	185 components			
		Emission Factor	4.50E-03 kg/hr/component			
	Connectors	Count	0 components			
		Emission Factor	2.00E-04 kg/hr/component			
	Flanges	Count	782 components			
		Emission Factor	3.90E-04 kg/hr/component			
	Open-Ended Lines	Count	39 components			
		Emission Factor	2.00E-03 kg/hr/component			
	Pump Seals	Count	0 components			
		Emission Factor	2.40E-03 kg/hr/component			
	Other	Count	3 components	**Emissions**		
		Emission Factor	8.80E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}		2285.41% by weight	62.5705 lb/hr	274.0590 tpy	75.0846 lb/hr
	CO_2		1.33% by weight	0.0365 lb/hr	0.1598 tpy	0.0438 lb/hr
	TOC (Total)		97.62% by weight	2.6728 lb/hr	11.7067 tpy	3.2073 lb/hr
	Methane		91.36% by weight	2.5014 lb/hr	10.9560 tpy	3.0016 lb/hr
	Ethane		4.58% by weight	0.1254 lb/hr	0.5492 tpy	0.1505 lb/hr
	VOC (Total)		1.68% by weight	0.0460 lb/hr	0.2015 tpy	0.0552 lb/hr
	VOC (non-HAP)		1.54% by weight	0.0422 lb/hr	0.1849 tpy	0.0506 lb/hr
	HAP (Total)		0.14% by weight	0.0038 lb/hr	0.0167 tpy	0.0046 lb/hr
	Benzene		0.05% by weight	1.34E-03 lb/hr	5.88E-03 tpy	1.61E-03 lb/hr
	Ethylbenzene		0.00% by weight	3.30E-05 lb/hr	1.44E-04 tpy	3.96E-05 lb/hr
	Hexane (n-)		0.05% by weight	1.34E-03 lb/hr	5.86E-03 tpy	1.61E-03 lb/hr
	Methanol					
	Naphthalene					
	Toluene		0.03% by weight	8.59E-04 lb/hr	3.76E-03 tpy	1.03E-03 lb/hr
	Trimethylpentane (2,2,4-)					
	Xylenes		0.01% by weight	2.31E-04 lb/hr	1.01E-03 tpy	2.77E-04 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017).
The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings (P2).
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on gas analysis used to estimate gas release annual emissions (TABLE C-1).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.
6. Considered new fugitive components at M&R02

TABLE B-2(a)
Piping Components
Hourly and Annual Emission Estimates - Project

Source			M&R02-PC-PL			
Service			Light Oil			
			Condensate-liquid			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	44 components			
		Emission Factor	2.50E-03 kg/hr/component			
	Connectors	Count	192 components			
		Emission Factor	2.10E-04 kg/hr/component			
	Flanges	Count	0 components			
		Emission Factor	1.10E-04 kg/hr/component			
	Open-Ended Lines	Count	15 components			
		Emission Factor	1.40E-03 kg/hr/component			
	Pump Seals	Count	0 components			
		Emission Factor	1.30E-02 kg/hr/component			
	Other	Count	0 components	**Emissions**		
		Emission Factor	7.50E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}		0.96% by weight	0.0036 lb/hr	0.0159 tpy	0.0044 lb/hr
	CO_2		0.01% by weight	0.0000 lb/hr	0.0002 tpy	0.0001 lb/hr
	TOC (Total)		99.99% by weight	0.3776 lb/hr	1.6541 tpy	0.4532 lb/hr
	Methane		0.04% by weight	0.0001 lb/hr	0.0006 tpy	0.0002 lb/hr
	Ethane		0.09% by weight	0.0003 lb/hr	0.0015 tpy	0.0004 lb/hr
	VOC (Total)		99.86% by weight	0.3772 lb/hr	1.6520 tpy	0.4526 lb/hr
	VOC (non-HAP)					
	HAP (Total)		14.54% by weight	0.0549 lb/hr	0.2406 tpy	0.0659 lb/hr
	Benzene		1.44% by weight	5.44E-03 lb/hr	2.38E-02 tpy	6.53E-03 lb/hr
	Ethylbenzene		0.48% by weight	1.80E-03 lb/hr	7.88E-03 tpy	2.16E-03 lb/hr
	Hexane (n-)		1.69% by weight	6.40E-03 lb/hr	2.80E-02 tpy	7.68E-03 lb/hr
	Methanol					
	Naphthalene					
	Toluene		4.49% by weight	1.70E-02 lb/hr	7.43E-02 tpy	2.04E-02 lb/hr
	Trimethylpentane (2,2,4-)		0.03% by weight	9.75E-05 lb/hr	4.27E-04 tpy	1.17E-04 lb/hr
	Xylenes		6.42% by weight	2.42E-02 lb/hr	1.06E-01 tpy	2.91E-02 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017). The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings (P2).
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on composition estimate (TABLE E-1).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.
6. Considered new fugitive components at M&R02

TABLE B-2(b)
Piping Components
Hourly and Annual Emission Estimates - Project

Source			M&R02-PC-PL			
Service			Light Oil			
			Condensate-vapor			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	30 components			
		Emission Factor	2.50E-03 kg/hr/component			
	Connectors	Count	99 components			
		Emission Factor	2.10E-04 kg/hr/component			
	Flanges	Count	0 components			
		Emission Factor	1.10E-04 kg/hr/component			
	Open-Ended Lines	Count	0 components			
		Emission Factor	1.40E-03 kg/hr/component			
	Pump Seals	Count	0 components			
		Emission Factor	1.30E-02 kg/hr/component			
	Other	Count	2 components	**Emissions**		
		Emission Factor	7.50E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}		1504.37% by weight	3.6744 lb/hr	16.0938 tpy	4.4092 lb/hr
	CO_2		2.18% by weight	0.0053 lb/hr	0.0234 tpy	0.0064 lb/hr
	TOC (Total)		97.82% by weight	0.2389 lb/hr	1.0464 tpy	0.2867 lb/hr
	Methane		60.09% by weight	0.1468 lb/hr	0.6428 tpy	0.1761 lb/hr
	Ethane		9.86% by weight	0.0241 lb/hr	0.1055 tpy	0.0289 lb/hr
	VOC (Total)		27.87% by weight	0.0681 lb/hr	0.2981 tpy	0.0817 lb/hr
	VOC (non-HAP)					
	HAP (Total)		1.74% by weight	0.0042 lb/hr	0.0186 tpy	0.0051 lb/hr
	Benzene		0.42% by weight	1.03E-03 lb/hr	4.49E-03 tpy	1.23E-03 lb/hr
	Ethylbenzene		0.01% by weight	3.24E-05 lb/hr	1.42E-04 tpy	3.89E-05 lb/hr
	Hexane (n-)		0.80% by weight	1.96E-03 lb/hr	8.61E-03 tpy	2.36E-03 lb/hr
	Methanol					
	Naphthalene					
	Toluene		0.38% by weight	9.30E-04 lb/hr	4.07E-03 tpy	1.12E-03 lb/hr
	Trimethylpentane (2,2,4-)		0.00% by weight	9.45E-06 lb/hr	4.14E-05 tpy	1.13E-05 lb/hr
	Xylenes		0.11% by weight	2.77E-04 lb/hr	1.21E-03 tpy	3.33E-04 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017). The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings (P2).
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on vapor composition estimate (TABLE E-1).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.
6. Considered new fugitive components at M&R02

TABLE C-1
Gas Releases
Hourly and Annual Emission Estimates
(Project)

Category	Station Operations					
Source	M&R02-GR-ST			M&R02-GR-PL		
	Avg. Hourly	Max. Annual	Max. Hourly	Avg. Hourly	Max. Annual	Max. Hourly
Gas Release	0 scfh	0 scf/yr	0 scfh	87.533 scfh	766,788 scf/yr	65,745 scfh
	0 lb/hr	0 lb/yr	0 lb/hr	4.0625 lb/hr	35,587 lb/yr	3,131 lb/hr
NO_X						
CO						
SO_2						
$PM_{10/2.5}$						
$CO_{2\text{-}e}$	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	92.844 lb/hr	406.66 tpy	70,942 lb/hr
CO_2	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0541 lb/hr	0.2371 tpy	41.7131 lb/hr
N_2O						
TOC (Total)	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	3.9660 lb/hr	17.3709 tpy	3,056 lb/hr
Methane	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	3.7116 lb/hr	16.2569 tpy	2,836 lb/hr
Ethane	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.1861 lb/hr	0.8150 tpy	142 lb/hr
VOC (Total)	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0683 lb/hr	0.2990 tpy	78.1727 lb/hr
VOC (non-HAP)	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0626 lb/hr	0.2743 tpy	71.7108 lb/hr
HAP (Total)	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0056 lb/hr	0.0247 tpy	6.4618 lb/hr
Acetaldehyde						
Acrolein						
Benzene	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0020 lb/hr	0.0087 tpy	2.2801 lb/hr
Biphenyl						
Butadiene (1,3-)						
Carbon Tetrachloride						
Chlorobenzene						
Chloroform						
Dichloropropene (1,3-)						
Ethylbenzene	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0000 lb/hr	0.0002 tpy	0.0560 lb/hr
Ethylene Dibromide						
Formaldehyde						
Hexane (n-)	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0020 lb/hr	0.0087 tpy	2.2744 lb/hr
Methanol						
Methylene Chloride						
Methylnaphthalene (2-)						
Naphthalene						
PAH						
Phenol						
Propylene Oxide						
Styrene						
Tetrachloroethane (1,1,2,2-)						
Toluene	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0013 lb/hr	0.0056 tpy	1.4590 lb/hr
Trichloroethane (1,1,2-)						
Trimethylpentane (2,2,4-)						
Vinyl Chloride						
Xylenes	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0003 lb/hr	0.0015 tpy	0.3923 lb/hr

NOTES

1. Gas release estimates based on data for a similar compressor station.
2. Gas density is the value extracted from physical property estimation spreadsheets

Density (Lab):	0.0441 lb/scf				Density:
Density (GC - Avg+):	0.0464 lb/scf	Safety Factor (GC):	103%	Average Plus:	0.0464 lb/scf
Density (GC - Max):	0.0476 lb/scf			Maximum:	0.0476 lb/scf

3. As it will be assumed that Gas Chromatograph (GC) is more representative, the following is used to scaled the extended analysis (Lab).

				Average Plus	Maximum	VOC Specie Scaling:	
VOC (Lab):	0.00128 lb/scf	VOC:	GC	0.00074 lb/scf	0.00110 lb/scf	Average Plus:	58%
	2.91% wt%		Use	1.68% wt%	2.50% wt%	Maximum:	86%
Methane (Lab):	90.19% wt%	Methane (Use):		91.36% wt%	90.59% wt%		
Ethane (Lab):	4.52% wt%	Ethane (Use):		4.58% wt%	4.54% wt%		

TABLE C-2
Summary of Gas Release Volumes - Project

Category	Event Information					Gas Release		
	Description		Gas Release	Frequency		Release	Hourly	Annual
	Type	ID	(scf/event)	(hr^{-1})	(yr^{-1})	Point	(scf/hr)	(scf/yr)
Blowdown	Pipeline	M&R	61,197	1	5	M&R	61,197	305,984
Purge	Pipeline	M&R	2,379	1	5	M&R	2,379	11,896
Actuation	Pipeline	0001-HG-D1-30" F/S	65	4	365	RCV305	258	23,572
Actuation	Pipeline	0001-HG-D1-30" F/S	65	4	365	GOV300	258	23,572
Actuation	Pipeline	0001-HG-D1-30" F/S	65	4	365	GOV302	258	23,572
Actuation	Pipeline	0002-HG-D1-30" F/S	65	4	365	GOV301	258	23,572
Actuation	Pipeline	0016-HG-XX-36" Receiver	65	4	365	RCV129A	258	23,572
Actuation	Pipeline	2001-HG-XX-36" Receiver	65	4	365	GOV371	258	23,572
Actuation	Pipeline	Regulator Run	2	4	365	PM122A	8	741
Actuation	Pipeline	Regulator Run	2	4	365	PCV122A	8	741
Actuation	Pipeline	Regulator Run	2	4	365	PM122B	8	741
Actuation	Pipeline	Regulator Run	2	4	365	PCV122B	8	741
Actuation	Pipeline	Meter run#1	148	4	365	RSV120A	592	54,050
Actuation	Pipeline	Meter run#2	148	4	365	RSV120B	592	54,050
Actuation	Pipeline	Meter run#3	148	4	365	RSV120C	592	54,050
Actuation	Pipeline	Regulator Run	148	4	365	RSIV123A	592	54,050
Actuation	Pipeline	Regulator Run	148	4	365	RSIV123B	592	54,050
Vent	Pipeline	Gas Chromatograph Building	1	4	35,040	GC Building	4	34,261
Station Operations							0	0
Pipeline Operations							65,745	766,788

NOTES

1. Data extracted from TABLE C-3, TABLE C-4, TABLE C-5, and TABLE C-6.
2. For pipeline and station yard blowdowns and purges it is assumed that only a blowdown or purge can take place at any segment of pipeline in any 1-hour period.

Pipeline Blowdown
Purge

TABLE C-3
Blowdown - Project

Piping Description						Initial Conditions			Final Conditions			Event[2]		Gas Release Data		
Location Description			Diameter (in)		Length	Volume	Press.	Temp.	Press.	Temp.	Volume[1]	Frequency		Hourly	Annual	Release
General	Location		nom.	act.	(ft)	(ft^3)	(psig)	(°F)	(psig)	(°F)	(scf)	(hr^{-1})	(yr^{-1})	(scf/hr)	(scf/yr)	Point
Pipeline	M&R	Pipeline from Meter Skid to Regulator	20	19.00	36.00	71	750	50	0	68	4,404	1	5	4,404	22,020	Pipeline - M&R
Pipeline	M&R	Meter Skids	16	15.00	48.00	59	750	50	0	68	3,660	1	5	3,660	18,299	
Pipeline	M&R	Regulator Skid	10	9.75	24.00	12	750	50	0	68	773	1	5	773	3,866	
Pipeline	M&R	Pipeline f/s to meter runs	36	35.00	24.00	160	750	50	0	68	9,963	1	5	9,963	49,813	
Pipeline	M&R	Pipeline from f/s to tank	2	1.94	30.00	1	750	50	0	68	38	1	5	38	191	
Pipeline	M&R	Line from launcher to f/s	36	35.00	0.00	0	750	50	0	68	0	1	5	0	0	
Pipeline	M&R	Filter/Separator				246	750	50	0	68	15,273	1	5	15,273	76,367	
Pipeline	M&R	Receiver Barrel	36	35.00	64.80	433	750	50	0	68	26,899	1	5	26,899	134,496	
Pipeline	M&R	Equilizer Line	2	1.94	99.60	2	750	50	0	68	127	1	5	127	634	
Pipeline	M&R	Pipeline from/to Heater Skids	1	0.96	192.00	1	750	50	0	68	60	1	5	60	298	
Pipeline - M&R		TOTAL			518.40	984.98	750	50			61,197	1	5	61,196.75	305,983.73	

NOTES

1. Final volume calculated using ideal gas law $[(PV/ZT)_i = (PV/ZT)_f]$. $V_f = V_i\ (P_i/P_f)\ (T_f/T_i)\ (Z_f/Z_i)$, where Z is estimated using the following equation: $Z = 0.9994 - 0.0002P + 3E\text{-}08P^2$.
2. The frequency of events is based on operator experience as to what would reasonably constitute a worst-case scenario.
3. Blowdown of the affected Launcher/Receiver barrel is included with the blowdown of the piping in the Launcher/Receiver Area.
4. For conservatism assumed all lines are blown down simultaneously.
5. Blowdown emissions are from new sources located at M&R02 Station.

TABLE C-4
Purge and Drain - Project

Piping Description		Purge Valve Data		Gas Stream Data											Miscellaneous Factors[3,4,5]					Purge Data[6,7]		Event[8]			Gas Release Data		
General	Location	ID	Type	Throat Cross-Section			Upstream Data				Critical Flow Data[1,2]					Discharge	Adjustment Factors				Fractional	Gas Flow	Frequency		Duration	Hourly	Annual	Release
				Diameter		Area	Pressure		Temp.		Absolute Press.		Absolute Temp.		Velocity	Coefficien					Amount	Rate						Point
				nom.	act.	**A**	$\mathbf{P_o}$		$\mathbf{T_o}$		Ratio	$\mathbf{P_c}$	Ratio	$\mathbf{T_c}$		$\mathbf{v_c}$	$\mathbf{C_d}$	Valve	Pressure	Temp.	Expansion	Valve	(scf/sec)	(hr^{-1})	(yr^{-1})	(sec)	(scf/hr)	(scf/yr)	
				(in)	(in)	(ft^2)	(psig)	(psia)	(°F)	(°R)	$\mathbf{R_{cp}}$ $R_{ct}^{(k/(k-1))}$	P_oR_{cp} (psia)	$\mathbf{R_{ct}}$ 2/(k+1)	(T_o R_{ct}) (°F)	(T_o R_{ct}) (°R)	(ft/sec)	(n.d.)	Type $\mathbf{F_{vt}}$ (n.d.)	$\mathbf{F_P}$ (P_c/P_{STP}) (n.d.)	$\mathbf{F_T}$ (T_{STP}/T_c) (n.d.)	$\mathbf{F_Z}$ (Z_{STP}/Z_c) (n.d.)	Opened $\mathbf{f_{open}}$ (n.d.)							
Pipeline	M&R	M&R	Plug	2.0	1.939	0.0205	13	27.7	50	510	0.5439	15.06	0.8658	-18.44	441.56	1,273.75	0.98	0.40	1.0227	1.1958	1.0001	100%	13	1	5	190	2,379	11,896	M&R

NOTES

1. The ratio of specific heats for natural gas is assumed to be 1.31 (n.d.).
2. Critical velocity is estimated using the following equation: $(k\ g_c R/M)^{0.5}$. Where,
   g = acceleration due to gravity = 32.174 ft/sec^2
   R = universal gas constant = 1,545 (ft lb)/(lb-mol °R)
   M = molecular weight of gas = 17.7224 lb/lb-mol {TABLE C-7}
3. Discharge coefficient.
4. Valve type adjustment factor.
5. Expansion adjustment factor is estimated using the following equation: $Z = 0.9994 - 0.0002P + 3E\text{-}08P^2$
6. The fractional amount that the valve is opened is based on operator experience as to what would reasonably constitute a worst-case scenario.
7. The purge gas flow rate is estimated using the following equation: $C_d A\ v_c\ F_p\ F_t\ Y\ f_{open}\ F_{vt}$.
8. The frequency and duration of events is based on operator experience as to what would reasonably constitute a worst-case scenario.
9. Gas releases from Low Point Drains are not included if there were no modifications to these drains/valves.

TABLE C-5
Pneumatic - Project

Description				Pneumatic Device				Power Gas					Event			Gas Release Data		
Location Description		Dia.	ID	Vendor	Description		Detail	Pressure		Gas per 90° Stroke		Flow	Frequency		Duration	Hourly	Annual	Release
General	Location	(in.)			Major	Minor		(psig)	(psia)	(scf/psia)	(scf)	(scfm)	(hr^{-1})	(yr^{-1})	(sec)	(scf/hr)	(scf/yr)	Point
Pipeline	0001-HG-D1-30" F/S	36	RCV305	Shafer	Actuator	26x22	26x22	125	140	0.4623	65		4	365	80	258	23572	RCV305
Pipeline	0001-HG-D1-30" F/S	30	GOV300	Shafer	Actuator	26x22	26x22	125	140	0.4623	65		4	365	80	258	23572	GOV300
Pipeline	0001-HG-D1-30" F/S	30	GOV302	Shafer	Actuator	26x22	26x22	125	140	0.4623	65		4	365	80	258	23572	GOV302
Pipeline	0002-HG-D1-30" F/S	30	GOV301	Shafer	Actuator	26x22	26x22	125	140	0.4623	65		4	365	80	258	23572	GOV301
Pipeline	0016-HG-XX-36" Receiver	36	RCV129A	Shafer	Actuator	26x22	26x22	125	140	0.4623	65		4	365	80	258	23572	RCV129A
Pipeline	2001-HG-XX-36" Receiver	36	GOV371	Shafer	Actuator	26x22	26x22	125	140	0.4623	65		4	365	80	258	23572	GOV371
Pipeline	Regulator Run	16	PM122A	Becker	Actuator		QTCV-T1DB	125	140	0.0145	2		4	365		8	741	PM122A
Pipeline	Regulator Run	16	PCV122A	Becker	Actuator		QTCV-T1DB	125	140	0.0145	2		4	365		8	741	PCV122A
Pipeline	Regulator Run	16	PM122B	Becker	Actuator		QTCV-T1DB	125	140	0.0145	2		4	365		8	741	PM122B
Pipeline	Regulator Run	16	PCV122B	Becker	Actuator		QTCV-T1DB	125	140	0.0145	2		4	365		8	741	PCV122B
Pipeline	Meter run#1	16	RSV120A	Bettis	Actuator	G8040	G8040	125	140	1.0600	148		4	365		592	54050	RSV120A
Pipeline	Meter run#2	16	RSV120B	Bettis	Actuator	G8040	G8040	125	140	1.0600	148		4	365		592	54050	RSV120B
Pipeline	Meter run#3	16	RSV120C	Bettis	Actuator	G8040	G8040	125	140	1.0600	148		4	365		592	54050	RSV120C
Pipeline	Regulator Run	20	RSIV123A	Bettis	Actuator	G8040	G8040	125	140	1.0600	148		4	365		592	54050	RSIV123A
Pipeline	Regulator Run	20	RSIV123B	Bettis	Actuator	G8040	G8040	125	140	1.0600	148		4	365		592	54050	RSIV123B

NOTES

1. Vendor literature to support the estimation of gas consumption and event duration. A 90° stroke is sufficient to open or close a valve.
2. For regulators that are the spring and diaphragm type, gas venting would only occur if spring tears diaphragm.
3. The frequency of events is based on a conservative overestimation.
4. Assuming that valves with 30" and 36" diameters have typical Shafer model number 26x22 operators

TABLE C-6
Gas Chromatograph - Project

Description			Chromatog	Initial Conditions			Final Conditions			Event		Gas Release Data		
Location Description			Vendor	Volume	Press.	Temp.	Press.	Temp.	Volume	Frequency		Hourly	Annual	Release
General	Location	ID		(ft3)	(psig)	(°F)	(psig)	(°F)	(scf)	(hr^{-1})	(yr^{-1})	(scf/hr)	(scf/yr)	Point
Pipeline	Gas Chromatograph Building	TBD	ABB	0.0092	1,200	50	0	68	1	4	35,040	4	34,261	GC Building

NOTES

1. Gas Chromatograph emissions are based on vendor provided total vent volume (includes purge and sample release).

TABLE C-7
Natural Gas
Physical Property Estimations

Component				Molecular Weight	Vapor Density	Stream		
Name (i)	Formula	Type	HAP	$\mathbf{M_i}$ $(lb/lb\text{-}mol)_i$	ρ_i $(lb/scf)_i$	Mole Fraction $\mathbf{f_{n-i}}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $\mathbf{f_{m-i}}$ $(f_{n-i}M_i)/\sum(f_{n-i}M_i)$ (lb_i/lb_T)	Volume Fraction $\mathbf{f_{v-i}}$ $f_{m-i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Nitrogen	N2			28.013	0.0727	0.632%	1.044%	0.633%
Carbon Dioxide	CO2	GHG		44.010	0.1143	0.514%	1.332%	0.514%
Methane	C01H04	GHG		16.042	0.0417	95.390%	90.193%	95.447%
Ethane	C02H06			30.069	0.0781	2.551%	4.522%	2.553%
Propane	C03H08	VOC		44.096	0.1145	0.449%	1.167%	0.449%
Butane (i-)	C04H10	VOC		58.122	0.1509	0.097%	0.333%	0.097%
Butane (n-)	C04H10	VOC		58.122	0.1509	0.114%	0.391%	0.114%
Cyclopentane	C05H10	VOC		70.133	0.1821	0.002%	0.007%	0.002%
Pentane (i-)	C05H12	VOC		72.149	0.1873			
Pentane (i-)	C05H12	VOC		72.149	0.1873			
Pentane (n-)	C05H12	VOC		72.149	0.1873	0.041%	0.176%	0.041%
Benzene	C06H06	VOC	X	78.112	0.2028	0.018%	0.085%	0.018%
Cyclohexane	C06H12	VOC		84.159	0.2185	0.007%	0.035%	0.007%
Methylcyclopentane	C06H12	VOC		84.159	0.2185	0.005%	0.026%	0.005%
Dimethylbutane (2,2-)	C06H14	VOC		86.175	0.2238	0.004%	0.019%	0.004%
Dimethylbutane (2,3-)	C06H14	VOC		86.175	0.2238	0.003%	0.014%	0.003%
Hexane (n-)	C06H14	VOC	X	86.175	0.2238	0.017%	0.085%	0.017%
Methylpentane (2-)	C06H14	VOC		86.175	0.2238	0.014%	0.073%	0.014%
Methylpentane (3-)	C06H14	VOC		86.175	0.2238	0.009%	0.044%	0.009%
Toluene	C07H08	VOC	X	92.138	0.2392	0.010%	0.054%	0.010%
Cycloheptane	C07H14	VOC		98.186	0.2549			
Dimethylcyclopentane (1,1-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Dimethylcyclopentane (1,c-2-)	C07H14	VOC		98.186	0.2549			
Dimethylcyclopentane (1,c-3-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Dimethylcyclopentane (1,t-2-)	C07H14	VOC		98.186	0.2549	0.001%	0.006%	0.001%
Dimethylcyclopentane (1,t-3-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Ethylcyclopentane	C07H14	VOC		98.186	0.2549	0.000%	0.002%	0.000%
Methylcyclohexane	C07H14	VOC		98.186	0.2549	0.007%	0.042%	0.007%
Dimethylpentane (2,2-)	C07H16	VOC		100.202	0.2602	0.001%	0.006%	0.001%
Dimethylpentane (2,3-)	C07H16	VOC		100.202	0.2602	0.002%	0.010%	0.002%
Dimethylpentane (2,4-)	C07H16	VOC		100.202	0.2602	0.001%	0.006%	0.001%
Dimethylpentane (3,3-)	C07H16	VOC		100.202	0.2602	0.001%	0.004%	0.001%
Ethylpentane (3-)	C07H16	VOC		100.202	0.2602	0.000%	0.002%	0.000%
Heptane (n-)	C07H16	VOC		100.202	0.2602	0.009%	0.055%	0.009%
Methylhexane (2-)	C07H16	VOC		100.202	0.2602	0.005%	0.031%	0.005%
Methylhexane (3-)	C07H16	VOC		100.202	0.2602	0.005%	0.030%	0.005%
Trimethylbutane (2,2,3-)	C07H16	VOC		100.202	0.2602	0.001%	0.004%	0.001%
Ethylbenzene	C08H10	VOC	X	106.165	0.2757	0.000%	0.002%	0.000%
Xylene (m-)	C08H10	VOC	X	106.165	0.2757	0.001%	0.006%	0.001%
Xylene (o-)	C08H10	VOC	X	106.165	0.2757	0.000%	0.002%	0.000%
Xylene (p-)	C08H10	VOC	X	106.165	0.2757	0.001%	0.006%	0.001%
Cyclooctane	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,1-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,c-2-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Dimethylcyclohexane (1,c-3-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Dimethylcyclohexane (1,c-4-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,t-2-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Dimethylcyclohexane (1,t-3-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,t-4-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Ethylcyclohexane	C08H16	VOC		112.213	0.2914			

TABLE C-7
Natural Gas
Physical Property Estimations

Component				Molecular Weight	Vapor Density	Stream		
Name (i)	Formula	Type	HAP	$\mathbf{M_i}$ $(lb/lb\text{-}mol)_i$	$\boldsymbol{\rho_i}$ $(lb/scf)_i$	Mole Fraction $\mathbf{f_{n\text{-}i}}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $\mathbf{f_{m\text{-}i}}$ $(f_{n\text{-}i}M_i)/\sum(f_{n\text{-}i}M_i)$ (lb_i/lb_T)	Volume Fraction $\mathbf{f_{v\text{-}i}}$ $f_{m\text{-}i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Ethylcyclopentane (1-methyl-1-)	C08H16	VOC		112.213	0.2914			
Ethylcyclopentane (1-methyl-c-2-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	C08H16	VOC		112.213	0.2914			
Ethylcyclopentane (1-methyl-t-2-)	C08H16	VOC		112.213	0.2914			
Propylcyclopentane (i-)	C08H16	VOC		112.213	0.2914			
Propylcyclopentane (n-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,1,2-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,1,3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,c-3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,t-3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,t-4-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,t-2,c-3-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Trimethylcyclopentane (1,t-2,c-4-)	C08H16	VOC		112.213	0.2914			
Dimethylhexane (2,2-)	C08H18	VOC		114.229	0.2966			
Dimethylhexane (2,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (2,4-)	C08H18	VOC		114.229	0.2966			
Dimethylhexane (2,5-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (3,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (3,4-)	C08H18	VOC		114.229	0.2966	0.001%	0.004%	0.001%
Ethylhexane (3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Methylheptane (2-)	C08H18	VOC		114.229	0.2966	0.002%	0.013%	0.002%
Methylheptane (3-)	C08H18	VOC		114.229	0.2966	0.003%	0.018%	0.003%
Methylheptane (4-)	C08H18	VOC		114.229	0.2966			
Octane (n-)	C08H18	VOC		114.229	0.2966	0.005%	0.034%	0.005%
Trimethylpentane (1,1,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Trimethylpentane (2,2,3-)	C08H18	VOC		114.229	0.2966			
Trimethylpentane (2,2,4-)	C08H18	VOC	X	114.229	0.2966			
Trimethylpentane (2,3,4-)	C08H18	VOC		114.229	0.2966			
Ethyltoluene (m-)	C09H12	VOC		120.192	0.3121			
Ethyltoluene (o-)	C09H12	VOC		120.192	0.3121			
Ethyltoluene (p-)	C09H12	VOC		120.192	0.3121			
Propylbenzene (i-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Propylbenzene (n-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Trimethylbenzene (1,2,4-)	C09H12	VOC		120.192	0.3121			
Trimethylbenzene (1,3,5-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Butylcyclopentane (n-)	C09H18	VOC		126.239	0.3278			
Methylcyclooctane	C09H18	VOC		126.239	0.3278			
Propylcyclohexane (i-)	C09H18	VOC		126.239	0.3278			
Propylcyclohexane (n-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,2-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,c-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,c-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,t-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,c-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,c-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,t-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-3,c-5-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-3,t-5-)	C09H18	VOC		126.239	0.3278			

TABLE C-7
Natural Gas
Physical Property Estimations

Component				Molecular Weight	Vapor Density	Stream		
Name (i)	Formula	Type	HAP	$\mathbf{M_i}$ $(lb/lb\text{-}mol)_i$	$\boldsymbol{\rho_i}$ $(lb/scf)_i$	Mole Fraction $\mathbf{f_{n-i}}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $\mathbf{f_{m-i}}$ $(f_{n-i}M_i)/\Sigma(f_{n-i}M_i)$ (lb_i/lb_T)	Volume Fraction $\mathbf{f_{v-i}}$ $f_{m-i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Dimethylheptane (2,2-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,3-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,5-)	C09H20	VOC		128.255	0.3330			
Dimethylheptane (2,6-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (3,3-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (3,4-)	C09H20	VOC		128.255	0.3330			
Dimethylheptane (3,5-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Methyloctane (2-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Methyloctane (3-)	C09H20	VOC		128.255	0.3330	0.001%	0.005%	0.001%
Methyloctane (4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Nonane (n-)	C09H20	VOC		128.255	0.3330	0.002%	0.018%	0.002%
Trimethylhexane (2,2,3-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,2,4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Trimethylhexane (2,2,5-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Trimethylhexane (2,3,3-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,3,4-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,3,5-)	C09H20	VOC		128.255	0.3330			
Butylbenzene (t-)	C10H14	VOC		134.218	0.3485			
Butylcyclohexane (i-)	C10H20	VOC		140.266	0.3642			
Butylcyclohexane (t-)	C10H20	VOC		140.266	0.3642			
Decane (n-)	C10H22	VOC		142.282	0.3694	0.001%	0.008%	0.001%
Dimethyloctane (2,2-)	C10H22	VOC		142.282	0.3694			
Dimethyloctane (2,3-)	C10H22	VOC		142.282	0.3694			
Dimethyloctane (3,3-)	C10H22	VOC		142.282	0.3694	0.000%	0.003%	0.000%
Ethyloctane (3-)	C10H22	VOC		142.282	0.3694			
Methylnonane (2-)	C10H22	VOC		142.282	0.3694	0.000%	0.003%	0.000%
Methylnonane (3-)	C10H22	VOC		142.282	0.3694			
Methylnonane (4-)	C10H22	VOC		142.282	0.3694			
Methylnonane (5-)	C10H22	VOC		142.282	0.3694			
Trimethylheptane (2,3,4-)	C10H22	VOC		142.282	0.3694			
Trimethylheptane (2,5,5-)	C10H22	VOC		142.282	0.3694			
Undecane (n-)	C11H24	VOC		156.308	0.4059	0.000%	0.003%	0.000%
Dodecane (n-)	C12H26	VOC		170.335	0.4423	0.000%	0.003%	0.000%
Tridecane (n-)	C13H28	VOC		184.361	0.4787			
Tetradecane (n-)	C14H30	VOC		198.388	0.5151			
Natural Gas				16.977	0.0441	99.940%	100.000%	100.000%
TOC (Total)				16.766	0.0435	98.794%	97.624%	98.853%
VOC (Total)				57.866	0.1503	0.853%	2.910%	0.854%
HAP (Total)				85.428	0.2218	0.048%	0.241%	0.048%
Xylenes				106.165	0.2757	0.002%	0.015%	0.002%

NOTES

1. Vapor density is estimated using the ideal gas law (PV = nRT = (m/M)RT OR ρ = RPT/M), where R = 10.73164 (psia ft^3)/(lb-mol °R).
2. Standard conditions 68 °F
   14.696 psia
3. Mole percentages from analysis on Various of sample collected at Meter Station Avg. Results (3 Most Representative Samples).
The sample is assumed to be representative of the actual gas composition at M&&R02 Station

TABLE D-1
Flash Analysis
Summary of Laboratory Analysis

	FEED Pressurized Liquid	VAPOR Flash Gas	LIQUID Residual Liquid
Pressure	575.000 psig	0.034 psig	0.034 psig
	589.696 psia	14.730 psia	14.730 psia
Temperature	72 °F	60 °F	60 °F
API Gravity at 60°F	73.960 n.d.	788.526 n.d.	61.227 n.d.
Specific Gravity at 60°F	0.6887 n.d. (water)	0.1538 n.d. (water)	0.7342 n.d. (water)
	3.3880 n.d. (air)	0.9301 n.d. (air)	4.4320 n.d. (air)
Molecular Weight	98.125 lb/lb-mol	26.938 lb/lb-mol	128.362 lb/lb-mol
Density at 60°F and 14.730 psia	5.747 lb/gal	1.283 lb/gal	6.126 lb/gal
	0.2593 lb/ft^3	0.0712 lb/ft^3	0.3392 lb/ft^3
	22.1622 ft^3/gal	18.0282 ft^3/gal	18.0610 ft^3/gal
	930.8120 ft^3/bbl	757.1853 ft^3/bbl	758.5600 ft^3/bbl
	378.4123 $ft^3/lb\text{-}mol$	378.4123 $ft^3/lb\text{-}mol$	378.4123 $ft^3/lb\text{-}mol$
	17.0747 gal/lb-mol	20.9900 gal/lb-mol	20.9520 gal/lb-mol
	2.4598 lb-mol/bbl	2.0010 lb-mol/bbl	2.0046 lb-mol/bbl
Density at 68°F and 14.696 psia	947.3299 scf/bbl	770.6220 scf/bbl	772.0211 scf/bbl
	385.1275 scf/lb-mol	385.1275 scf/lb-mol	385.1275 scf/lb-mol
	2.4598 lb-mol/bbl	2.0010 lb-mol/bbl	2.0046 lb-mol/bbl
Vapor to Liquid Mole Ratio (V/L)	0.4249 n.d. ($lb\text{-}mol_{VAPOR}/lb\text{-}mol_{LIQUID}$)		
Mole Balance	1.0000 bbl	0.3666 bbl	0.8612 bbl
	2.4598 lb-mol	0.7335 lb-mol	1.7263 lb-mol
	947.3299 scf	282.4903 scf	664.8396 scf
Flash Factor (FF)	328.0318 scf_{VAPOR}/bbl_{LIQUID}		

NOTES

1. Sample Data:
   - Location: Atlanta, TX
   - Date: 04/15/09
   - Time: Not Recorded
2. Reference Conditions:

	SPL	Standard
T =	60 °F	68 °F
P =	14.730 psia	14.696 psia
Water	8.344 lb/gal	8.338 lb/gal
Air	0.0765 lb/ft^3	0.0752 lb/ft^3

3. V + L = F => F = (1 + V/L)L {Overall Mole Balance}.

TABLE D-2
Flash Analysis
Extrapolation of Specie Mole Percentages

Component						Liquid Dump Flash Data				
						Input			Output	
						Liquid	Scaled	*Calculated*	Vapor	Liquid
Name (i)	GC Postition	SPL Class	Formula	Type	HAP	z_i ($mol_{i\text{-}F}/mol_F$)		z_i ($mol_{i\text{-}F}/mol_F$)	y_i ($mol_{i\text{-}V}/mol_V$)	x_i ($mol_{i\text{-}L}/mol_L$)
Nitrogen	1		N2			0.034%	0.034%	0.030%	0.101%	0.000%
Carbon Dioxide	3		CO2	GHG		0.968%	0.968%	0.970%	3.163%	0.038%
Methane	2		C01H04	GHG		20.922%	20.922%	20.921%	69.445%	0.303%
Ethane	4		C02H06			3.391%	3.391%	3.390%	10.467%	0.383%
Propane	5		C03H08	VOC		2.183%	2.183%	2.180%	5.339%	0.838%
Butane (i-)	6		C04H10	VOC		1.232%	1.232%	1.230%	2.126%	0.849%
Butane (n-)	7		C04H10	VOC		1.721%	1.721%	1.720%	2.495%	1.391%
Pentane (i-)	8		C05H12	VOC		2.354%	2.354%	2.350%	1.895%	2.543%
Pentane (n-)	9		C05H12	VOC		1.622%	1.622%	1.620%	1.056%	1.859%
Dimethylbutane (2,2-)	10	Hexanes	C06H14	VOC		0.174%	0.174%	0.174%	0.050%	0.227%
Dimethylbutane (2,3-)	11	Hexanes	C06H14	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Cyclopentane	12	Hexanes	C05H10	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylpentane (2-)	13	Hexanes	C06H14	VOC		1.218%	1.218%	1.218%	0.352%	1.586%
Methylpentane (3-)	14	Hexanes	C06H14	VOC		0.912%	0.912%	0.912%	0.264%	1.187%
Hexane (n-)	15	Hexanes	C06H14	VOC	X	1.937%	1.937%	1.937%	0.561%	2.522%
Dimethylpentane (2,2-)	16	Heptanes	C07H16	VOC		0.311%	0.311%	0.311%	0.032%	0.430%
Methylcyclopentane	17	Heptanes	C06H12	VOC		1.134%	1.134%	1.134%	0.116%	1.566%
Dimethylpentane (2,4-)	18	Heptanes	C07H16	VOC		0.128%	0.128%	0.128%	0.013%	0.177%
Trimethylbutane (2,2,3-)	19	Heptanes	C07H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Benzene	20	Heptanes	C06H06	VOC	X	1.713%	1.713%	1.713%	0.175%	2.366%
Dimethylpentane (3,3-)	21	Heptanes	C07H16	VOC		0.221%	0.221%	0.221%	0.023%	0.305%
Cyclohexane	22	Heptanes	C06H12	VOC		1.106%	1.106%	1.106%	0.113%	1.528%
Methylhexane (2-)	23	Heptanes	C07H16	VOC		2.292%	2.292%	2.292%	0.235%	3.166%
Dimethylpentane (2,3-)	24	Heptanes	C07H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclopentane (1,1-)	25	Heptanes	C07H14	VOC		0.603%	0.603%	0.603%	0.062%	0.833%
Methylhexane (3-)	26	Heptanes	C07H16	VOC		2.379%	2.379%	2.379%	0.244%	3.286%
Dimethylcyclopentane (1,t-3-)	27	Heptanes	C07H14	VOC		0.163%	0.163%	0.163%	0.017%	0.225%
Dimethylcyclopentane (1,c-3-)	28	Heptanes	C07H14	VOC		0.266%	0.266%	0.266%	0.027%	0.367%
Ethylpentane (3-)	29	Heptanes	C07H16	VOC		0.029%	0.029%	0.029%	0.003%	0.040%
Dimethylcyclopentane (1,t-2-)	30	Heptanes	C07H14	VOC		0.222%	0.222%	0.222%	0.023%	0.307%
Trimethylpentane (2,2,4-)	31	Heptanes	C08H18	VOC	X	0.021%	0.021%	0.021%	0.002%	0.029%
Heptane (n-)	32	Heptanes	C07H16	VOC		3.742%	3.742%	3.742%	0.383%	5.169%
Methylcyclohexane	33	Octanes	C07H14	VOC		3.301%	3.301%	3.301%	0.136%	4.646%
Trimethylcyclopentane (1,1,3-)	34	Octanes	C08H16	VOC		0.225%	0.225%	0.225%	0.009%	0.317%
Dimethylhexane (2,2-)	35	Octanes	C08H18	VOC		0.095%	0.095%	0.095%	0.004%	0.134%
Dimethylcyclopentane (1,c-2-)	36	Octanes	C07H14	VOC		0.848%	0.848%	0.848%	0.035%	1.193%
Dimethylhexane (2,5-)	37	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,4-)	38	Octanes	C08H18	VOC		0.143%	0.143%	0.143%	0.006%	0.201%
Ethylcyclopentane	39	Octanes	C07H14	VOC		0.464%	0.464%	0.464%	0.019%	0.653%
Trimethylpentane (2,2,3-)	40	Octanes	C08H18	VOC		0.028%	0.028%	0.028%	0.001%	0.039%
Trimethylcyclopentane (1,t-2,c-4-)	41	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (3,3-)	42	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	43	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylpentane (2,3,4-)	44	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,3-)	45	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Toluene	46	Octanes	C07H08	VOC	X	4.444%	4.444%	4.444%	0.183%	6.255%
Trimethylcyclopentane (1,1,2-)	47	Octanes	C08H16	VOC		0.371%	0.371%	0.371%	0.015%	0.522%
Dimethylhexane (3,4-)	48	Octanes	C08H18	VOC		3.505%	3.505%	3.505%	0.144%	4.933%
Methylheptane (2-)	49	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylheptane (4-)	50	Octanes	C08H18	VOC		2.896%	2.896%	2.896%	0.119%	4.076%
Dimethylhexane (3,4-)	51	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylheptane (3-)	52	Octanes	C08H18	VOC		0.416%	0.416%	0.416%	0.017%	0.585%
Ethylhexane (3-)	53	Octanes	C08H18	VOC		0.111%	0.111%	0.111%	0.005%	0.156%
Trimethylcyclopentane (1,c-2,t-4-)	54	Octanes	C08H16	VOC		0.028%	0.028%	0.028%	0.001%	0.039%
Dimethylcyclohexane (1,c-3-)	55	Octanes	C08H16	VOC		0.170%	0.170%	0.170%	0.007%	0.239%
Trimethylcyclopentane (1,c-2,t-3-)	56	Octanes	C08H16	VOC		0.170%	0.170%	0.170%	0.007%	0.239%
Dimethylcyclohexane (1,t-4-)	57	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,5-)	58	Octanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,1-)	59	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	60	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	61	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	62	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,4-)	63	Octanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	64	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Cycloheptane	65	Octanes	C07H14	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Octane (n-)	66	Octanes	C08H18	VOC		4.372%	4.372%	4.372%	0.180%	6.153%
Trimethylhexane (2,4,4-)	67	Nonanes	C09H20	VOC		0.190%	0.190%	0.190%	0.003%	0.269%
Tetramethylpentane (2,2,4,4-)	68	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	69	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Dimethylcyclohexane (1,c-4-)	70	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Trimethylcyclopentane (1,c-2,c-3-)	71	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Propylcyclopentane (i-)	72	Nonanes	C08H16	VOC		0.348%	0.348%	0.348%	0.006%	0.493%
Trimethylhexane (2,3,5-)	73	Nonanes	C09H20	VOC		0.006%	0.006%	0.006%	0.000%	0.009%
Dimethylheptane (2,2-)	74	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,4-)	75	Nonanes	C09H20	VOC		0.158%	0.158%	0.158%	0.003%	0.224%
Methylcyclopentane (1-ethyl-c-2-)	76	Nonanes	C08H16	VOC		0.181%	0.181%	0.181%	0.003%	0.257%
Trimethylhexane (2,2,3-)	77	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%

TABLE D-2
Flash Analysis
Extrapolation of Specie Mole Percentages

Component						Liquid Dump Flash Data				
						Input			Output	
						Liquid	Scaled	*Calculated*	Vapor	Liquid
Name (i)	GC Postition	SPL Class	Formula	Type	HAP	z_i ($mol_{i\text{-}F}/mol_F$)		z_i ($mol_{i\text{-}F}/mol_F$)	y_i ($mol_{i\text{-}V}/mol_V$)	x_i ($mol_{i\text{-}L}/mol_L$)
Dimethylcyclohexane (1,c-2-)	78	Nonanes	C08H16	VOC		0.510%	0.510%	0.510%	0.009%	0.723%
Dimethylheptane (2,6-)	79	Nonanes	C09H20	VOC		0.112%	0.112%	0.112%	0.002%	0.159%
Propylcyclopentane (n-)	80	Nonanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	81	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclohexane	82	Nonanes	C08H16	VOC		1.365%	1.365%	1.365%	0.023%	1.935%
Dimethylheptane (2,5-)	83	Nonanes	C09H20	VOC		0.067%	0.067%	0.067%	0.001%	0.095%
Dimethylheptane (3,5-)	84	Nonanes	C09H20	VOC		0.067%	0.067%	0.067%	0.001%	0.095%
Trimethylcyclohexane (1,1,3-)	85	Nonanes	C09H18	VOC		0.077%	0.077%	0.077%	0.001%	0.109%
Trimethylhexane (2,3,3-)	86	Nonanes	C09H20	VOC		0.038%	0.038%	0.038%	0.001%	0.054%
Dimethylheptane (3,3-)	87	Nonanes	C09H20	VOC		0.038%	0.038%	0.038%	0.001%	0.054%
Trimethylcyclohexane (1,1,4-)	88	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Tetramethylpentane (2,2,3,3-)	89	Nonanes	C09H20	VOC		0.261%	0.261%	0.261%	0.004%	0.370%
Ethylbenzene	90	Nonanes	C08H10	VOC	X	0.406%	0.406%	0.406%	0.007%	0.576%
Trimethylhexane (2,3,4-)	91	Nonanes	C09H20	VOC		0.007%	0.007%	0.007%	0.000%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	92	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,3-)	93	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	94	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Xylene (m-)	95	Nonanes	C08H10	VOC	X	2.462%	2.462%	2.462%	0.042%	3.490%
Xylene (p-)	96	Nonanes	C08H10	VOC	X	2.462%	2.462%	2.462%	0.042%	3.490%
Dimethylheptane (3,4-)	97	Nonanes	C09H20	VOC		0.092%	0.092%	0.092%	0.002%	0.130%
Methyloctane (2-)	98	Nonanes	C09H20	VOC		0.782%	0.782%	0.782%	0.013%	1.109%
Methyloctane (4-)	99	Nonanes	C09H20	VOC		0.782%	0.782%	0.782%	0.013%	1.109%
Dimethylheptane (3,4-)	100	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methyloctane (3-)	101	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Butylcyclopentane (i-)	102	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	103	Nonanes	C09H18	VOC		0.231%	0.231%	0.231%	0.004%	0.327%
Trimethylcyclohexane (1,t-2,c-4-)	104	Nonanes	C09H18	VOC		0.231%	0.231%	0.231%	0.004%	0.327%
Xylene (o-)	105	Nonanes	C08H10	VOC	X	0.547%	0.547%	0.547%	0.009%	0.775%
Trimethylcyclohexane (1,1,2-)	106	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	107	Nonanes	C09H18	VOC		0.200%	0.200%	0.200%	0.003%	0.284%
Trimethylcyclohexane (1,c-2,c-4-)	108	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Nonane (n-)	109	Nonanes	C09H20	VOC		2.884%	2.884%	2.884%	0.050%	4.088%
Unknowns	110	Decanes+	C10+	VOC		10.753%	10.753%	10.753%	0.079%	15.288%
TOTAL						100.001%	100.000%	99.984%	100.001%	99.976%
TOC (Total)						98.999%	98.998%	98.984%	96.737%	99.938%
VOC (Total)						74.686%	74.685%	74.673%	16.825%	99.252%
Hexanes						4.241%	4.240%	4.241%	1.227%	5.521%
Heptanes						14.330%	14.310%	14.330%	1.468%	19.795%
Octanes						21.587%	21.610%	21.587%	0.888%	30.382%
Nonanes						14.663%	14.660%	14.663%	0.252%	20.786%
Decanes+						10.753%	10.770%	10.753%	0.079%	15.288%
HAP (Total)						13.992%	13.992%	13.992%	1.022%	19.503%
Xylenes						1.209%	1.209%	1.209%	0.021%	1.714%

NOTES

1. Sample Data: Location: Atlanta, TX
   Date: 04/15/09
   Dimethyloctane (2,3-) Time: Not Recorded
2. $v_i + l_i = f_i$; $y_i = v_i/V$; $x_i = l_i/L$; $z_i = f_i/F$ => $y_iV + x_iL = z_iF$ => $y_i(V/L)L + x_iL = z_i(1 + V/L)L$ => $z_i = [y_i(V/L) + x_i]/[1 + (V/L)]$ {Mole Balance}.
3. V/L = 0.4249 1 + V/L = 1.4249
4. z_i is refined to the same number if significant digits as y_i and x_i using the component mole balance and laboratory results for V/L.
5. z_i is scale using the hydrocarbon (e.g., hexanes+) z_i percentage in the flash analysis results, with the exception of HAP species.
6. $[y_i ; x_i]$ mole percent for species of hydrocarbons is estimated using scaled lab mole percent results for z_i and $[y ; x]_{HC}$ for the hydrocarbon.

(assumes v_i/l_i is same for all hydrocarbon species)

$(v/l)_{hexanes}$ = 0.2219

$y_{hexanes}$ = 1.227% $x_{hexanes}$ = 5.520% $z_{hexanes}$ = 4.240%

$y_i = z_i(y/z)_{hexanes}$ = 0.2894 z_i

$x_i = z_i(x/z)_{hexanes}$ = 1.3019 z_i

TABLE D-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular Weight	Density	Mole Percent	Weight Percent
Name (i)	Type	HAP	$(lb/mol)_i$	$(lb/scf)_i$	(mol_i/mol_T)	(lb_i/lb_T)
Nitrogen			28.013	0.0727	0.030%	0.009%
Carbon Dioxide	GHG		44.010	0.1143	0.970%	0.435%
Methane	GHG		16.042	0.0417	20.924%	3.421%
Ethane			30.069	0.0781	3.391%	1.039%
Propane	VOC		44.096	0.1145	2.181%	0.980%
Butane (i-)	VOC		58.122	0.1509	1.230%	0.729%
Butane (n-)	VOC		58.122	0.1509	1.720%	1.019%
Pentane (i-)	VOC		72.149	0.1873	2.350%	1.728%
Pentane (n-)	VOC		72.149	0.1873	1.620%	1.191%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.174%	0.153%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	1.218%	1.070%
Methylpentane (3-)	VOC		86.175	0.2238	0.912%	0.801%
Hexane (n-)	VOC	X	86.175	0.2238	1.937%	1.701%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.311%	0.318%
Methylcyclopentane	VOC		84.159	0.2185	1.134%	0.973%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.128%	0.131%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	1.713%	1.364%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.221%	0.226%
Cyclohexane	VOC		84.159	0.2185	1.106%	0.949%
Methylhexane (2-)	VOC		100.202	0.2602	2.292%	2.341%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.603%	0.603%
Methylhexane (3-)	VOC		100.202	0.2602	2.379%	2.430%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.163%	0.163%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.266%	0.266%
Ethylpentane (3-)	VOC		100.202	0.2602	0.029%	0.030%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.222%	0.222%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.021%	0.024%
Heptane (n-)	VOC		100.202	0.2602	3.743%	3.822%
Methylcyclohexane	VOC		98.186	0.2549	3.302%	3.304%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.225%	0.257%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.095%	0.111%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	0.848%	0.849%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.143%	0.166%
Ethylcyclopentane	VOC		98.186	0.2549	0.464%	0.464%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.028%	0.033%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE D-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	4.445%	4.174%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.371%	0.424%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	3.506%	4.081%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	2.896%	3.372%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.416%	0.484%
Ethylhexane (3-)	VOC		114.229	0.2966	0.111%	0.129%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.028%	0.032%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.170%	0.194%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.170%	0.194%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	4.373%	5.090%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.190%	0.248%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.053%	0.061%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.053%	0.061%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.053%	0.061%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.348%	0.398%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.006%	0.008%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.158%	0.207%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.181%	0.207%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.510%	0.583%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.112%	0.146%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	1.365%	1.561%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.067%	0.088%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.067%	0.088%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.077%	0.099%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.038%	0.050%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.038%	0.050%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE D-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.261%	0.341%
Ethylbenzene	VOC	X	106.165	0.2757	0.406%	0.439%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.007%	0.009%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	2.462%	2.664%
Xylene (p-)	VOC	X	106.165	0.2757	2.462%	2.664%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.092%	0.120%
Methyloctane (2-)	VOC		128.255	0.3330	0.782%	1.022%
Methyloctane (4-)	VOC		128.255	0.3330	0.782%	1.022%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.231%	0.297%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.231%	0.297%
Xylene (o-)	VOC	X	106.165	0.2757	0.547%	0.592%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.200%	0.257%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	2.884%	3.770%
Unknowns	VOC		**283.704**	0.7366	10.755%	31.094%
Pressurized Liquid			98.125	0.2548	100.000%	100.000%
TOC (Total)			98.677	0.2562	99.000%	99.556%
VOC (Total)			124.943	0.3244	74.685%	95.096%
HAP (Total)			92.449	0.2400	7.356%	6.931%
Xylenes			106.165	0.2757	5.472%	5.920%

NOTES

1. Normalized mole percentages from TABLE D-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE D-1.

MW = 98.125 lb/lb-mol

TABLE D-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular Weight	Density	Mole Percent	Weight Percent
Name (i)	Type	HAP	$(lb/mol)_i$	$(lb/scf)_i$	(mol_i/mol_T)	(lb_i/lb_T)
Nitrogen			28.013	0.0727	0.101%	0.105%
Carbon Dioxide	GHG		44.010	0.1143	3.163%	5.167%
Methane	GHG		16.042	0.0417	69.444%	41.356%
Ethane			30.069	0.0781	10.467%	11.683%
Propane	VOC		44.096	0.1145	5.339%	8.739%
Butane (i-)	VOC		58.122	0.1509	2.126%	4.587%
Butane (n-)	VOC		58.122	0.1509	2.495%	5.383%
Pentane (i-)	VOC		72.149	0.1873	1.895%	5.075%
Pentane (n-)	VOC		72.149	0.1873	1.056%	2.828%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.050%	0.161%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	0.352%	1.128%
Methylpentane (3-)	VOC		86.175	0.2238	0.264%	0.844%
Hexane (n-)	VOC	X	86.175	0.2238	0.561%	1.793%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.032%	0.119%
Methylcyclopentane	VOC		84.159	0.2185	0.116%	0.363%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.013%	0.049%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	0.175%	0.509%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.023%	0.084%
Cyclohexane	VOC		84.159	0.2185	0.113%	0.354%
Methylhexane (2-)	VOC		100.202	0.2602	0.235%	0.873%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.062%	0.225%
Methylhexane (3-)	VOC		100.202	0.2602	0.244%	0.907%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.017%	0.061%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.027%	0.099%
Ethylpentane (3-)	VOC		100.202	0.2602	0.003%	0.011%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.023%	0.083%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.002%	0.009%
Heptane (n-)	VOC		100.202	0.2602	0.383%	1.426%
Methylcyclohexane	VOC		98.186	0.2549	0.136%	0.495%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.009%	0.039%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.004%	0.017%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	0.035%	0.127%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.006%	0.025%
Ethylcyclopentane	VOC		98.186	0.2549	0.019%	0.070%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.001%	0.005%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE D-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	0.183%	0.625%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.015%	0.064%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.144%	0.611%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	0.119%	0.505%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.017%	0.073%
Ethylhexane (3-)	VOC		114.229	0.2966	0.005%	0.019%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.001%	0.005%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.007%	0.029%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.007%	0.029%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	0.180%	0.763%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.003%	0.016%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.001%	0.004%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.001%	0.004%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.001%	0.004%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.006%	0.025%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.003%	0.013%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.003%	0.013%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.009%	0.037%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.002%	0.009%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	0.023%	0.098%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.001%	0.005%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.001%	0.005%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.001%	0.006%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.001%	0.003%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.001%	0.003%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE D-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.004%	0.021%
Ethylbenzene	VOC	X	106.165	0.2757	0.007%	0.028%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.000%	0.001%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	0.042%	0.167%
Xylene (p-)	VOC	X	106.165	0.2757	0.042%	0.167%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.002%	0.008%
Methyloctane (2-)	VOC		128.255	0.3330	0.013%	0.064%
Methyloctane (4-)	VOC		128.255	0.3330	0.013%	0.064%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.004%	0.019%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.004%	0.019%
Xylene (o-)	VOC	X	106.165	0.2757	0.009%	0.037%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.003%	0.016%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	0.050%	0.236%
Unknowns	VOC		**473.700**	1.2300	0.079%	1.387%
Flash Gas			26.938	0.0699	100.000%	100.000%
TOC (Total)			26.379	0.0685	96.736%	94.728%
VOC (Total)			66.745	0.1733	16.825%	41.688%
HAP (Total)			88.115	0.2288	0.762%	2.492%
Xylenes			106.165	0.2757	0.094%	0.371%

NOTES

1. Normalized mole percentages from TABLE D-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE D-1, unless value negative.

MW = 26.938 lb/lb-mol

TABLE D-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular Weight	Density	Mole Percent	Weight Percent
Name (i)	Type	HAP	$(lb/mol)_i$	$(lb/scf)_i$	(mol_i/mol_T)	(lb_i/lb_T)
Nitrogen			28.013	0.0727	0.000%	0.000%
Carbon Dioxide	GHG		44.010	0.1143	0.038%	0.013%
Methane	GHG		16.042	0.0417	0.303%	0.038%
Ethane			30.069	0.0781	0.383%	0.090%
Propane	VOC		44.096	0.1145	0.838%	0.288%
Butane (i-)	VOC		58.122	0.1509	0.849%	0.385%
Butane (n-)	VOC		58.122	0.1509	1.391%	0.630%
Pentane (i-)	VOC		72.149	0.1873	2.544%	1.430%
Pentane (n-)	VOC		72.149	0.1873	1.859%	1.045%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.227%	0.152%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	1.586%	1.065%
Methylpentane (3-)	VOC		86.175	0.2238	1.188%	0.797%
Hexane (n-)	VOC	X	86.175	0.2238	2.522%	1.693%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.430%	0.335%
Methylcyclopentane	VOC		84.159	0.2185	1.567%	1.027%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.177%	0.138%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	2.367%	1.440%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.305%	0.238%
Cyclohexane	VOC		84.159	0.2185	1.528%	1.002%
Methylhexane (2-)	VOC		100.202	0.2602	3.167%	2.472%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.833%	0.637%
Methylhexane (3-)	VOC		100.202	0.2602	3.287%	2.566%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.225%	0.172%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.368%	0.281%
Ethylpentane (3-)	VOC		100.202	0.2602	0.040%	0.031%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.307%	0.235%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.029%	0.026%
Heptane (n-)	VOC		100.202	0.2602	5.170%	4.036%
Methylcyclohexane	VOC		98.186	0.2549	4.647%	3.555%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.317%	0.277%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.134%	0.119%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	1.194%	0.913%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.201%	0.179%
Ethylcyclopentane	VOC		98.186	0.2549	0.653%	0.500%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.039%	0.035%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE D-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	6.256%	4.491%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.522%	0.457%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	4.934%	4.391%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	4.077%	3.628%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.586%	0.521%
Ethylhexane (3-)	VOC		114.229	0.2966	0.156%	0.139%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.039%	0.034%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.239%	0.209%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.239%	0.209%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	6.155%	5.477%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.269%	0.269%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.075%	0.066%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.075%	0.066%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.075%	0.066%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.493%	0.431%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.009%	0.009%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.224%	0.224%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.257%	0.224%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.723%	0.632%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.159%	0.159%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	1.935%	1.692%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.095%	0.095%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.095%	0.095%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.109%	0.107%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.054%	0.054%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.054%	0.054%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE D-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.370%	0.370%
Ethylbenzene	VOC	X	106.165	0.2757	0.576%	0.476%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.010%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	3.491%	2.887%
Xylene (p-)	VOC	X	106.165	0.2757	3.491%	2.887%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.130%	0.130%
Methyloctane (2-)	VOC		128.255	0.3330	1.109%	1.108%
Methyloctane (4-)	VOC		128.255	0.3330	1.109%	1.108%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.328%	0.322%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.328%	0.322%
Xylene (o-)	VOC	X	106.165	0.2757	0.776%	0.641%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.284%	0.279%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	4.089%	4.086%
Unknowns	VOC		**283.170**	0.7353	15.292%	33.734%
Residual Liquid			128.362	0.3333	100.000%	100.000%
TOC (Total)			128.394	0.3334	99.962%	99.987%
VOC (Total)			129.116	0.3353	99.276%	99.859%
HAP (Total)			92.587	0.2404	10.159%	7.327%
Xylenes			106.165	0.2757	7.757%	6.416%

NOTES

1. Normalized mole percentages from TABLE D-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE D-1.

MW = 128.362 lb/lb-mol

TABLE D-4
Flash Analysis
Maximum Hourly and Annual Emission Estimates

Station ID	MR02-V01				
Service	Pipeline Liquids				
Liquids Holding Capacity	1,000 gal			1,000 gal	
Liquids Input Rate	4,000 gal/yr			1,000 gal/hr	
Flash Gas Density	0.0769 lb/scf			0.0769 lb/scf	
Flash Factor	328.03 scf/bbl			328.03 scf/bbl	
Flash Gas Rate	31,241 scf/yr			7,810 scfh	
Flash Losses	2,404 lb/yr	Average	Maximum	601 lb/hr	Maximum
Flash Gas	100.00% by weight	0.2744 lb/hr	1.2018 tpy	100.00% by weight	600.9213 lb/hr
CO_{2-e}	1039.07% by weight	2.8511 lb/hr	12.4880 tpy	1039.07% by weight	6,244.0081 lb/hr
CO_2	5.17% by weight	0.0142 lb/hr	0.0621 tpy	5.17% by weight	31.0522 lb/hr
TOC (Total)	94.73% by weight	0.2599 lb/hr	1.1385 tpy	94.73% by weight	569.2380 lb/hr
Methane	41.36% by weight	0.1135 lb/hr	0.4970 tpy	41.36% by weight	248.5182 lb/hr
Ethane	11.68% by weight	0.0321 lb/hr	0.1404 tpy	11.68% by weight	70.2082 lb/hr
VOC (Total)	41.69% by weight	0.1144 lb/hr	0.5010 tpy	41.69% by weight	250.5115 lb/hr
VOC (non-HAP)	39.20% by weight	0.1076 lb/hr	0.4711 tpy	9.19% by weight	55.2321 lb/hr
HAP (Total)	2.49% by weight	0.0068 lb/hr	0.0300 tpy	2.49% by weight	14.9762 lb/hr
Benzene	0.5089% by weight	0.0014 lb/hr	0.0061 tpy	0.5089% by weight	3.0579 lb/hr
Ethylbenzene	0.0275% by weight	0.0001 lb/hr	0.0003 tpy	0.0275% by weight	0.1653 lb/hr
Hexane (n-)	1.7932% by weight	0.0049 lb/hr	0.0216 tpy	1.7932% by weight	10.7758 lb/hr
Methanol					
Naphthalene					
Toluene	0.6253% by weight	0.0017 lb/hr	0.0075 tpy	0.6253% by weight	3.7576 lb/hr
Trimethylpentane (2,2,4-)	0.0091% by weight	0.0000 lb/hr	0.0001 tpy	0.0091% by weight	0.0548 lb/hr
Xylenes	0.3706% by weight	0.0010 lb/hr	0.0045 tpy	0.3706% by weight	2.2272 lb/hr

NOTES

1. Separator Characteristics:
   - Orientation: Vertical Fixed Roof Tank
   - Height/Length: 6.00 ft
   - Diameter: 5.33 ft
   - Capacity (physical): 1,000 gal
   - Capacity (liquid): 1,000 gal
2. Liquid input rates:
   - a. maximum hourly based on operator experience; 1,000 gal
   - b. maximum annual based on operating experience and safety factor; and 4,000 gal
   - c. average hourly is just the maximum annual divided by 8,760 hrs/yr.
3. Flash gas density is 110% of the value extracted from TABLE D-3b.
   Density (TABLE D-3b): 0.0699 lb/scf Safety Factor: 110%
4. Flash factor extracted from TABLE D-1.
5. Speciated emissions vapor weight percentages extracted from TABLE D-3b.
6. Included a conservative estimate of volume of liquids gathered at M&R02 station, from maintenance activities

TABLE E-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum			mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ M_i	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	**T** (°F)	P_i (psia)		(mol_i/mol_L) $f_{v\text{-}i}$	(lb_i/lb_L) $f_{m\text{-}i}$	(mol_i/mol_V)	(lb_i/lb_V)
Nitrogen			28.013	3.7362	2.6465E+02	-6.7880E+00	0.0000E+00	0.0000E+00	-345.75	-232.60	68.00			0.000%	0.000%	0.000%	0.000%
Carbon Dioxide	GHG		44.010	35.0169	-1.5119E+03	-1.1334E+01	9.3368E-03	1.7136E-09	-68.80	87.80	68.00	833.1743		0.038%	0.013%	1.087%	2.183%
Methane	GHG		16.042	14.6667	-5.7097E+02	-3.3373E+00	-2.1999E-09	1.3096E-05	-295.60	-115.60	68.00	7,889.8148		0.303%	0.038%	82.053%	60.088%
Ethane			30.069	20.6973	-1.1341E+03	-5.2514E+00	-9.8774E-11	6.7329E-06	-297.40	89.60	68.00	546.5426		0.383%	0.090%	7.185%	9.862%
Propane	VOC		44.096	21.4469	-1.4627E+03	-5.2610E+00	3.2820E-11	3.7349E-06	-306.40	206.60	68.00	121.5870		0.838%	0.288%	3.497%	7.039%
Butane (i-)	VOC		58.122	31.2541	-1.9532E+03	-8.8060E+00	8.9246E-11	5.7501E-06	-254.20	275.00	68.00	44.2751		0.849%	0.385%	1.290%	3.423%
Butane (n-)	VOC		58.122	27.0441	-1.9049E+03	-7.1805E+00	-6.6845E-11	4.2190E-06	-216.40	305.60	68.00	30.1688		1.391%	0.630%	1.440%	3.821%
Pentane (i-)	VOC		72.149	29.2963	-2.1762E+03	-7.8830E+00	-4.6512E-11	3.8997E-06	-256.00	368.60	68.00	11.1082		2.544%	1.430%	0.970%	3.193%
Pentane (n-)	VOC		72.149	33.3239	-2.4227E+03	-9.2354E+00	9.0199E-11	4.1050E-06	-202.00	386.60	68.00	8.1938		1.859%	1.045%	0.523%	1.722%
Dimethylbutane (2,2-)	VOC		86.175	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.227%	0.152%	0.039%	0.155%
Dimethylbutane (2,3-)	VOC		86.175	33.6319	-2.5524E+03	-9.3142E+00	1.4759E-10	3.9140E-06	-223.60	500.00	68.00	3.6998		0.000%	0.000%	0.000%	0.000%
Cyclopentane	VOC		70.133	29.1547	-2.3512E+03	-7.6965E+00	-1.6212E-10	3.1250E-06	-137.20	462.20	68.00	5.0181		0.000%	0.000%	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	30.7477	-2.4888E+03	-8.2295E+00	-2.3723E-11	3.2402E-06	-243.40	437.00	68.00	3.3041		1.586%	1.065%	0.180%	0.707%
Methylpentane (3-)	VOC		86.175	35.2848	-2.6773E+03	-9.8546E+00	2.2352E-11	4.0277E-06	-261.40	447.80	68.00	2.9617		1.188%	0.797%	0.121%	0.475%
Hexane (n-)	VOC	X	86.175	69.7378	-3.6278E+03	-2.3927E+01	1.2810E-02	-1.6844E-16	-139.00	453.20	68.00	2.3626		2.522%	1.693%	0.204%	0.804%
Dimethylpentane (2,2-)	VOC		100.202	6.2875	-2.1682E+03	2.6936E+00	-1.5525E-02	1.0917E-05	-191.20	478.40	68.00	1.6191		0.430%	0.335%	0.024%	0.109%
Methylcyclopentane	VOC		84.159	32.4766	-2.6434E+03	-8.7933E+00	2.0749E-11	3.2158E-06	-223.60	500.00	68.00	2.1257		1.567%	1.027%	0.114%	0.439%
Dimethylpentane (2,4-)	VOC		100.202	35.9436	-2.8460E+03	-9.9938E+00	8.0693E-11	3.6419E-06	-182.20	476.60	68.00	1.5074		0.177%	0.138%	0.009%	0.042%
Trimethylbutane (2,2,3-)	VOC		100.202	32.3633	-2.6614E+03	-8.7743E+00	-7.6870E-10	3.2006E-06	-11.20	496.40	68.00	1.5789		0.000%	0.000%	0.000%	0.000%
Benzene	VOC	X	78.112	31.7718	-2.7254E+03	-8.4443E+00	-5.3534E-09	2.7187E-06	42.80	552.20	68.00	1.4495		2.367%	1.440%	0.118%	0.420%
Dimethylpentane (3,3-)	VOC		100.202	30.2570	-2.6313E+03	-7.9839E+00	4.6848E-13	2.7170E-06	-209.20	505.40	68.00	1.2681		0.305%	0.238%	0.013%	0.061%
Cyclohexane	VOC		84.159	48.5529	-3.0874E+03	-1.5521E+01	7.3830E-03	6.3563E-12	44.60	537.80	68.00	1.5112		1.528%	1.002%	0.079%	0.304%
Methylhexane (2-)	VOC		100.202	54.1075	-3.3785E+03	-1.7547E+01	8.2594E-03	-3.4967E-14	-180.40	494.60	68.00	0.9987		3.167%	2.472%	0.109%	0.496%
Dimethylpentane (2,3-)	VOC		100.202	39.7737	-2.9050E+03	-1.2012E+01	5.1334E-03	-2.3807E-14	-171.40	507.20	68.00	1.0467		0.000%	0.000%	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	58.1943	-3.4151E+03	-1.9294E+01	9.6704E-03	-2.4361E-15	-94.00	525.20	68.00	1.1616		0.833%	0.637%	0.033%	0.149%
Methylhexane (3-)	VOC		100.202	35.2535	-2.9310E+03	-9.6667E+00	-5.2026E-11	3.2107E-06	-182.20	503.60	68.00	0.9291		3.287%	2.566%	0.105%	0.479%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	53.1912	-3.3121E+03	-1.7277E+01	8.3107E-03	5.0896E-14	-209.20	536.00	68.00	0.9791		0.225%	0.172%	0.008%	0.034%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	35.4255	-2.7286E+03	-1.0444E+01	4.6608E-03	1.7565E-14	-209.20	532.40	68.00	1.0075		0.368%	0.281%	0.013%	0.057%
Ethylpentane (3-)	VOC		100.202	8.5463	-2.2979E+03	1.5503E+00	-1.2233E-02	8.2670E-06	-180.40	514.40	68.00	0.8755		0.040%	0.031%	0.001%	0.006%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	36.8109	-2.9536E+03	-1.0275E+01	-4.6212E-12	3.6730E-06	-178.60	536.00	68.00	0.9713		0.307%	0.235%	0.010%	0.046%
Trimethylpentane (2,2,4-)	VOC	X	114.229	50.3422	-3.2789E+03	-1.6111E+01	7.4260E-03	-9.1804E-14	-160.60	519.80	68.00	0.7453		0.029%	0.026%	0.001%	0.004%
Heptane (n-)	VOC		100.202	65.0257	-3.8188E+03	-2.1684E+01	1.0387E-02	1.0206E-14	-130.00	512.60	68.00	0.6808		5.170%	4.036%	0.121%	0.552%
Methylcyclohexane	VOC		98.186	38.0955	-3.0738E+03	-1.0684E+01	-5.1766E-11	3.5282E-06	-194.80	570.20	68.00	0.6925		4.647%	3.555%	0.110%	0.495%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.317%	0.277%	0.000%	0.001%
Dimethylhexane (2,2-)	VOC		114.229	38.7670	-3.1841E+03	-1.0857E+01	1.9275E-12	3.4797E-06	-185.80	530.60	68.00	0.5066		0.134%	0.119%	0.002%	0.012%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	36.3623	-3.0025E+03	-1.0070E+01	-1.0435E-09	3.3726E-06	-65.20	557.60	68.00	0.7110		1.194%	0.913%	0.029%	0.131%
Dimethylhexane (2,5-)	VOC		114.229	40.0260	-3.2647E+03	-1.1282E+01	-6.5408E-10	3.6200E-06	-131.80	530.60	68.00	0.4490		0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	56.2877	-3.6225E+03	-1.8225E+01	8.1864E-03	8.7232E-12	30.20	537.80	68.00	0.4499		0.201%	0.179%	0.003%	0.016%
Ethylcyclopentane	VOC		98.186	36.3631	-3.0448E+03	-1.0038E+01	3.5007E-11	3.2347E-06	-216.40	566.60	68.00	0.5963		0.653%	0.500%	0.013%	0.060%
Trimethylpentane (2,2,3-)	VOC		114.229	35.9540	-3.0569E+03	-9.8896E+00	-7.2916E-11	3.1060E-06	-169.60	555.80	68.00	0.4788		0.039%	0.035%	0.001%	0.003%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	38.0712	-3.1736E+03	-1.0617E+01	6.3090E-11	3.3817E-06	-194.80	552.20	68.00	0.4250		0.000%	0.000%	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	34.1565	-3.0232E+03	-9.2267E+00	2.7691E-11	2.7828E-06	-164.20	559.40	68.00	0.4029		0.000%	0.000%	0.000%	0.000%

TABLE E-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum			mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ M_i	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	**T** (°F)	P_i (psia)		(mol_i/mol_L) f_{v-i}	(lb_i/lb_L) f_{m-i}	(mol_i/mol_V)	(lb_i/lb_V)
Dimethylhexane (2,3-)	VOC		114.229	57.3778	-3.7143E+03	-1.8599E+01	8.2907E-03	-2.8441E-12	30.20	554.00	68.00	0.3451		0.000%	0.000%	0.000%	0.000%
Toluene	VOC	X	92.138	34.0775	-3.0379E+03	-9.1635E+00	1.0289E-11	2.7035E-06	-139.00	606.20	68.00	0.4219		6.256%	4.491%	0.091%	0.381%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.522%	0.457%	0.000%	0.001%
Dimethylhexane (3,4-)	VOC		114.229	38.6119	-3.2685E+03	-1.0752E+01	3.6386E-09	3.2771E-06	30.20	564.80	68.00	0.3186		4.934%	4.391%	0.054%	0.281%
Methylheptane (2-)	VOC		114.229	37.6930	-3.2611E+03	-1.0391E+01	-1.0524E-12	3.0560E-06	-164.20	548.60	68.00	0.3028		0.000%	0.000%	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	40.2080	-3.3661E+03	-1.1279E+01	-8.7855E-11	3.4055E-06	-185.80	552.20	68.00	0.3001		4.077%	3.628%	0.042%	0.219%
Dimethylhexane (3,4-)	VOC		114.229	38.6119	-3.2685E+03	-1.0752E+01	3.6386E-09	3.2771E-06	30.20	564.80	68.00	0.3186		0.000%	0.000%	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	52.8828	-3.6231E+03	-1.6804E+01	7.1828E-03	7.4077E-14	-184.00	555.80	68.00	0.2869		0.586%	0.521%	0.006%	0.030%
Ethylhexane (3-)	VOC		114.229	40.2079	-3.3651E+03	-1.1285E+01	-5.4180E-09	3.4199E-06	30.20	557.60	68.00	0.2931		0.156%	0.139%	0.002%	0.008%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.039%	0.034%	0.000%	0.000%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	32.4775	-3.0067E+03	-8.5896E+00	7.0258E-11	2.1739E-06	-103.00	604.40	68.00	0.3176		0.239%	0.209%	0.003%	0.013%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.239%	0.209%	0.000%	0.001%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	32.5731	-2.9872E+03	-8.6494E+00	-2.1355E-09	2.2946E-06	-34.60	602.60	68.00	0.3364		0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	7.8816	-2.6422E+03	2.3902E+00	-1.5376E-02	9.7931E-06	-158.80	563.00	68.00	0.2426		0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	33.1329	-3.0084E+03	-8.8498E+00	-4.3621E-10	2.3704E-06	-27.40	604.40	68.00	0.3361		0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Cycloheptane	VOC		98.186	54.0858	-3.6109E+03	-1.7331E+01	7.5272E-03	1.7553E-12	17.60	627.80	68.00	0.3185		0.000%	0.000%	0.000%	0.000%
Octane (n-)	VOC		114.229	29.0948	-3.0114E+03	-7.2653E+00	-2.2696E-11	1.4680E-06	-70.60	564.80	68.00	0.2040		6.155%	5.477%	0.043%	0.225%
Trimethylhexane (2,4,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.269%	0.269%	0.047%	0.275%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	-3.8184	-2.2442E+03	7.0671E+00	-1.9644E-02	1.1435E-05	-86.80	568.40	68.00	0.2957		0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	32.4384	-3.0550E+03	-8.5372E+00	2.2892E-10	2.0099E-06	-130.00	617.00	68.00	0.2590		0.075%	0.066%	0.001%	0.003%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	31.9151	-3.0253E+03	-8.3613E+00	5.7055E-12	1.9673E-06	-124.60	617.00	68.00	0.2640		0.075%	0.066%	0.001%	0.003%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.075%	0.066%	0.000%	0.000%
Propylcyclopentane (i-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.493%	0.431%	0.000%	0.001%
Trimethylhexane (2,3,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.009%	0.009%	0.001%	0.009%
Dimethylheptane (2,2-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.224%	0.224%	0.039%	0.228%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.257%	0.224%	0.000%	0.001%
Trimethylhexane (2,2,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	32.1635	-3.0728E+03	-8.4344E+00	6.8943E-10	1.9558E-06	-58.00	631.40	68.00	0.2121		0.723%	0.632%	0.005%	0.027%
Dimethylheptane (2,6-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.159%	0.159%	0.028%	0.162%
Propylcyclopentane (n-)	VOC		112.213	33.9220	-3.2097E+03	-8.9914E+00	-3.2992E-11	2.0684E-06	-178.60	626.00	68.00	0.1793		0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	32.7090	-3.1283E+03	-8.6023E+00	-3.9268E-11	1.9935E-06	-167.80	636.80	68.00	0.1870		1.935%	1.692%	0.012%	0.064%
Dimethylheptane (2,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.095%	0.095%	0.017%	0.097%
Dimethylheptane (3,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.095%	0.095%	0.017%	0.097%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.109%	0.107%	0.000%	0.000%
Trimethylhexane (2,3,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.054%	0.054%	0.009%	0.055%
Dimethylheptane (3,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.054%	0.054%	0.009%	0.055%

TABLE E-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum			mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ $\mathbf{M_i}$	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	**T** (°F)	P_i (psia)		(mol_i/mol_L) $\mathbf{f_{v-i}}$	(lb_i/lb_L) $\mathbf{f_{m-i}}$	(mol_i/mol_V)	(lb_i/lb_V)
Trimethylcyclohexane (1,1,4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Tetramethylpentane (2,2,3,3-)	VOC		128.255	35.4216	-3.2760E+03	-9.5678E+00	9.0298E-10	2.4355E-06	14.00	640.40	68.00	0.1369		0.370%	0.370%	0.002%	0.010%
Ethylbenzene	VOC	X	106.165	36.1998	-3.3402E+03	-9.7970E+00	-1.1467E-11	2.5758E-06	-139.00	651.20	68.00	0.1388		0.576%	0.476%	0.003%	0.013%
Trimethylhexane (2,3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.010%	0.010%	0.002%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	34.6803	-3.2981E+03	-9.2570E+00	-4.3563E-10	-2.4103E-06	-54.40	649.40	68.00	0.0468		3.491%	2.887%	0.006%	0.027%
Xylene (p-)	VOC	X	106.165	60.0531	-4.0159E+03	-1.9441E+01	8.2881E-03	-2.3647E-12	55.40	649.40	68.00	0.1277		3.491%	2.887%	0.015%	0.074%
Dimethylheptane (3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.130%	0.130%	0.023%	0.133%
Methyloctane (2-)	VOC		128.255	6.0191	-2.8579E+03	3.4068E+00	-1.6572E-02	9.8047E-06	-112.00	597.20	68.00	0.0881		1.109%	1.108%	0.003%	0.020%
Methyloctane (4-)	VOC		128.255	11.2012	-2.9467E+03	1.2133E+00	-1.4423E-02	9.1770E-06	-171.40	599.00	68.00	0.0974		1.109%	1.108%	0.004%	0.022%
Dimethylheptane (3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.000%	0.000%	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	9.8147	-2.9609E+03	1.9061E+00	-1.5675E-02	9.7961E-06	-160.60	602.60	68.00	0.0889		0.000%	0.000%	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.328%	0.322%	0.000%	0.001%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.328%	0.322%	0.000%	0.001%
Xylene (o-)	VOC	X	106.165	37.2413	-3.4573E+03	-1.0126E+01	9.0676E-11	2.6123E-06	-13.00	674.60	68.00	0.0946		0.776%	0.641%	0.003%	0.012%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.284%	0.279%	0.000%	0.001%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Nonane (n-)	VOC		128.255	8.8817	-2.8042E+03	1.5262E+00	-1.0464E-02	5.7972E-06	-63.40	613.40	68.00	0.0627		4.089%	4.086%	0.009%	0.051%
Unknowns	VOC		283.170	116.5157	-8.0140E+03	-3.8799E+01	1.3398E-02	-4.4444E-13	50.00	813.20	68.00	0.0000		15.292%	33.734%	0.000%	0.000%
Residual Liquid	Liquid	128.362 lb/lb-mol		Vapor	68.00 °F		29.1420 psia		21.907 lb/lb-mol					100.000%	100.000%	100.000%	100.000%
TOC (Total)		128.394 lb/lb-mol			68.00 °F		28.8362 psia		21.664 lb/lb-mol					99.962%	99.987%	98.913%	97.817%
VOC (Total)		129.116 lb/lb-mol			68.00 °F		2.8403 psia		63.095 lb/lb-mol					99.276%	99.859%	9.676%	27.868%
HAP (Total)		95.690 lb/lb-mol			68.00 °F		0.6569 psia		86.481 lb/lb-mol					19.507%	14.542%	0.440%	1.736%
Xylenes		106.165 lb/lb-mol			68.00 °F		0.0880 psia		106.165 lb/lb-mol					7.757%	6.416%	0.023%	0.114%

NOTES

1. Liquid composition of residual liquid based on SPL flash analysis (see TABLE D-3c).
2. Vapor pressure data for unknowns based on: Pentadecane (n-)

TABLE E-2
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		MR02-V01				
Service		Pipeline Liquids				
Capacity		1,000 gal			1,000 gal	
Temperature of Stored Liquid		56.78 °F			82.20 °F	
Vapor Pressure		6.6239 psia			10.3398 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		4.00 turnover/yr				
		4,000 gal/yr			1,000 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					30.1205 lbs/month	
		172.4088 lb/yr			0.0405 lb/hr	
Working Losses		**9.78E-03** lb/gal			**1.24E-02** lb/gal	
		39.1126 lb/yr	Average	Maximum	12.3576 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.0706 lb/hr	0.3093 tpy	358.84% by weight	0.1453 lb/hr
	Work		0.0160 lb/hr	0.0702 tpy		44.3438 lb/hr
	Total		0.0866 lb/hr	0.3795 tpy		44.4890 lb/hr
CO_{2-e}		5398.27% by weight	1.3035 lb/hr	5.7092 tpy	5398.27% by weight	669.2812 lb/hr
CO_2		7.83% by weight	0.0019 lb/hr	0.0083 tpy	7.83% by weight	0.9712 lb/hr
TOC (Total)		351.00% by weight	0.0848 lb/hr	0.3712 tpy	351.00% by weight	43.5178 lb/hr
Methane		215.62% by weight	0.0521 lb/hr	0.2280 tpy	215.62% by weight	26.7324 lb/hr
Ethane		35.39% by weight	0.0085 lb/hr	0.0374 tpy	35.39% by weight	4.3873 lb/hr
VOC (Total)		100.00% by weight	0.0241 lb/hr	0.1058 tpy	100.00% by weight	12.3981 lb/hr
VOC (non-HAP)		93.77% by weight	0.0226 lb/hr	0.0992 tpy	93.77% by weight	11.6258 lb/hr
HAP (Total)		6.23% by weight	0.0015 lb/hr	0.0066 tpy	6.23% by weight	0.7722 lb/hr
Benzene		1.5063% by weight	3.64E-04 lb/hr	1.59E-03 tpy	1.5063% by weight	1.87E-01 lb/hr
Ethylbenzene		0.0477% by weight	1.15E-05 lb/hr	5.04E-05 tpy	0.0477% by weight	5.91E-03 lb/hr
Hexane (n-)		2.8866% by weight	6.97E-04 lb/hr	3.05E-03 tpy	2.8866% by weight	3.58E-01 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	3.30E-04 lb/hr	1.45E-03 tpy	1.3668% by weight	1.69E-01 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	3.35E-06 lb/hr	1.47E-05 tpy	0.0139% by weight	1.72E-03 lb/hr
Xylenes		0.4073% by weight	9.84E-05 lb/hr	4.31E-04 tpy	0.4073% by weight	5.05E-02 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	6.00 ft	Shell/Roof Color	Gray/Medium (or less solar)
Diameter	5.33 ft	Shell Condition	Good (absorptance)
Capacity (estimated)	1,000 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	1,000 gal	Pressure Setting	0.03 psig

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Cleveland, Ohio
Material	Gasoline (RVP 13)	Selection based on VOC vapor pressure (see TABLE E-1).	
Liquid Molecular Weight	92.00 lb/lb-mol	Vapor Molecular Weight	62.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	4.9635	5.4542	42.60	47.36	4.1347	2.4424	333
February	28	5.1913	5.8469	44.85	50.93	5.1909	2.5545	333
March	31	5.8266	6.7600	50.75	58.54	9.0869	2.8671	333
April	30	6.5962	7.9320	57.24	67.20	14.2682	3.2458	333
May	31	7.3823	9.0680	63.27	74.67	21.3223	3.6325	333
June	30	8.1036	10.0563	68.38	80.59	27.3599	3.9875	333
July	31	8.3713	10.3398	70.18	82.20	30.1205	4.1192	333
August	31	8.0860	9.7860	68.26	79.02	24.7150	3.9788	333
September	30	7.4312	8.7542	63.63	72.68	16.5379	3.6566	333
October	31	6.5426	7.4810	56.81	63.99	10.3828	3.2194	333
November	30	5.8011	6.3837	50.52	55.51	5.4940	2.8545	333
December	31	5.1911	5.6253	44.85	48.94	3.7956	2.5543	333
ALL	365	6.6239	10.3398	56.78	82.20	172.4088	39.1126	4,000

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. Speciation of emissions is based on vapor weight percentages in TABLE E-1 normalized on VOC to assure methodology is conservative.
5. Included a conservative estimate of volume of liquids gathered at M&R02 station, from maintenance activities

TABLE E-3
Volatile Organic Liquids Loading (Tanker Trucks)
Hourly and Annual Emission Estimates

Source	M&R02-TL-PL				
Supply Vessel	MR02-V01				
	Pipeline Liquids				
	1,000 gal			1,000 gal	
Tanker Truck Service	Dedicated Normal			Dedicated Normal	
Loading Method	Submerged			Submerged	
Saturation Factor	0.60 n.d.			0.60 n.d.	
Vapor Molecular Weight	62.00 lb/lb-mol			62.00 lb/lb-mol	
Bulk Liquid Temperature	56.78 °F			82.20 °F	
	516.78 R			542.20 R	
Vapor Pressure	6.6239 psia			10.3398 psia	
Loading Loss Factor	5.9411 lb/kgal			8.8391 lb/kgal	
Pumping Rate				150 gpm	
Throughput	4.00 turnover/yr				
	4,000 gal/yr			1,000 gal/hr	
Loading Losses	23.7646 lb/yr	Average	Maximum	8.8391 lb/hr	Maximum
Residual Liquid	358.84% by weight	0.0097 lb/hr	0.0426 tpy	358.84% by weight	31.7182 lb/hr
CO_{2-e}	5398.27% by weight	0.1464 lb/hr	0.6414 tpy	5398.27% by weight	477.1601 lb/hr
CO_2	7.83% by weight	0.0002 lb/hr	0.0009 tpy	7.83% by weight	0.6924 lb/hr
TOC (Total)	351.00% by weight	0.0095 lb/hr	0.0417 tpy	351.00% by weight	31.0258 lb/hr
Methane	215.62% by weight	0.0058 lb/hr	0.0256 tpy	215.62% by weight	19.0587 lb/hr
Ethane	35.39% by weight	0.0010 lb/hr	0.0042 tpy	35.39% by weight	3.1279 lb/hr
VOC (Total)	100.00% by weight	0.0027 lb/hr	0.0119 tpy	100.00% by weight	8.8391 lb/hr
VOC (non-HAP)	93.77% by weight	0.0025 lb/hr	0.0111 tpy	93.77% by weight	8.2886 lb/hr
HAP (Total)	6.23% by weight	0.0002 lb/hr	0.0007 tpy	6.23% by weight	0.5506 lb/hr
Benzene	1.5063% by weight	4.09E-05 lb/hr	1.79E-04 tpy	1.5063% by weight	1.33E-01 lb/hr
Ethylbenzene	0.0477% by weight	1.29E-06 lb/hr	5.66E-06 tpy	0.0477% by weight	4.21E-03 lb/hr
Hexane (n-)	2.8866% by weight	7.83E-05 lb/hr	3.43E-04 tpy	2.8866% by weight	2.55E-01 lb/hr
Methanol					
Naphthalene					
Toluene	1.3668% by weight	3.71E-05 lb/hr	1.62E-04 tpy	1.3668% by weight	1.21E-01 lb/hr
Trimethylpentane (2,2,4-)	0.0139% by weight	3.77E-07 lb/hr	1.65E-06 tpy	0.0139% by weight	1.23E-03 lb/hr
Xylenes	0.4073% by weight	1.11E-05 lb/hr	4.84E-05 tpy	0.4073% by weight	3.60E-02 lb/hr

NOTES

1. Emissions calculated using methods provided in USEPA, AP-42 Section 5.2 dated 6/2008. $L_L = 12.46[(S)M_V P/T]$
2. Physical property, throughput and speciation data based data from supply vessel emission calculation spreadsheet.
3. Included a conservative estimate of volume of liquids gathered at M&R02 station, from maintenance activities

TABLE F-1
2-Stroke Lean-Burn Reciprocating Engines
Hourly and Annual Emission Estimates
Uncontrolled

Type		2slb				
Service		Emergency				
JJJJ Relevant Date		Manufactured: On or After 01/01/2009				
ZZZZ Status		New RICE at Area HAP Source				
Make		Cummins				
Model		GTA12/GTA743				
Fuel		Natural Gas				
Fuel Higher Heating Value(HHV)		1,020 BTU/scf			1,020 BTU/scf	
Ambient Temperature		80 °F			80 °F	
Power Output		265 bhp (mech.)			265 bhp (mech.)	
		18 kW (elec.)			18 kW (elec.)	
Heat Rate at HHV		8,641 BTU/hp-hr			8,641 BTU/hp-hr	
Operating Hours		500 hrs/yr				
Fuel Consumption		2,245 scfh			2,245 scfh	
		1.122 MMscf/yr				
Heat Input at HHV		2.29 MMBTU/hr			2.29 MMBTU/hr	
		1,145 MMBTU/yr	Uncontrolled			Uncontrolled
Pollutant	Control Efficiency	Uncontrolled	Average Hourly	Maximum Annual	Uncontrolled	Maximum Hourly
NO_X		5,337.59 lb/MMscf	11.9823 lb/hr	2.9956 tpy	5,337.59 lb/MMscf	11.9823 lb/hr
CO		658.42 lb/MMscf	1.4781 lb/hr	0.3695 tpy	658.42 lb/MMscf	1.4781 lb/hr
SO_2		0.60 lb/MMscf	0.0013 lb/hr	0.0003 tpy	0.60 lb/MMscf	0.0013 lb/hr
$PM_{10/2.5}$		49.28 lb/MMscf	0.1106 lb/hr	0.0277 tpy	49.28 lb/MMscf	0.1106 lb/hr
CO_{2-e}		128,349 lb/MMscf	288 lb/hr	72 tpy	128,349 lb/MMscf	288 lb/hr
CO_2		120,161 lb/MMscf	270 lb/hr	67 tpy	120,161 lb/MMscf	270 lb/hr
N_2O		0.23 lb/MMscf	0.0005 lb/hr	0.0001 tpy	0.23 lb/MMscf	0.0005 lb/hr
TOC (Total)		437.21 lb/MMscf	0.9815 lb/hr	0.2454 tpy	437.21 lb/MMscf	0.9815 lb/hr
Methane		386.56 lb/MMscf	0.8678 lb/hr	0.2169 tpy	386.56 lb/MMscf	0.8678 lb/hr
Ethane		18.70 lb/MMscf	0.0420 lb/hr	0.0105 tpy	18.70 lb/MMscf	0.0420 lb/hr
VOC (Total)		31.95 lb/MMscf	0.0717 lb/hr	0.0179 tpy	31.95 lb/MMscf	0.0717 lb/hr
VOC (non-HAP)		10.74 lb/MMscf	0.0241 lb/hr	0.0060 tpy	10.74 lb/MMscf	0.0241 lb/hr
HAP (Total)		21.20 lb/MMscf	0.0476 lb/hr	0.0119 tpy	21.20 lb/MMscf	0.0476 lb/hr
Acetaldehyde		2.07E+00 lb/MMscf	4.64E-03 lb/hr	1.16E-03 tpy	2.07E+00 lb/MMscf	4.64E-03 lb/hr
Acrolein		2.07E+00 lb/MMscf	4.66E-03 lb/hr	1.16E-03 tpy	2.07E+00 lb/MMscf	4.66E-03 lb/hr
Benzene		5.17E-01 lb/MMscf	1.16E-03 lb/hr	2.90E-04 tpy	5.17E-01 lb/MMscf	1.16E-03 lb/hr
Biphenyl		1.05E-03 lb/MMscf	2.36E-06 lb/hr	5.91E-07 tpy	1.05E-03 lb/MMscf	2.36E-06 lb/hr
Butadiene (1,3-)		2.19E-01 lb/MMscf	4.91E-04 lb/hr	1.23E-04 tpy	2.19E-01 lb/MMscf	4.91E-04 lb/hr
Carbon Tetrachloride		1.62E-02 lb/MMscf	3.63E-05 lb/hr	9.08E-06 tpy	1.62E-02 lb/MMscf	3.63E-05 lb/hr
Chlorobenzene		1.18E-02 lb/MMscf	2.66E-05 lb/hr	6.64E-06 tpy	1.18E-02 lb/MMscf	2.66E-05 lb/hr
Chloroform		1.26E-02 lb/MMscf	2.82E-05 lb/hr	7.05E-06 tpy	1.26E-02 lb/MMscf	2.82E-05 lb/hr
Dichloropropene (1,3-)		1.17E-02 lb/MMscf	2.62E-05 lb/hr	6.55E-06 tpy	1.17E-02 lb/MMscf	2.62E-05 lb/hr
Ethylbenzene		2.88E-02 lb/MMscf	6.46E-05 lb/hr	1.62E-05 tpy	2.88E-02 lb/MMscf	6.46E-05 lb/hr
Ethylene Dibromide		1.96E-02 lb/MMscf	4.39E-05 lb/hr	1.10E-05 tpy	1.96E-02 lb/MMscf	4.39E-05 lb/hr
Formaldehyde		1.47E+01 lb/MMscf	3.30E-02 lb/hr	8.26E-03 tpy	1.47E+01 lb/MMscf	3.30E-02 lb/hr
Hexane (n-)		1.19E-01 lb/MMscf	2.66E-04 lb/hr	6.66E-05 tpy	1.19E-01 lb/MMscf	2.66E-04 lb/hr
Methanol		6.61E-01 lb/MMscf	1.48E-03 lb/hr	3.71E-04 tpy	6.61E-01 lb/MMscf	1.48E-03 lb/hr
Methylene Chloride		3.92E-02 lb/MMscf	8.80E-05 lb/hr	2.20E-05 tpy	3.92E-02 lb/MMscf	8.80E-05 lb/hr
Methylnaphthalene (2-)		5.71E-03 lb/MMscf	1.28E-05 lb/hr	3.20E-06 tpy	5.71E-03 lb/MMscf	1.28E-05 lb/hr
Naphthalene		2.57E-02 lb/MMscf	5.76E-05 lb/hr	1.44E-05 tpy	2.57E-02 lb/MMscf	5.76E-05 lb/hr
PAH		3.57E-02 lb/MMscf	8.02E-05 lb/hr	2.00E-05 tpy	3.57E-02 lb/MMscf	8.02E-05 lb/hr
Phenol		1.12E-02 lb/MMscf	2.52E-05 lb/hr	6.30E-06 tpy	1.12E-02 lb/MMscf	2.52E-05 lb/hr
Propylene Oxide						
Styrene		1.46E-02 lb/MMscf	3.28E-05 lb/hr	8.20E-06 tpy	1.46E-02 lb/MMscf	3.28E-05 lb/hr
Tetrachloroethane (1,1,2,2-)		1.77E-02 lb/MMscf	3.97E-05 lb/hr	9.92E-06 tpy	1.77E-02 lb/MMscf	3.97E-05 lb/hr
Toluene		2.57E-01 lb/MMscf	5.76E-04 lb/hr	1.44E-04 tpy	2.57E-01 lb/MMscf	5.76E-04 lb/hr
Trichloroethane (1,1,2-)		1.40E-02 lb/MMscf	3.15E-05 lb/hr	7.88E-06 tpy	1.40E-02 lb/MMscf	3.15E-05 lb/hr
Trimethylpentane (2,2,4-)		2.26E-01 lb/MMscf	5.06E-04 lb/hr	1.27E-04 tpy	2.26E-01 lb/MMscf	5.06E-04 lb/hr
Vinyl Chloride		6.58E-03 lb/MMscf	1.48E-05 lb/hr	3.70E-06 tpy	6.58E-03 lb/MMscf	1.48E-05 lb/hr
Xylenes		7.14E-02 lb/MMscf	1.60E-04 lb/hr	4.01E-05 tpy	7.14E-02 lb/MMscf	1.60E-04 lb/hr

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Maximum hourly emissions based on 100% of rated capacity.
3. Vendor provided data on power output and heat rate.
4. NOX and CO emissions are estimated based on Vendor Data.
5. SO2 and PM10/2.5 emission factors based on AP-42, Section 3.2 (Revised 7/00), Table 3.2-1.
6. CO2 and N2O emission factors based on 40 CFR 98, Subpart C, Table C-1 and 40 CFR 98, Subpart C, Table C-2, respectively.
7. TOC (Total) and TOC species emissions are estimated based on Vendor Data.
   Emission factors based on: $EF_i = [EF_{(TOC)}]/[(EF_{TOC\text{-}AP42})]\ (EF_{i\text{-}AP42})$

TABLE G-1
Heaters
Natural Gas Combustion
Maximum Emission Estimates

Station ID	M&R02_HIG-01				
Agency ID	HIG-01				
Make	Bruest				
Model	SR-8				
Burner	N/A				
Fuel	Natural Gas				
Fuel Higher Heating Value (HHV)	1,020 BTU/scf			1,020 BTU/scf	
Heat Output at HHV	0.0006 MMBTU/hr			0.0007 MMBTU/hr	
Thermal Efficiency	70%			70%	
Operating Hours	8,760 hrs/yr				
Fuel Consumption	0.88 scfh			0.93 scfh	
	0.008 MMscf/yr				
Heat Input at HHV	0.0009 MMBTU/hr			0.0009 MMBTU/hr	
	8 MMBTU/yr	Avg. Hourly	Max. Annual		Max. Hourly
NO_X	73.82 lb/MMscf	0.0001 lb/hr	0.0003 tpy	73.8239 lb/MMscf	0.0001 lb/hr
CO	1,169.14 lb/MMscf	0.0010 lb/hr	0.0045 tpy	1,169.1403 lb/MMscf	0.0011 lb/hr
SO_2	0.60 lb/MMscf	0.0000 lb/hr	0.0000 tpy	0.6000 lb/MMscf	0.0000 lb/hr
$PM_{10/2.5}$	7.60 lb/MMscf	0.0000 lb/hr	0.0000 tpy	7.6000 lb/MMscf	0.0000 lb/hr
CO_{2-e}	121,999.15 lb/MMscf	0.1076 lb/hr	0.4715 tpy	121,999.15 lb/MMscf	0.1130 lb/hr
CO_2	119,926.98 lb/MMscf	0.1058 lb/hr	0.4635 tpy	119,926.98 lb/MMscf	0.1111 lb/hr
N_2O	0.23 lb/MMscf	0.0000 lb/hr	0.0000 tpy	0.23 lb/MMscf	0.0000 lb/hr
TOC (Total)	383.52 lb/MMscf	0.0003 lb/hr	0.0015 tpy	383.52 lb/MMscf	0.0004 lb/hr
Methane	80.19 lb/MMscf	0.0001 lb/hr	0.0003 tpy	80.19 lb/MMscf	0.0001 lb/hr
Ethane	108.08 lb/MMscf	0.0001 lb/hr	0.0004 tpy	108.08 lb/MMscf	0.0001 lb/hr
VOC (Total)	191.76 lb/MMscf	0.0002 lb/hr	0.0007 tpy	191.76 lb/MMscf	0.0002 lb/hr
HAP (Total)	65.82 lb/MMscf	0.0001 lb/hr	0.0003 tpy	65.82 lb/MMscf	0.0001 lb/hr
Acetaldehyde					
Acrolein					
Benzene	7.32E-02 lb/MMscf	6.46E-08 lb/hr	2.83E-07 tpy	7.32E-02 lb/MMscf	6.78E-08 lb/hr
Butadiene (1,3-)					
Carbon Tetrachloride					
Chlorobenzene					
Chloroethane					
Chloroform					
Dichloroethane (1,2-)					
Dichloropropane (1,2-)					
Dichloropropene (1,3-)					
Ethylbenzene					
Ethylene Dibromide					
Formaldehyde	2.61E+00 lb/MMscf	2.31E-06 lb/hr	1.01E-05 tpy	2.61E+00 lb/MMscf	2.42E-06 lb/hr
Hexane (n-)	6.28E+01 lb/MMscf	5.54E-05 lb/hr	2.43E-04 tpy	6.28E+01 lb/MMscf	5.81E-05 lb/hr
Methanol					
Methylene Chloride					
Methylnaphthalene (2-)	8.37E-04 lb/MMscf	7.38E-10 lb/hr	3.23E-09 tpy	8.37E-04 lb/MMscf	7.75E-10 lb/hr
Naphthalene	2.13E-02 lb/MMscf	1.88E-08 lb/hr	8.22E-08 tpy	2.13E-02 lb/MMscf	1.97E-08 lb/hr
PAH	3.08E-03 lb/MMscf	2.71E-09 lb/hr	1.19E-08 tpy	3.08E-03 lb/MMscf	2.85E-09 lb/hr
Phenol					
Propylene Oxide					
Styrene					
Tetrachloroethane (1,1,2,2-)					
Toluene	1.19E-01 lb/MMscf	1.05E-07 lb/hr	4.58E-07 tpy	1.19E-01 lb/MMscf	1.10E-07 lb/hr
Trichloroethane (1,1,2-)					
Trimethylpentane (2,2,4-)					
Vinyl Chloride					
Xylenes					

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Manufacturer provided data on rated capacity and fuel consumption (model SR-8 = model 1800).
3. Maximum output is assumed to be 105% of rated capacity.
4. Manufacturer provided NOx; CO; and HC emission test results (60 ppmvd at 3% O2; 1,560 ppmvd at 3% O2; and 470 ppmvd at 3% O2, respectively).
Based on data in the North American Combustion Handbook published by North American, Mfg., Co., the NO_X, CO and HC emission conversion factors are:
0.001206 (lb/MMBTU)/ppmvd at 3% O2; 0.000735(lb/MMBTU)/ppmvd at 3% O2; and 0.000400 (lb/MMBTU)/ppmvd at 3% O2, respectively.
5. CO2 emission factor based on 40 CFR 98, Subpart C, Table C-2 (1,026 BTU/scf; 53.02 kg/MMBTU ==> 119,926.98 lb/MMscf).
6. N2O emission factor based on 40 CFR 98, Subpart C, Table C-2 (1,026 BTU/scf; 0.0001 kg/MMBTU ==> 0.23 lb/MMscf).
7. Remaining emission factors were extracted from Section 1 of AP-42 (date 7/98): Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4.
Methane, Ethane, VOC, HAP, and Speciate VOC AP-42 emission factors were scaled based on the vendor data for HC: $EF_{Scaled} = (EF_{AP42})(EF_{HC}/EF_{THC-AP42})$

TABLE A-1
Potential to Emit
Basis
Project Increase

Emission Source				Material/Capacity		Operational Limits												Data Sources
ID	FIN	EPN	Description			Short-Term -- Material Flow			Short-Term -- Capacity			Annual Material Flow			Annual Utilization			
M&R03-PC	M&R03-PC-NG	M&R03-PC-NG	Piping Components	Natural Gas		Valves: 141; Connectors: 0; Flanges: 706; Open-Ended Lines: 42; Pump Seals: 0; Other (blowdown valves, relief valves, and compressor seals): 6												TABLE B-1
	M&R03-PC-PL	M&R03-PC-PL	Piping Components	Pipeline liquids-Condensate		Valves: 54; Connectors: 276; Flanges: 0; Open-Ended Lines: 17; Pump Seals: 0; Other (blowdown valves, relief valves, and compressor seals): 0												TABLE B-2
M&R03-GR	M&R03-GR-ST	M&R03-GR-ST	Gas Release Events	Natural Gas		Natural Gas	32,657	scfh				Natural Gas	372,131	scf/yr	Runtime	N/A		TABLE C-1
	M&R03-GR-PL	M&R03-GR-PL	Gas Release Events	Natural Gas														
MR03-V01	MR03-V01	MR03-V01	Storage Tank	1,000	gal	Pipeline Liquids	1,000	gal/hr				Pipeline Liquids	4,000	gal/yr	Runtime	N/A		TABLE E-2
M&R03-TL-PL	M&R03-TL-PL	M&R03-TL-PL	Truck Loading Area	1,000	gph	Pipeline Liquids	1,000	gal/hr				Pipeline Liquids	4,000	gal/yr	Runtime	N/A		TABLE E-3
M&R03-EGEN01	M&R03-EGEN01	M&R03-EGEN01	Emergency Generator	265	bhp	Natural Gas	2,245	scfh	Power Output	265	bhp	Natural Gas	1,122,440	scf/yr	Runtime	500	hrs/yr	TABLE F-1
M&R03-HIG-01	M&R03-HIG-01	M&R03-HIG-01	Heating Device	0.0006	MMBTU/hr (output)	Natural Gas	0.93	scfh	Heat Input	0.0009	MMBTU/hr	Natural Gas	7,729	scf/yr	Runtime	8,760	hrs/yr	TABLE G-1

TABLE A-1
Potential to Emit
Emissions
Project Increase

Emission Source				Material/Capacity		Potential to Emit																						Data Sources
						CO_{2-e}		NO_X		CO		$PM_{10/2.5}$		SO_2		VOC (Total)		HAP (Total)		Benzene		Ethylbenzene		Hexane (n-)		Toluene		Xylenes		
ID	FIN	EPN	Description			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
M&R03-PC	M&R03-PC-NG	M&R03-PC-NG	Piping Components	Natural Gas		63.280	230.97									0.0465	0.1698	0.0038	0.0140	0.0014	0.0050	0.0000	0.0001	0.0014	0.0049	0.0009	0.0032	0.0002	0.0009	TABLE B-1
	M&R03-PC-PL	M&R03-PC-PL	Piping Components	Pipeline liquids-Condensate		0.7107	2.5940									0.5389	1.9669	0.0774	0.2825	0.0078	0.0284	0.0025	0.0092	0.0093	0.0339	0.0238	0.0870	0.0338	0.1235	TABLE B-2
M&R03-GR	M&R03-GR-ST	M&R03-GR-ST	Gas Release Events	Natural Gas		35,238	197.36									38.830	0.1451	3.2097	0.0120	1.1326	0.0042	0.0278	0.0001	1.1297	0.0042	0.7247	0.0027	0.1948	0.0007	TABLE C-1
	M&R03-GR-PL	M&R03-GR-PL	Gas Release Events	Natural Gas																									
MR03-V01	MR03-V01	MR03-V01	Storage Tank	Flash		6,244.0	12.488									250.51	0.5010	14.976	0.0300	3.0579	0.0061	0.1653	0.0003	10.7758	0.0216	3.7576	0.0075	2.2272	0.0045	TABLE D-4
				Storage		669.28	5.7092									12.398	0.1058	0.7722	0.0066	0.1868	0.0016	0.0059	0.0001	0.3579	0.0031	0.1695	0.0014	0.0505	0.0004	TABLE E-2
M&R03-TL-PL	M&R03-TL-PL	M&R03-TL-PL	Truck Loading Area	1,000	gph	477.16	0.6414									8.8391	0.0119	0.5506	0.0007	0.1331	0.0002	0.0042	5.66E-06	0.2552	0.0003	0.1208	0.0002	0.0360	4.84E-05	TABLE E-3
M&R03-EGEN01	M&R03-EGEN01	M&R03-EGEN01	Emergency Generator	265	bhp	288.13	72.032	11.982	2.9956	1.4781	0.3695	0.1106	0.0277	0.0013	0.0003	0.0717	0.0179	0.0476	0.0119	0.0012	0.0003	0.0001	1.62E-05	0.0003	0.0001	0.0006	0.0001	0.0002	4.01E-05	TABLE F-1
M&R03-HIG-01	M&R03-HIG-01	M&R03-HIG-01	Heating Device	0.0006	MMBTU/hr (output)	0.1130	0.4715	6.8E-05	0.0003	0.0011	0.0045	7.04E-06	2.94E-05	5.56E-07	2.32E-06	0.0002	0.0007	6.10E-05	0.0003	6.78E-08	2.83E-07			5.81E-05	0.0002	1.10E-07	4.58E-07			TABLE G-1
				TOTAL		**42,981**	**522.27**	**11.982**	**2.9958**	**1.4791**	**0.3740**	**0.1106**	**0.0277**	**0.0013**	**0.0003**	**311.24**	**2.9191**	**19.638**	**0.3579**	**4.5206**	**0.0458**	**0.2058**	**0.0098**	**12.5295**	**0.0683**	**4.7979**	**0.1021**	**2.5428**	**0.1301**	

TABLE B-1
Piping Components
Hourly and Annual Emission Estimates - Project

Source			M&R03-PC-NG			
Service			Gas			
			Natural Gas			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	141 components			
		Emission Factor	4.50E-03 kg/hr/component			
	Connectors	Count	0 components			
		Emission Factor	2.00E-04 kg/hr/component			
	Flanges	Count	706 components			
		Emission Factor	3.90E-04 kg/hr/component			
	Open-Ended Lines	Count	42 components			
		Emission Factor	2.00E-03 kg/hr/component			
	Pump Seals	Count	0 components			
		Emission Factor	2.40E-03 kg/hr/component			
	Other	Count	6 components	**Emissions**		
		Emission Factor	8.80E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}		2285.41% by weight	52.7336 lb/hr	230.9733 tpy	63.2803 lb/hr
	CO_2		1.33% by weight	0.0307 lb/hr	0.1347 tpy	0.0369 lb/hr
	TOC (Total)		97.62% by weight	2.2526 lb/hr	9.8663 tpy	2.7031 lb/hr
	Methane		91.36% by weight	2.1081 lb/hr	9.2335 tpy	2.5297 lb/hr
	Ethane		4.58% by weight	0.1057 lb/hr	0.4629 tpy	0.1268 lb/hr
	VOC (Total)		1.68% by weight	0.0388 lb/hr	0.1698 tpy	0.0465 lb/hr
	VOC (non-HAP)		1.54% by weight	0.0356 lb/hr	0.1558 tpy	0.0427 lb/hr
	HAP (Total)		0.14% by weight	0.0032 lb/hr	0.0140 tpy	0.0038 lb/hr
	Benzene		0.05% by weight	1.13E-03 lb/hr	4.95E-03 tpy	1.36E-03 lb/hr
	Ethylbenzene		0.00% by weight	2.78E-05 lb/hr	1.22E-04 tpy	3.34E-05 lb/hr
	Hexane (n-)		0.05% by weight	1.13E-03 lb/hr	4.94E-03 tpy	1.35E-03 lb/hr
	Methanol					
	Naphthalene					
	Toluene		0.03% by weight	7.24E-04 lb/hr	3.17E-03 tpy	8.68E-04 lb/hr
	Trimethylpentane (2,2,4-)					
	Xylenes		0.01% by weight	1.95E-04 lb/hr	8.52E-04 tpy	2.33E-04 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017).
The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings (P2).
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on gas analysis used to estimate gas release annual emissions (TABLE C-1).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.
6. Considered new fugitive components at M&R03

TABLE B-2(a)
Piping Components
Hourly and Annual Emission Estimates - Project

Source			M&R03-PC-PL			
Service			Light Oil			
			Condensate-liquid			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	48 components			
		Emission Factor	2.50E-03 kg/hr/component			
	Connectors	Count	263 components			
		Emission Factor	2.10E-04 kg/hr/component			
	Flanges	Count	0 components			
		Emission Factor	1.10E-04 kg/hr/component			
	Open-Ended Lines	Count	17 components			
		Emission Factor	1.40E-03 kg/hr/component			
	Pump Seals	Count	0 components			
		Emission Factor	1.30E-02 kg/hr/component			
	Other	Count	0 components	**Emissions**		
		Emission Factor	7.50E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}		0.96% by weight	0.0042 lb/hr	0.0184 tpy	0.0051 lb/hr
	CO_2		0.01% by weight	0.0001 lb/hr	0.0003 tpy	0.0001 lb/hr
	TOC (Total)		99.99% by weight	0.4387 lb/hr	1.9216 tpy	0.5265 lb/hr
	Methane		0.04% by weight	0.0002 lb/hr	0.0007 tpy	0.0002 lb/hr
	Ethane		0.09% by weight	0.0004 lb/hr	0.0017 tpy	0.0005 lb/hr
	VOC (Total)		99.86% by weight	0.4382 lb/hr	1.9191 tpy	0.5258 lb/hr
	VOC (non-HAP)					
	HAP (Total)		14.54% by weight	0.0638 lb/hr	0.2795 tpy	0.0766 lb/hr
	Benzene		1.44% by weight	6.32E-03 lb/hr	2.77E-02 tpy	7.58E-03 lb/hr
	Ethylbenzene		0.48% by weight	2.09E-03 lb/hr	9.15E-03 tpy	2.51E-03 lb/hr
	Hexane (n-)		1.69% by weight	7.43E-03 lb/hr	3.25E-02 tpy	8.92E-03 lb/hr
	Methanol					
	Naphthalene					
	Toluene		4.49% by weight	1.97E-02 lb/hr	8.63E-02 tpy	2.36E-02 lb/hr
	Trimethylpentane (2,2,4-)		0.03% by weight	1.13E-04 lb/hr	4.96E-04 tpy	1.36E-04 lb/hr
	Xylenes		6.42% by weight	2.82E-02 lb/hr	1.23E-01 tpy	3.38E-02 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017).
The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings (P2).
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on composition estimate (TABLE E-1).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.
6. Considered new fugitive components at M&R03

TABLE B-2(b)
Piping Components
Hourly and Annual Emission Estimates - Project

Source			M&R03-PC-PL			
Service			Light Oil			
			Condensate-vapor			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	6 components			
		Emission Factor	2.50E-03 kg/hr/component			
	Connectors	Count	13 components			
		Emission Factor	2.10E-04 kg/hr/component			
	Flanges	Count	0 components			
		Emission Factor	1.10E-04 kg/hr/component			
	Open-Ended Lines	Count	0 components			
		Emission Factor	1.40E-03 kg/hr/component			
	Pump Seals	Count	0 components			
		Emission Factor	1.30E-02 kg/hr/component			
	Other	Count	0 components	**Emissions**		
		Emission Factor	7.50E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}		1504.37% by weight	0.5880 lb/hr	2.5755 tpy	0.7056 lb/hr
	CO_2		2.18% by weight	0.0009 lb/hr	0.0037 tpy	0.0010 lb/hr
	TOC (Total)		97.82% by weight	0.0382 lb/hr	0.1675 tpy	0.0459 lb/hr
	Methane		60.09% by weight	0.0235 lb/hr	0.1029 tpy	0.0282 lb/hr
	Ethane		9.86% by weight	0.0039 lb/hr	0.0169 tpy	0.0046 lb/hr
	VOC (Total)		27.87% by weight	0.0109 lb/hr	0.0477 tpy	0.0131 lb/hr
	VOC (non-HAP)					
	HAP (Total)		1.74% by weight	0.0007 lb/hr	0.0030 tpy	0.0008 lb/hr
	Benzene		0.42% by weight	1.64E-04 lb/hr	7.19E-04 tpy	1.97E-04 lb/hr
	Ethylbenzene		0.01% by weight	5.19E-06 lb/hr	2.27E-05 tpy	6.23E-06 lb/hr
	Hexane (n-)		0.80% by weight	3.14E-04 lb/hr	1.38E-03 tpy	3.77E-04 lb/hr
	Methanol					
	Naphthalene					
	Toluene		0.38% by weight	1.49E-04 lb/hr	6.52E-04 tpy	1.79E-04 lb/hr
	Trimethylpentane (2,2,4-)		0.00% by weight	1.51E-06 lb/hr	6.62E-06 tpy	1.81E-06 lb/hr
	Xylenes		0.11% by weight	4.44E-05 lb/hr	1.94E-04 tpy	5.32E-05 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017).
The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts based on design drawings (P2).
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on vapor composition estimate (TABLE E-1).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative.
6. Considered new fugitive components at M&R03

TABLE C-1
Gas Releases
Hourly and Annual Emission Estimates
(Project)

Category	Station Operations					
Source	M&R03-GR-ST			M&R03-GR-PL		
	Avg. Hourly	Max. Annual	Max. Hourly	Avg. Hourly	Max. Annual	Max. Hourly
Gas Release	0 scfh	0 scf/yr	0 scfh	42.481 scfh	372,131 scf/yr	32,657 scfh
	0 lb/hr	0 lb/yr	0 lb/hr	1.9716 lb/hr	17,271 lb/yr	1,555 lb/hr
NO_X						
CO						
SO_2						
$PM_{10/2.5}$						
$CO_{2\text{-}e}$	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	45.058 lb/hr	197.36 tpy	35,238 lb/hr
CO_2	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0263 lb/hr	0.1151 tpy	20.7197 lb/hr
N_2O						
TOC (Total)	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	1.9247 lb/hr	8.4303 tpy	1,518 lb/hr
Methane	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	1.8013 lb/hr	7.8896 tpy	1,409 lb/hr
Ethane	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0903 lb/hr	0.3955 tpy	71 lb/hr
VOC (Total)	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0331 lb/hr	0.1451 tpy	38.8297 lb/hr
VOC (non-HAP)	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0304 lb/hr	0.1331 tpy	35.6200 lb/hr
HAP (Total)	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0027 lb/hr	0.0120 tpy	3.2097 lb/hr
Acetaldehyde						
Acrolein						
Benzene	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0010 lb/hr	0.0042 tpy	1.1326 lb/hr
Biphenyl						
Butadiene (1,3-)						
Carbon Tetrachloride						
Chlorobenzene						
Chloroform						
Dichloropropene (1,3-)						
Ethylbenzene	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0000 lb/hr	0.0001 tpy	0.0278 lb/hr
Ethylene Dibromide						
Formaldehyde						
Hexane (n-)	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0010 lb/hr	0.0042 tpy	1.1297 lb/hr
Methanol						
Methylene Chloride						
Methylnaphthalene (2-)						
Naphthalene						
PAH						
Phenol						
Propylene Oxide						
Styrene						
Tetrachloroethane (1,1,2,2-)						
Toluene	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0006 lb/hr	0.0027 tpy	0.7247 lb/hr
Trichloroethane (1,1,2-)						
Trimethylpentane (2,2,4-)						
Vinyl Chloride						
Xylenes	0.0000 lb/hr	0.0000 tpy	0.0000 lb/hr	0.0002 lb/hr	0.0007 tpy	0.1948 lb/hr

NOTES

1. Gas release estimates based on data for a similar compressor station.
2. Gas density is the value extracted from physical property estimation spreadsheets

Density (Lab):	0.0441 lb/scf				Density:
Density (GC - Avg+):	0.0464 lb/scf	Safety Factor (GC):	103%	Average Plus:	0.0464 lb/scf
Density (GC - Max):	0.0476 lb/scf			Maximum:	0.0476 lb/scf

3. As it will be assumed that Gas Chromatograph (GC) is more representative, the following is used to scaled the extended analysis (Lab).

				Average Plus	Maximum	VOC Specie Scaling:	
VOC (Lab):	0.00128 lb/scf	VOC:	GC	0.00074 lb/scf	0.00110 lb/scf	Average Plus:	58%
	2.91% wt%		Use	1.68% wt%	2.50% wt%	Maximum:	86%
Methane (Lab):	90.19% wt%	Methane (Use):		91.36% wt%	90.59% wt%		
Ethane (Lab):	4.52% wt%	Ethane (Use):		4.58% wt%	4.54% wt%		

TABLE C-2
Summary of Gas Release Volumes - Project

Category	Event Information					Gas Release		
	Description		Gas Release	Frequency		Release	Hourly	Annual
	Type	ID	(scf/event)	(hr^{-1})	(yr^{-1})	Point	(scf/hr)	(scf/yr)
Blowdown	Pipeline	M&R	30,690	1	5	M&R	30,690	153,452
Purge	Pipeline	M&R	1,071	1	5	M&R	1,071	5,355
Actuation	Pipeline	30" Line to Filter/Separator	13	4	365	TBD	51	4,650
Actuation	Pipeline	30" line to compressor station-1	13	4	365	TBD	51	4,650
Actuation	Pipeline	To Nexus Pipeline	13	4	365	RCV129A	51	4,650
Actuation	Pipeline	Regulator Run	2	4	365	PM122A	8	741
Actuation	Pipeline	Regulator Run	2	4	365	PCV122A	8	741
Actuation	Pipeline	Regulator Run	2	4	365	PM122B	8	741
Actuation	Pipeline	Regulator Run	2	4	365	PCV122B	8	741
Actuation	Pipeline	Meter Skid	148	4	365	FV120B	592	54,050
Actuation	Pipeline	Regulator Run	148	4	365	RSIV123A	592	54,050
Actuation	Pipeline	Regulator Run	148	4	365	RSIV123B	592	54,050
Vent	Pipeline	Gas Chromatograph Building	1	4	35,040	GC Building	4	34,261
Station Operations							0	0
Pipeline Operations							32,657	372,131

NOTES

1. Data extracted from TABLE C-3, TABLE C-4, TABLE C-5, and TABLE C-6.
2. For pipeline and station yard blowdowns and purges it is assumed that only a blowdown or purge can take place at any segment of pipeline in any 1-hour period.

Pipeline Blowdown
Purge

TABLE C-3
Blowdown - Project

Piping Description						Initial Conditions			Final Conditions			Event[2]		Gas Release Data		
Location Description			Diameter (in)		Length	Volume	Press.	Temp.	Press.	Temp.	Volume[1]	Frequency		Hourly	Annual	Release
General	Location		nom.	act.	(ft)	(ft^3)	(psig)	(°F)	(psig)	(°F)	(scf)	(hr^{-1})	(yr^{-1})	(scf/hr)	(scf/yr)	Point
Pipeline	M&R	Pipeline from Meter Skid to Regulator	20	19.00	36.00	71	750	50	0	68	4,404	1	5	4,404	22,020	Pipeline - M&R
Pipeline	M&R	Meter Skids	12	11.75	48.00	36	750	50	0	68	2,246	1	5	2,246	11,228	
Pipeline	M&R	Regulatro Skid	16	15.00	24.00	29	750	50	0	68	1,830	1	5	1,830	9,149	
Pipeline	M&R	Pipeline f/s to meter runs	30	29.00	24.00	110	750	50	0	68	6,840	1	5	6,840	34,198	
Pipeline	M&R	Pipeline from f/s to tank	2	1.94	30.00	1	750	50	0	68	38	1	5	38	191	
Pipeline	M&R	Filter/Separator				246	750	50	0	68	15,273	1	5	15,273	76,367	
Pipeline	M&R	Pipeline from/to Heater Skids	1	0.96	192.00	1	750	50	0	68	60	1	5	60	298	
Pipeline - M&R		TOTAL			354.00	493.97	750	50			30,690	1	5	30,690.32	153,451.62	

NOTES

1. Final volume calculated using ideal gas law $[(PV/ZT)_i = (PV/ZT)_f]$. $V_f = V_i (P_i/P_f) (T_f/T_i) (Z_f/Z_i)$, where Z is estimated using the following equation: $Z = 0.9994 - 0.0002P + 3E\text{-}08P^2$.
2. The frequency of events is based on operator experience as to what would reasonably constitute a worst-case scenario.
3. Blowdown of the affected Launcher/Receiver barrel is included with the blowdown of the piping in the Launcher/Receiver Area.
4. For conservatism assumed all lines are blown down simultaneously.
5. Blowdown emissions are from new sources located at M&R03 Station.

TABLE C-4
Purge and Drain - Project

Piping Description		Purge Valve Data		Gas Stream Data											Miscellaneous Factors[3,4,5]					Purge Data[6,7]		Event[8]			Gas Release Data		
General	Location	ID	Type	Throat Cross-Section			Upstream Data				Critical Flow Data[1,2]					Discharge	Adjustment Factors				Fractional	Gas Flow	Frequency		Duration	Hourly	Annual	Release
				Diameter		Area	Pressure		Temp.		Absolute Press.		Absolute Temp.		Velocity	Coefficien					Amount	Rate						Point
				nom.	act.	**A**	$\mathbf{P_o}$		$\mathbf{T_o}$		Ratio	$\mathbf{P_c}$	Ratio	$\mathbf{T_c}$		$\mathbf{v_c}$	$\mathbf{C_d}$	Valve	Pressure	Temp.	Expansion	Valve	(scf/sec)	(hr^{-1})	(yr^{-1})	(sec)	(scf/hr)	(scf/yr)	
				(in)	(in)	(ft^2)	(psig)	(psia)	(°F)	(°R)	$\mathbf{R_{cp}}$ $R_{ct}^{(k/(k-1))}$	P_oR_{cp} (psia)	$\mathbf{R_{ct}}$ 2/(k+1)	(T_o R_{ct}) (°F)	(T_o R_{ct}) (°R)	(ft/sec)	(n.d.)	Type $\mathbf{F_{vt}}$ (n.d.)	$\mathbf{F_P}$ (P_c/P_{STP})	$\mathbf{F_T}$ (T_{STP}/T_c)	$\mathbf{F_Z}$ (Z_{STP}/Z_c)	Opened $\mathbf{f_{open}}$ (n.d.)							
Pipeline	M&R	M&R	Plug	2.0	1.939	0.0205	9	23.7	50	510	0.5439	12.89	0.8658	-18.44	441.56	1,273.75	0.98	0.40	0.8750	1.1958	0.9996	100%	11	1	5	100	1,071	5,355	M&R

NOTES

1. The ratio of specific heats for natural gas is assumed to be 1.31 (n.d.).
2. Critical velocity is estimated using the following equation: $(k\ g_c R/M)^{0.5}$. Where, g = acceleration due to gravity = 32.174 ft/sec^2
   R = universal gas constant = 1,545 (ft lb)/(lb-mol °R)
   M = molecular weight of gas = 17.7224 lb/lb-mol {TABLE C-7}
3. Discharge coefficient.
4. Valve type adjustment factor.
5. Expansion adjustment factor is estimated using the following equation: $Z = 0.9994 - 0.0002P + 3E\text{-}08P^2$
6. The fractional amount that the valve is opened is based on operator experience as to what would reasonably constitute a worst-case scenario.
7. The purge gas flow rate is estimated using the following equation: $C_d A\ v_c\ F_p\ F_t\ Y\ f_{open}\ F_{vt}$.
8. The frequency and duration of events is based on operator experience as to what would reasonably constitute a worst-case scenario.
9. Gas releases from Low Point Drains are not included if there were no modifications to these drains/valves.

TABLE C-5
Pneumatic - Project

Description				Pneumatic Device				Power Gas					Event			Gas Release Data		
Location Description		Dia.	ID	Vendor	Description		Detail	Pressure		Gas per 90° Stroke		Flow	Frequency		Duration	Hourly	Annual	Release
General	Location	(in.)			Major	Minor		(psig)	(psia)	(scf/psia)	(scf)	(scfm)	(hr^{-1})	(yr^{-1})	(sec)	(scf/hr)	(scf/yr)	Point
Pipeline	30" Line to Filter/Separator	30	TBD	Shafer	Actuator	14.5x16	14.5x16	125	140	0.0912	13		4	365	32	51	4650	TBD
Pipeline	30" line to compressor station-1	30	TBD	Shafer	Actuator	14.5x16	14.5x16	125	140	0.0912	13		4	365	32	51	4650	TBD
Pipeline	To Nexus Pipeline	30	RCV129A	Shafer	Actuator	14.5x16	14.5x16	125	140	0.0912	13		4	365	32	51	4650	RCV129A
Pipeline	Regulator Run	16	PM122A	Becker	Actuator		QTCV-T1DB	125	140	0.0145	2		4	365		8	741	PM122A
Pipeline	Regulator Run	16	PCV122A	Becker	Actuator		QTCV-T1DB	125	140	0.0145	2		4	365		8	741	PCV122A
Pipeline	Regulator Run	16	PM122B	Becker	Actuator		QTCV-T1DB	125	140	0.0145	2		4	365		8	741	PM122B
Pipeline	Regulator Run	16	PCV122B	Becker	Actuator		QTCV-T1DB	125	140	0.0145	2		4	365		8	741	PCV122B
Pipeline	Meter Skid	12	FV120B	Bettis	Actuator	G8040	G8040	125	140	1.0600	148		4	365		592	54050	FV120B
Pipeline	Regulator Run	20	RSIV123A	Bettis	Actuator	G8040	G8040	125	140	1.0600	148		4	365		592	54050	RSIV123A
Pipeline	Regulator Run	20	RSIV123B	Bettis	Actuator	G8040	G8040	125	140	1.0600	148		4	365		592	54050	RSIV123B

NOTES

1. Vendor literature to support the estimation of gas consumption and event duration. A 90° stroke is sufficient to open or close a valve.
2. For regulators that are the spring and diaphragm type, gas venting would only occur if spring tears diaphragm.
3. The frequency of events is based on a conservative overestimation.
4. Assuming that valves with 30" diameters have typical Shafer model number 14.5x16 operato

TABLE C-6
Gas Chromatograph - Project

Description			Chromatog	Initial Conditions			Final Conditions			Event		Gas Release Data		
Location Description			Vendor	Volume	Press.	Temp.	Press.	Temp.	Volume	Frequency		Hourly	Annual	Release
General	Location	ID		(ft3)	(psig)	(°F)	(psig)	(°F)	(scf)	(hr^{-1})	(yr^{-1})	(scf/hr)	(scf/yr)	Point
Pipeline	Gas Chromatograph Building	TBD	ABB	0.0092	1,200	50	0	68	1	4	35,040	4	34,261	GC Building

NOTES

1. Gas Chromatograph emissions are based on vendor provided total vent volume (includes purge and sample release).

TABLE C-7
Natural Gas
Physical Property Estimations

Component				Molecular Weight M_i $(lb/lb\text{-}mol)_i$	Vapor Density ρ_i $(lb/scf)_i$	Stream		
Name (i)	Formula	Type	HAP			Mole Fraction $f_{n\text{-}i}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $f_{m\text{-}i}$ $(f_{n\text{-}i}M_i)/\Sigma(f_{n\text{-}i}M_i)$ (lb_i/lb_T)	Volume Fraction $f_{v\text{-}i}$ $f_{m\text{-}i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Nitrogen	N2			28.013	0.0727	0.632%	1.044%	0.633%
Carbon Dioxide	CO2	GHG		44.010	0.1143	0.514%	1.332%	0.514%
Methane	C01H04	GHG		16.042	0.0417	95.390%	90.193%	95.447%
Ethane	C02H06			30.069	0.0781	2.551%	4.522%	2.553%
Propane	C03H08	VOC		44.096	0.1145	0.449%	1.167%	0.449%
Butane (i-)	C04H10	VOC		58.122	0.1509	0.097%	0.333%	0.097%
Butane (n-)	C04H10	VOC		58.122	0.1509	0.114%	0.391%	0.114%
Cyclopentane	C05H10	VOC		70.133	0.1821	0.002%	0.007%	0.002%
Pentane (i-)	C05H12	VOC		72.149	0.1873			
Pentane (i-)	C05H12	VOC		72.149	0.1873			
Pentane (n-)	C05H12	VOC		72.149	0.1873	0.041%	0.176%	0.041%
Benzene	C06H06	VOC	X	78.112	0.2028	0.018%	0.085%	0.018%
Cyclohexane	C06H12	VOC		84.159	0.2185	0.007%	0.035%	0.007%
Methylcyclopentane	C06H12	VOC		84.159	0.2185	0.005%	0.026%	0.005%
Dimethylbutane (2,2-)	C06H14	VOC		86.175	0.2238	0.004%	0.019%	0.004%
Dimethylbutane (2,3-)	C06H14	VOC		86.175	0.2238	0.003%	0.014%	0.003%
Hexane (n-)	C06H14	VOC	X	86.175	0.2238	0.017%	0.085%	0.017%
Methylpentane (2-)	C06H14	VOC		86.175	0.2238	0.014%	0.073%	0.014%
Methylpentane (3-)	C06H14	VOC		86.175	0.2238	0.009%	0.044%	0.009%
Toluene	C07H08	VOC	X	92.138	0.2392	0.010%	0.054%	0.010%
Cycloheptane	C07H14	VOC		98.186	0.2549			
Dimethylcyclopentane (1,1-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Dimethylcyclopentane (1,c-2-)	C07H14	VOC		98.186	0.2549			
Dimethylcyclopentane (1,c-3-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Dimethylcyclopentane (1,t-2-)	C07H14	VOC		98.186	0.2549	0.001%	0.006%	0.001%
Dimethylcyclopentane (1,t-3-)	C07H14	VOC		98.186	0.2549	0.001%	0.004%	0.001%
Ethylcyclopentane	C07H14	VOC		98.186	0.2549	0.000%	0.002%	0.000%
Methylcyclohexane	C07H14	VOC		98.186	0.2549	0.007%	0.042%	0.007%
Dimethylpentane (2,2-)	C07H16	VOC		100.202	0.2602	0.001%	0.006%	0.001%
Dimethylpentane (2,3-)	C07H16	VOC		100.202	0.2602	0.002%	0.010%	0.002%
Dimethylpentane (2,4-)	C07H16	VOC		100.202	0.2602	0.001%	0.006%	0.001%
Dimethylpentane (3,3-)	C07H16	VOC		100.202	0.2602	0.001%	0.004%	0.001%
Ethylpentane (3-)	C07H16	VOC		100.202	0.2602	0.000%	0.002%	0.000%
Heptane (n-)	C07H16	VOC		100.202	0.2602	0.009%	0.055%	0.009%
Methylhexane (2-)	C07H16	VOC		100.202	0.2602	0.005%	0.031%	0.005%
Methylhexane (3-)	C07H16	VOC		100.202	0.2602	0.005%	0.030%	0.005%
Trimethylbutane (2,2,3-)	C07H16	VOC		100.202	0.2602	0.001%	0.004%	0.001%
Ethylbenzene	C08H10	VOC	X	106.165	0.2757	0.000%	0.002%	0.000%
Xylene (m-)	C08H10	VOC	X	106.165	0.2757	0.001%	0.006%	0.001%
Xylene (o-)	C08H10	VOC	X	106.165	0.2757	0.000%	0.002%	0.000%
Xylene (p-)	C08H10	VOC	X	106.165	0.2757	0.001%	0.006%	0.001%
Cyclooctane	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,1-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,c-2-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Dimethylcyclohexane (1,c-3-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Dimethylcyclohexane (1,c-4-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,t-2-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Dimethylcyclohexane (1,t-3-)	C08H16	VOC		112.213	0.2914			
Dimethylcyclohexane (1,t-4-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Ethylcyclohexane	C08H16	VOC		112.213	0.2914			

TABLE C-7
Natural Gas
Physical Property Estimations

Component				Molecular Weight	Vapor Density	Stream		
Name (i)	Formula	Type	HAP	$\mathbf{M_i}$ $(lb/lb\text{-}mol)_i$	$\boldsymbol{\rho_i}$ $(lb/scf)_i$	Mole Fraction $\mathbf{f_{n\text{-}i}}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $\mathbf{f_{m\text{-}i}}$ $(f_{n\text{-}i}M_i)/\sum(f_{n\text{-}i}M_i)$ (lb_i/lb_T)	Volume Fraction $\mathbf{f_{v\text{-}i}}$ $f_{m\text{-}i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Ethylcyclopentane (1-methyl-1-)	C08H16	VOC		112.213	0.2914			
Ethylcyclopentane (1-methyl-c-2-)	C08H16	VOC		112.213	0.2914	0.000%	0.002%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	C08H16	VOC		112.213	0.2914			
Ethylcyclopentane (1-methyl-t-2-)	C08H16	VOC		112.213	0.2914			
Propylcyclopentane (i-)	C08H16	VOC		112.213	0.2914			
Propylcyclopentane (n-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,1,2-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,1,3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,c-3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,t-3-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,c-2,t-4-)	C08H16	VOC		112.213	0.2914			
Trimethylcyclopentane (1,t-2,c-3-)	C08H16	VOC		112.213	0.2914	0.001%	0.004%	0.001%
Trimethylcyclopentane (1,t-2,c-4-)	C08H16	VOC		112.213	0.2914			
Dimethylhexane (2,2-)	C08H18	VOC		114.229	0.2966			
Dimethylhexane (2,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (2,4-)	C08H18	VOC		114.229	0.2966			
Dimethylhexane (2,5-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (3,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Dimethylhexane (3,4-)	C08H18	VOC		114.229	0.2966	0.001%	0.004%	0.001%
Ethylhexane (3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Methylheptane (2-)	C08H18	VOC		114.229	0.2966	0.002%	0.013%	0.002%
Methylheptane (3-)	C08H18	VOC		114.229	0.2966	0.003%	0.018%	0.003%
Methylheptane (4-)	C08H18	VOC		114.229	0.2966			
Octane (n-)	C08H18	VOC		114.229	0.2966	0.005%	0.034%	0.005%
Trimethylpentane (1,1,3-)	C08H18	VOC		114.229	0.2966	0.000%	0.002%	0.000%
Trimethylpentane (2,2,3-)	C08H18	VOC		114.229	0.2966			
Trimethylpentane (2,2,4-)	C08H18	VOC	X	114.229	0.2966			
Trimethylpentane (2,3,4-)	C08H18	VOC		114.229	0.2966			
Ethyltoluene (m-)	C09H12	VOC		120.192	0.3121			
Ethyltoluene (o-)	C09H12	VOC		120.192	0.3121			
Ethyltoluene (p-)	C09H12	VOC		120.192	0.3121			
Propylbenzene (i-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Propylbenzene (n-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Trimethylbenzene (1,2,4-)	C09H12	VOC		120.192	0.3121			
Trimethylbenzene (1,3,5-)	C09H12	VOC		120.192	0.3121	0.000%	0.002%	0.000%
Butylcyclopentane (n-)	C09H18	VOC		126.239	0.3278			
Methylcyclooctane	C09H18	VOC		126.239	0.3278			
Propylcyclohexane (i-)	C09H18	VOC		126.239	0.3278			
Propylcyclohexane (n-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,2-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,1,3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,c-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,c-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-2,t-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,c-3-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,c-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,t-2,t-4-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-3,c-5-)	C09H18	VOC		126.239	0.3278			
Trimethylcyclohexane (1,c-3,t-5-)	C09H18	VOC		126.239	0.3278			

TABLE C-7
Natural Gas
Physical Property Estimations

Component				Molecular Weight	Vapor Density	Stream		
Name (i)	Formula	Type	HAP	$\mathbf{M_i}$ $(lb/lb\text{-}mol)_i$	$\boldsymbol{\rho_i}$ $(lb/scf)_i$	Mole Fraction $\mathbf{f_{n\text{-}i}}$ $(lb\text{-}mol_i/lb\text{-}mol_T)$	Weight Fraction $\mathbf{f_{m\text{-}i}}$ $(f_{n\text{-}i}M_i)/\Sigma(f_{n\text{-}i}M_i)$ (lb_i/lb_T)	Volume Fraction $\mathbf{f_{v\text{-}i}}$ $f_{m\text{-}i}(\rho_i/\rho_T)$ (scf_i/scf_T)
Dimethylheptane (2,2-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,3-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (2,5-)	C09H20	VOC		128.255	0.3330			
Dimethylheptane (2,6-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (3,3-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Dimethylheptane (3,4-)	C09H20	VOC		128.255	0.3330			
Dimethylheptane (3,5-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Methyloctane (2-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Methyloctane (3-)	C09H20	VOC		128.255	0.3330	0.001%	0.005%	0.001%
Methyloctane (4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Nonane (n-)	C09H20	VOC		128.255	0.3330	0.002%	0.018%	0.002%
Trimethylhexane (2,2,3-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,2,4-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Trimethylhexane (2,2,5-)	C09H20	VOC		128.255	0.3330	0.000%	0.003%	0.000%
Trimethylhexane (2,3,3-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,3,4-)	C09H20	VOC		128.255	0.3330			
Trimethylhexane (2,3,5-)	C09H20	VOC		128.255	0.3330			
Butylbenzene (t-)	C10H14	VOC		134.218	0.3485			
Butylcyclohexane (i-)	C10H20	VOC		140.266	0.3642			
Butylcyclohexane (t-)	C10H20	VOC		140.266	0.3642			
Decane (n-)	C10H22	VOC		142.282	0.3694	0.001%	0.008%	0.001%
Dimethyloctane (2,2-)	C10H22	VOC		142.282	0.3694			
Dimethyloctane (2,3-)	C10H22	VOC		142.282	0.3694			
Dimethyloctane (3,3-)	C10H22	VOC		142.282	0.3694	0.000%	0.003%	0.000%
Ethyloctane (3-)	C10H22	VOC		142.282	0.3694			
Methylnonane (2-)	C10H22	VOC		142.282	0.3694	0.000%	0.003%	0.000%
Methylnonane (3-)	C10H22	VOC		142.282	0.3694			
Methylnonane (4-)	C10H22	VOC		142.282	0.3694			
Methylnonane (5-)	C10H22	VOC		142.282	0.3694			
Trimethylheptane (2,3,4-)	C10H22	VOC		142.282	0.3694			
Trimethylheptane (2,5,5-)	C10H22	VOC		142.282	0.3694			
Undecane (n-)	C11H24	VOC		156.308	0.4059	0.000%	0.003%	0.000%
Dodecane (n-)	C12H26	VOC		170.335	0.4423	0.000%	0.003%	0.000%
Tridecane (n-)	C13H28	VOC		184.361	0.4787			
Tetradecane (n-)	C14H30	VOC		198.388	0.5151			
Natural Gas				16.977	0.0441	99.940%	100.000%	100.000%
TOC (Total)				16.766	0.0435	98.794%	97.624%	98.853%
VOC (Total)				57.866	0.1503	0.853%	2.910%	0.854%
HAP (Total)				85.428	0.2218	0.048%	0.241%	0.048%
Xylenes				106.165	0.2757	0.002%	0.015%	0.002%

NOTES

1. Vapor density is estimated using the ideal gas law (PV = nRT = (m/M)RT OR ρ = RPT/M), where R = 10.73164 (psia ft^3)/(lb-mol °R).
2. Standard conditions 68 °F
   14.696 psia
3. Mole percentages from analysis on Various of sample collected at Meter Station Avg. Results (3 Most Representative Samples).
The sample is assumed to be representative of the actual gas composition at M&&R03 Station

TABLE D-1
Flash Analysis
Summary of Laboratory Analysis

	FEED Pressurized Liquid	VAPOR Flash Gas	LIQUID Residual Liquid
Pressure	575.000 psig	0.034 psig	0.034 psig
	589.696 psia	14.730 psia	14.730 psia
Temperature	72 °F	60 °F	60 °F
API Gravity at 60°F	73.960 n.d.	788.526 n.d.	61.227 n.d.
Specific Gravity at 60°F	0.6887 n.d. (water)	0.1538 n.d. (water)	0.7342 n.d. (water)
	3.3880 n.d. (air)	0.9301 n.d. (air)	4.4320 n.d. (air)
Molecular Weight	98.125 lb/lb-mol	26.938 lb/lb-mol	128.362 lb/lb-mol
Density at 60°F and 14.730 psia	5.747 lb/gal	1.283 lb/gal	6.126 lb/gal
	0.2593 lb/ft^3	0.0712 lb/ft^3	0.3392 lb/ft^3
	22.1622 ft^3/gal	18.0282 ft^3/gal	18.0610 ft^3/gal
	930.8120 ft^3/bbl	757.1853 ft^3/bbl	758.5600 ft^3/bbl
	378.4123 $ft^3/lb\text{-}mol$	378.4123 $ft^3/lb\text{-}mol$	378.4123 $ft^3/lb\text{-}mol$
	17.0747 gal/lb-mol	20.9900 gal/lb-mol	20.9520 gal/lb-mol
	2.4598 lb-mol/bbl	2.0010 lb-mol/bbl	2.0046 lb-mol/bbl
Density at 68°F and 14.696 psia	947.3299 scf/bbl	770.6220 scf/bbl	772.0211 scf/bbl
	385.1275 scf/lb-mol	385.1275 scf/lb-mol	385.1275 scf/lb-mol
	2.4598 lb-mol/bbl	2.0010 lb-mol/bbl	2.0046 lb-mol/bbl
Vapor to Liquid Mole Ratio (V/L)	0.4249 n.d. ($lb\text{-}mol_{VAPOR}/lb\text{-}mol_{LIQUID}$)		
Mole Balance	1.0000 bbl	0.3666 bbl	0.8612 bbl
	2.4598 lb-mol	0.7335 lb-mol	1.7263 lb-mol
	947.3299 scf	282.4903 scf	664.8396 scf
Flash Factor (FF)	328.0318 scf_{VAPOR}/bbl_{LIQUID}		

NOTES

1. Sample Data: Location: Atlanta, TX
   Date: 04/15/09
   Time: Not Recorded
2. Reference Conditions: SPL Standard
   T = 60 °F 68 °F
   P = 14.730 psia 14.696 psia
   Water 8.344 lb/gal 8.338 lb/gal
   Air 0.0765 lb/ft^3 0.0752 lb/ft^3
3. V + L = F => F = (1 + V/L)L {Overall Mole Balance}.

TABLE D-2
Flash Analysis
Extrapolation of Specie Mole Percentages

						Liquid Dump Flash Data				
						Input			Output	
						Liquid	Scaled	*Calculated*	Vapor	Liquid
Component						z_i		z_i	y_i	x_i
Name (i)	GC Postition	SPL Class	Formula	Type	HAP	(mol_{i-F}/mol_F)		(mol_{i-F}/mol_F)	(mol_{i-V}/mol_V)	(mol_{i-L}/mol_L)
Nitrogen	1		N2			0.034%	0.034%	0.030%	0.101%	0.000%
Carbon Dioxide	3		CO2	GHG		0.968%	0.968%	0.970%	3.163%	0.038%
Methane	2		C01H04	GHG		20.922%	20.922%	20.921%	69.445%	0.303%
Ethane	4		C02H06			3.391%	3.391%	3.390%	10.467%	0.383%
Propane	5		C03H08	VOC		2.183%	2.183%	2.180%	5.339%	0.838%
Butane (i-)	6		C04H10	VOC		1.232%	1.232%	1.230%	2.126%	0.849%
Butane (n-)	7		C04H10	VOC		1.721%	1.721%	1.720%	2.495%	1.391%
Pentane (i-)	8		C05H12	VOC		2.354%	2.354%	2.350%	1.895%	2.543%
Pentane (n-)	9		C05H12	VOC		1.622%	1.622%	1.620%	1.056%	1.859%
Dimethylbutane (2,2-)	10	Hexanes	C06H14	VOC		0.174%	0.174%	0.174%	0.050%	0.227%
Dimethylbutane (2,3-)	11	Hexanes	C06H14	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Cyclopentane	12	Hexanes	C05H10	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylpentane (2-)	13	Hexanes	C06H14	VOC		1.218%	1.218%	1.218%	0.352%	1.586%
Methylpentane (3-)	14	Hexanes	C06H14	VOC		0.912%	0.912%	0.912%	0.264%	1.187%
Hexane (n-)	15	Hexanes	C06H14	VOC	X	1.937%	1.937%	1.937%	0.561%	2.522%
Dimethylpentane (2,2-)	16	Heptanes	C07H16	VOC		0.311%	0.311%	0.311%	0.032%	0.430%
Methylcyclopentane	17	Heptanes	C06H12	VOC		1.134%	1.134%	1.134%	0.116%	1.566%
Dimethylpentane (2,4-)	18	Heptanes	C07H16	VOC		0.128%	0.128%	0.128%	0.013%	0.177%
Trimethylbutane (2,2,3-)	19	Heptanes	C07H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Benzene	20	Heptanes	C06H06	VOC	X	1.713%	1.713%	1.713%	0.175%	2.366%
Dimethylpentane (3,3-)	21	Heptanes	C07H16	VOC		0.221%	0.221%	0.221%	0.023%	0.305%
Cyclohexane	22	Heptanes	C06H12	VOC		1.106%	1.106%	1.106%	0.113%	1.528%
Methylhexane (2-)	23	Heptanes	C07H16	VOC		2.292%	2.292%	2.292%	0.235%	3.166%
Dimethylpentane (2,3-)	24	Heptanes	C07H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclopentane (1,1-)	25	Heptanes	C07H14	VOC		0.603%	0.603%	0.603%	0.062%	0.833%
Methylhexane (3-)	26	Heptanes	C07H16	VOC		2.379%	2.379%	2.379%	0.244%	3.286%
Dimethylcyclopentane (1,t-3-)	27	Heptanes	C07H14	VOC		0.163%	0.163%	0.163%	0.017%	0.225%
Dimethylcyclopentane (1,c-3-)	28	Heptanes	C07H14	VOC		0.266%	0.266%	0.266%	0.027%	0.367%
Ethylpentane (3-)	29	Heptanes	C07H16	VOC		0.029%	0.029%	0.029%	0.003%	0.040%
Dimethylcyclopentane (1,t-2-)	30	Heptanes	C07H14	VOC		0.222%	0.222%	0.222%	0.023%	0.307%
Trimethylpentane (2,2,4-)	31	Heptanes	C08H18	VOC	X	0.021%	0.021%	0.021%	0.002%	0.029%
Heptane (n-)	32	Heptanes	C07H16	VOC		3.742%	3.742%	3.742%	0.383%	5.169%
Methylcyclohexane	33	Octanes	C07H14	VOC		3.301%	3.301%	3.301%	0.136%	4.646%
Trimethylcyclopentane (1,1,3-)	34	Octanes	C08H16	VOC		0.225%	0.225%	0.225%	0.009%	0.317%
Dimethylhexane (2,2-)	35	Octanes	C08H18	VOC		0.095%	0.095%	0.095%	0.004%	0.134%
Dimethylcyclopentane (1,c-2-)	36	Octanes	C07H14	VOC		0.848%	0.848%	0.848%	0.035%	1.193%
Dimethylhexane (2,5-)	37	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,4-)	38	Octanes	C08H18	VOC		0.143%	0.143%	0.143%	0.006%	0.201%
Ethylcyclopentane	39	Octanes	C07H14	VOC		0.464%	0.464%	0.464%	0.019%	0.653%
Trimethylpentane (2,2,3-)	40	Octanes	C08H18	VOC		0.028%	0.028%	0.028%	0.001%	0.039%
Trimethylcyclopentane (1,t-2,c-4-)	41	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (3,3-)	42	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	43	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylpentane (2,3,4-)	44	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,3-)	45	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Toluene	46	Octanes	C07H08	VOC	X	4.444%	4.444%	4.444%	0.183%	6.255%
Trimethylcyclopentane (1,1,2-)	47	Octanes	C08H16	VOC		0.371%	0.371%	0.371%	0.015%	0.522%
Dimethylhexane (3,4-)	48	Octanes	C08H18	VOC		3.505%	3.505%	3.505%	0.144%	4.933%
Methylheptane (2-)	49	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylheptane (4-)	50	Octanes	C08H18	VOC		2.896%	2.896%	2.896%	0.119%	4.076%
Dimethylhexane (3,4-)	51	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylheptane (3-)	52	Octanes	C08H18	VOC		0.416%	0.416%	0.416%	0.017%	0.585%
Ethylhexane (3-)	53	Octanes	C08H18	VOC		0.111%	0.111%	0.111%	0.005%	0.156%
Trimethylcyclopentane (1,c-2,t-4-)	54	Octanes	C08H16	VOC		0.028%	0.028%	0.028%	0.001%	0.039%
Dimethylcyclohexane (1,c-3-)	55	Octanes	C08H16	VOC		0.170%	0.170%	0.170%	0.007%	0.239%
Trimethylcyclopentane (1,c-2,t-3-)	56	Octanes	C08H16	VOC		0.170%	0.170%	0.170%	0.007%	0.239%
Dimethylcyclohexane (1,t-4-)	57	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,5-)	58	Octanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,1-)	59	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	60	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	61	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	62	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,4-)	63	Octanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	64	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Cycloheptane	65	Octanes	C07H14	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Octane (n-)	66	Octanes	C08H18	VOC		4.372%	4.372%	4.372%	0.180%	6.153%
Trimethylhexane (2,4,4-)	67	Nonanes	C09H20	VOC		0.190%	0.190%	0.190%	0.003%	0.269%
Tetramethylpentane (2,2,4,4-)	68	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	69	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Dimethylcyclohexane (1,c-4-)	70	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Trimethylcyclopentane (1,c-2,c-3-)	71	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Propylcyclopentane (i-)	72	Nonanes	C08H16	VOC		0.348%	0.348%	0.348%	0.006%	0.493%
Trimethylhexane (2,3,5-)	73	Nonanes	C09H20	VOC		0.006%	0.006%	0.006%	0.000%	0.009%
Dimethylheptane (2,2-)	74	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,4-)	75	Nonanes	C09H20	VOC		0.158%	0.158%	0.158%	0.003%	0.224%
Methylcyclopentane (1-ethyl-c-2-)	76	Nonanes	C08H16	VOC		0.181%	0.181%	0.181%	0.003%	0.257%
Trimethylhexane (2,2,3-)	77	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%

TABLE D-2
Flash Analysis
Extrapolation of Specie Mole Percentages

Component						Liquid Dump Flash Data				
						Input			Output	
						Liquid	Scaled	*Calculated*	Vapor	Liquid
Name (i)	GC Postition	SPL Class	Formula	Type	HAP	z_i ($mol_{i\text{-}F}/mol_F$)		z_i ($mol_{i\text{-}F}/mol_F$)	y_i ($mol_{i\text{-}V}/mol_V$)	x_i ($mol_{i\text{-}L}/mol_L$)
Dimethylcyclohexane (1,c-2-)	78	Nonanes	C08H16	VOC		0.510%	0.510%	0.510%	0.009%	0.723%
Dimethylheptane (2,6-)	79	Nonanes	C09H20	VOC		0.112%	0.112%	0.112%	0.002%	0.159%
Propylcyclopentane (n-)	80	Nonanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	81	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclohexane	82	Nonanes	C08H16	VOC		1.365%	1.365%	1.365%	0.023%	1.935%
Dimethylheptane (2,5-)	83	Nonanes	C09H20	VOC		0.067%	0.067%	0.067%	0.001%	0.095%
Dimethylheptane (3,5-)	84	Nonanes	C09H20	VOC		0.067%	0.067%	0.067%	0.001%	0.095%
Trimethylcyclohexane (1,1,3-)	85	Nonanes	C09H18	VOC		0.077%	0.077%	0.077%	0.001%	0.109%
Trimethylhexane (2,3,3-)	86	Nonanes	C09H20	VOC		0.038%	0.038%	0.038%	0.001%	0.054%
Dimethylheptane (3,3-)	87	Nonanes	C09H20	VOC		0.038%	0.038%	0.038%	0.001%	0.054%
Trimethylcyclohexane (1,1,4-)	88	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Tetramethylpentane (2,2,3,3-)	89	Nonanes	C09H20	VOC		0.261%	0.261%	0.261%	0.004%	0.370%
Ethylbenzene	90	Nonanes	C08H10	VOC	X	0.406%	0.406%	0.406%	0.007%	0.576%
Trimethylhexane (2,3,4-)	91	Nonanes	C09H20	VOC		0.007%	0.007%	0.007%	0.000%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	92	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,3-)	93	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	94	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Xylene (m-)	95	Nonanes	C08H10	VOC	X	2.462%	2.462%	2.462%	0.042%	3.490%
Xylene (p-)	96	Nonanes	C08H10	VOC	X	2.462%	2.462%	2.462%	0.042%	3.490%
Dimethylheptane (3,4-)	97	Nonanes	C09H20	VOC		0.092%	0.092%	0.092%	0.002%	0.130%
Methyloctane (2-)	98	Nonanes	C09H20	VOC		0.782%	0.782%	0.782%	0.013%	1.109%
Methyloctane (4-)	99	Nonanes	C09H20	VOC		0.782%	0.782%	0.782%	0.013%	1.109%
Dimethylheptane (3,4-)	100	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methyloctane (3-)	101	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Butylcyclopentane (i-)	102	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	103	Nonanes	C09H18	VOC		0.231%	0.231%	0.231%	0.004%	0.327%
Trimethylcyclohexane (1,t-2,c-4-)	104	Nonanes	C09H18	VOC		0.231%	0.231%	0.231%	0.004%	0.327%
Xylene (o-)	105	Nonanes	C08H10	VOC	X	0.547%	0.547%	0.547%	0.009%	0.775%
Trimethylcyclohexane (1,1,2-)	106	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	107	Nonanes	C09H18	VOC		0.200%	0.200%	0.200%	0.003%	0.284%
Trimethylcyclohexane (1,c-2,c-4-)	108	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Nonane (n-)	109	Nonanes	C09H20	VOC		2.884%	2.884%	2.884%	0.050%	4.088%
Unknowns	110	Decanes+	C10+	VOC		10.753%	10.753%	10.753%	0.079%	15.288%
TOTAL						100.001%	100.000%	99.984%	100.001%	99.976%
TOC (Total)						98.999%	98.998%	98.984%	96.737%	99.938%
VOC (Total)						74.686%	74.685%	74.673%	16.825%	99.252%
Hexanes						4.241%	4.240%	4.241%	1.227%	5.521%
Heptanes						14.330%	14.310%	14.330%	1.468%	19.795%
Octanes						21.587%	21.610%	21.587%	0.888%	30.382%
Nonanes						14.663%	14.660%	14.663%	0.252%	20.786%
Decanes+						10.753%	10.770%	10.753%	0.079%	15.288%
HAP (Total)						13.992%	13.992%	13.992%	1.022%	19.503%
Xylenes						1.209%	1.209%	1.209%	0.021%	1.714%

NOTES

1. Sample Data: Location: Atlanta, TX
   Date: 04/15/09
   Dimethyloctane (2,3-) Time: Not Recorded
2. $v_i + l_i = f_i$; $y_i = v_i/V$; $x_i = l_i/L$; $z_i = f_i/F$ => $y_iV + x_iL = z_iF$ => $y_i(V/L)L + x_iL = z_i(1 + V/L)L$ => $z_i = [y_i(V/L) + x_i]/[1 + (V/L)]$ {Mole Balance}.
3. V/L = 0.4249 1 + V/L = 1.4249
4. z_i is refined to the same number if significant digits as y_i and x_i using the component mole balance and laboratory results for V/L.
5. z_i is scale using the hydrocarbon (e.g., hexanes+) z_i percentage in the flash analysis results, with the exception of HAP species.
6. $[y_i ; x_i]$ mole percent for species of hydrocarbons is estimated using scaled lab mole percent results for z_i and $[y ; x]_{HC}$ for the hydrocarbon.

(assumes v_i/l_i is same for all hydrocarbon species)

$(v/l)_{hexanes}$ = 0.2219

$y_{hexanes}$ = 1.227% $x_{hexanes}$ = 5.520% $z_{hexanes}$ = 4.240%

$y_i = z_i(y/z)_{hexanes}$ = 0.2894 z_i

$x_i = z_i(x/z)_{hexanes}$ = 1.3019 z_i

TABLE D-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular Weight	Density	Mole Percent	Weight Percent
Name (i)	Type	HAP	$(lb/mol)_i$	$(lb/scf)_i$	(mol_i/mol_T)	(lb_i/lb_T)
Nitrogen			28.013	0.0727	0.030%	0.009%
Carbon Dioxide	GHG		44.010	0.1143	0.970%	0.435%
Methane	GHG		16.042	0.0417	20.924%	3.421%
Ethane			30.069	0.0781	3.391%	1.039%
Propane	VOC		44.096	0.1145	2.181%	0.980%
Butane (i-)	VOC		58.122	0.1509	1.230%	0.729%
Butane (n-)	VOC		58.122	0.1509	1.720%	1.019%
Pentane (i-)	VOC		72.149	0.1873	2.350%	1.728%
Pentane (n-)	VOC		72.149	0.1873	1.620%	1.191%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.174%	0.153%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	1.218%	1.070%
Methylpentane (3-)	VOC		86.175	0.2238	0.912%	0.801%
Hexane (n-)	VOC	X	86.175	0.2238	1.937%	1.701%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.311%	0.318%
Methylcyclopentane	VOC		84.159	0.2185	1.134%	0.973%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.128%	0.131%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	1.713%	1.364%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.221%	0.226%
Cyclohexane	VOC		84.159	0.2185	1.106%	0.949%
Methylhexane (2-)	VOC		100.202	0.2602	2.292%	2.341%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.603%	0.603%
Methylhexane (3-)	VOC		100.202	0.2602	2.379%	2.430%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.163%	0.163%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.266%	0.266%
Ethylpentane (3-)	VOC		100.202	0.2602	0.029%	0.030%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.222%	0.222%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.021%	0.024%
Heptane (n-)	VOC		100.202	0.2602	3.743%	3.822%
Methylcyclohexane	VOC		98.186	0.2549	3.302%	3.304%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.225%	0.257%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.095%	0.111%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	0.848%	0.849%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.143%	0.166%
Ethylcyclopentane	VOC		98.186	0.2549	0.464%	0.464%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.028%	0.033%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE D-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	4.445%	4.174%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.371%	0.424%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	3.506%	4.081%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	2.896%	3.372%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.416%	0.484%
Ethylhexane (3-)	VOC		114.229	0.2966	0.111%	0.129%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.028%	0.032%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.170%	0.194%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.170%	0.194%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	4.373%	5.090%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.190%	0.248%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.053%	0.061%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.053%	0.061%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.053%	0.061%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.348%	0.398%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.006%	0.008%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.158%	0.207%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.181%	0.207%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.510%	0.583%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.112%	0.146%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	1.365%	1.561%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.067%	0.088%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.067%	0.088%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.077%	0.099%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.038%	0.050%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.038%	0.050%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE D-3a
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.261%	0.341%
Ethylbenzene	VOC	X	106.165	0.2757	0.406%	0.439%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.007%	0.009%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	2.462%	2.664%
Xylene (p-)	VOC	X	106.165	0.2757	2.462%	2.664%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.092%	0.120%
Methyloctane (2-)	VOC		128.255	0.3330	0.782%	1.022%
Methyloctane (4-)	VOC		128.255	0.3330	0.782%	1.022%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.231%	0.297%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.231%	0.297%
Xylene (o-)	VOC	X	106.165	0.2757	0.547%	0.592%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.200%	0.257%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	2.884%	3.770%
Unknowns	VOC		**283.704**	0.7366	10.755%	31.094%
Pressurized Liquid			98.125	0.2548	100.000%	100.000%
TOC (Total)			98.677	0.2562	99.000%	99.556%
VOC (Total)			124.943	0.3244	74.685%	95.096%
HAP (Total)			92.449	0.2400	7.356%	6.931%
Xylenes			106.165	0.2757	5.472%	5.920%

NOTES

1. Normalized mole percentages from TABLE D-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE D-1.

MW = 98.125 lb/lb-mol

TABLE D-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular Weight	Density	Mole Percent	Weight Percent
Name (i)	Type	HAP	$(lb/mol)_i$	$(lb/scf)_i$	(mol_i/mol_T)	(lb_i/lb_T)
Nitrogen			28.013	0.0727	0.101%	0.105%
Carbon Dioxide	GHG		44.010	0.1143	3.163%	5.167%
Methane	GHG		16.042	0.0417	69.444%	41.356%
Ethane			30.069	0.0781	10.467%	11.683%
Propane	VOC		44.096	0.1145	5.339%	8.739%
Butane (i-)	VOC		58.122	0.1509	2.126%	4.587%
Butane (n-)	VOC		58.122	0.1509	2.495%	5.383%
Pentane (i-)	VOC		72.149	0.1873	1.895%	5.075%
Pentane (n-)	VOC		72.149	0.1873	1.056%	2.828%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.050%	0.161%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	0.352%	1.128%
Methylpentane (3-)	VOC		86.175	0.2238	0.264%	0.844%
Hexane (n-)	VOC	X	86.175	0.2238	0.561%	1.793%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.032%	0.119%
Methylcyclopentane	VOC		84.159	0.2185	0.116%	0.363%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.013%	0.049%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	0.175%	0.509%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.023%	0.084%
Cyclohexane	VOC		84.159	0.2185	0.113%	0.354%
Methylhexane (2-)	VOC		100.202	0.2602	0.235%	0.873%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.062%	0.225%
Methylhexane (3-)	VOC		100.202	0.2602	0.244%	0.907%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.017%	0.061%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.027%	0.099%
Ethylpentane (3-)	VOC		100.202	0.2602	0.003%	0.011%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.023%	0.083%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.002%	0.009%
Heptane (n-)	VOC		100.202	0.2602	0.383%	1.426%
Methylcyclohexane	VOC		98.186	0.2549	0.136%	0.495%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.009%	0.039%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.004%	0.017%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	0.035%	0.127%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.006%	0.025%
Ethylcyclopentane	VOC		98.186	0.2549	0.019%	0.070%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.001%	0.005%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE D-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	0.183%	0.625%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.015%	0.064%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.144%	0.611%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	0.119%	0.505%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.017%	0.073%
Ethylhexane (3-)	VOC		114.229	0.2966	0.005%	0.019%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.001%	0.005%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.007%	0.029%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.007%	0.029%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	0.180%	0.763%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.003%	0.016%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.001%	0.004%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.001%	0.004%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.001%	0.004%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.006%	0.025%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.003%	0.013%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.003%	0.013%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.009%	0.037%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.002%	0.009%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	0.023%	0.098%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.001%	0.005%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.001%	0.005%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.001%	0.006%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.001%	0.003%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.001%	0.003%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE D-3b
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.004%	0.021%
Ethylbenzene	VOC	X	106.165	0.2757	0.007%	0.028%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.000%	0.001%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	0.042%	0.167%
Xylene (p-)	VOC	X	106.165	0.2757	0.042%	0.167%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.002%	0.008%
Methyloctane (2-)	VOC		128.255	0.3330	0.013%	0.064%
Methyloctane (4-)	VOC		128.255	0.3330	0.013%	0.064%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.004%	0.019%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.004%	0.019%
Xylene (o-)	VOC	X	106.165	0.2757	0.009%	0.037%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.003%	0.016%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	0.050%	0.236%
Unknowns	VOC		**473.700**	1.2300	0.079%	1.387%
Flash Gas			26.938	0.0699	100.000%	100.000%
TOC (Total)			26.379	0.0685	96.736%	94.728%
VOC (Total)			66.745	0.1733	16.825%	41.688%
HAP (Total)			88.115	0.2288	0.762%	2.492%
Xylenes			106.165	0.2757	0.094%	0.371%

NOTES

1. Normalized mole percentages from TABLE D-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE D-1, unless value negative.

MW = 26.938 lb/lb-mol

TABLE D-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular Weight	Density	Mole Percent	Weight Percent
Name (i)	Type	HAP	$(lb/mol)_i$	$(lb/scf)_i$	(mol_i/mol_T)	(lb_i/lb_T)
Nitrogen			28.013	0.0727	0.000%	0.000%
Carbon Dioxide	GHG		44.010	0.1143	0.038%	0.013%
Methane	GHG		16.042	0.0417	0.303%	0.038%
Ethane			30.069	0.0781	0.383%	0.090%
Propane	VOC		44.096	0.1145	0.838%	0.288%
Butane (i-)	VOC		58.122	0.1509	0.849%	0.385%
Butane (n-)	VOC		58.122	0.1509	1.391%	0.630%
Pentane (i-)	VOC		72.149	0.1873	2.544%	1.430%
Pentane (n-)	VOC		72.149	0.1873	1.859%	1.045%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.227%	0.152%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	1.586%	1.065%
Methylpentane (3-)	VOC		86.175	0.2238	1.188%	0.797%
Hexane (n-)	VOC	X	86.175	0.2238	2.522%	1.693%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.430%	0.335%
Methylcyclopentane	VOC		84.159	0.2185	1.567%	1.027%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.177%	0.138%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	2.367%	1.440%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.305%	0.238%
Cyclohexane	VOC		84.159	0.2185	1.528%	1.002%
Methylhexane (2-)	VOC		100.202	0.2602	3.167%	2.472%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.833%	0.637%
Methylhexane (3-)	VOC		100.202	0.2602	3.287%	2.566%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.225%	0.172%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.368%	0.281%
Ethylpentane (3-)	VOC		100.202	0.2602	0.040%	0.031%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.307%	0.235%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.029%	0.026%
Heptane (n-)	VOC		100.202	0.2602	5.170%	4.036%
Methylcyclohexane	VOC		98.186	0.2549	4.647%	3.555%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.317%	0.277%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.134%	0.119%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	1.194%	0.913%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.201%	0.179%
Ethylcyclopentane	VOC		98.186	0.2549	0.653%	0.500%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.039%	0.035%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE D-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	6.256%	4.491%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.522%	0.457%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	4.934%	4.391%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	4.077%	3.628%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.586%	0.521%
Ethylhexane (3-)	VOC		114.229	0.2966	0.156%	0.139%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.039%	0.034%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.239%	0.209%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.239%	0.209%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	6.155%	5.477%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.269%	0.269%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.075%	0.066%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.075%	0.066%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.075%	0.066%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.493%	0.431%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.009%	0.009%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.224%	0.224%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.257%	0.224%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.723%	0.632%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.159%	0.159%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	1.935%	1.692%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.095%	0.095%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.095%	0.095%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.109%	0.107%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.054%	0.054%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.054%	0.054%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE D-3c
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.370%	0.370%
Ethylbenzene	VOC	X	106.165	0.2757	0.576%	0.476%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.010%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	3.491%	2.887%
Xylene (p-)	VOC	X	106.165	0.2757	3.491%	2.887%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.130%	0.130%
Methyloctane (2-)	VOC		128.255	0.3330	1.109%	1.108%
Methyloctane (4-)	VOC		128.255	0.3330	1.109%	1.108%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.328%	0.322%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.328%	0.322%
Xylene (o-)	VOC	X	106.165	0.2757	0.776%	0.641%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.284%	0.279%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	4.089%	4.086%
Unknowns	VOC		**283.170**	0.7353	15.292%	33.734%
Residual Liquid			128.362	0.3333	100.000%	100.000%
TOC (Total)			128.394	0.3334	99.962%	99.987%
VOC (Total)			129.116	0.3353	99.276%	99.859%
HAP (Total)			92.587	0.2404	10.159%	7.327%
Xylenes			106.165	0.2757	7.757%	6.416%

NOTES

1. Normalized mole percentages from TABLE D-2 to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE D-1.

MW = 128.362 lb/lb-mol

TABLE D-4
Flash Analysis
Maximum Hourly and Annual Emission Estimates

Station ID	MR03-V01				
Service	Pipeline Liquids				
Liquids Holding Capacity	1,000 gal			1,000 gal	
Liquids Input Rate	4,000 gal/yr			1,000 gal/hr	
Flash Gas Density	0.0769 lb/scf			0.0769 lb/scf	
Flash Factor	328.03 scf/bbl			328.03 scf/bbl	
Flash Gas Rate	31,241 scf/yr			7,810 scfh	
Flash Losses	2,404 lb/yr	Average	Maximum	601 lb/hr	Maximum
Flash Gas	100.00% by weight	0.2744 lb/hr	1.2018 tpy	100.00% by weight	600.9213 lb/hr
CO_{2-e}	1039.07% by weight	2.8511 lb/hr	12.4880 tpy	1039.07% by weight	6,244.0081 lb/hr
CO_2	5.17% by weight	0.0142 lb/hr	0.0621 tpy	5.17% by weight	31.0522 lb/hr
TOC (Total)	94.73% by weight	0.2599 lb/hr	1.1385 tpy	94.73% by weight	569.2380 lb/hr
Methane	41.36% by weight	0.1135 lb/hr	0.4970 tpy	41.36% by weight	248.5182 lb/hr
Ethane	11.68% by weight	0.0321 lb/hr	0.1404 tpy	11.68% by weight	70.2082 lb/hr
VOC (Total)	41.69% by weight	0.1144 lb/hr	0.5010 tpy	41.69% by weight	250.5115 lb/hr
VOC (non-HAP)	39.20% by weight	0.1076 lb/hr	0.4711 tpy	9.19% by weight	55.2321 lb/hr
HAP (Total)	2.49% by weight	0.0068 lb/hr	0.0300 tpy	2.49% by weight	14.9762 lb/hr
Benzene	0.5089% by weight	0.0014 lb/hr	0.0061 tpy	0.5089% by weight	3.0579 lb/hr
Ethylbenzene	0.0275% by weight	0.0001 lb/hr	0.0003 tpy	0.0275% by weight	0.1653 lb/hr
Hexane (n-)	1.7932% by weight	0.0049 lb/hr	0.0216 tpy	1.7932% by weight	10.7758 lb/hr
Methanol					
Naphthalene					
Toluene	0.6253% by weight	0.0017 lb/hr	0.0075 tpy	0.6253% by weight	3.7576 lb/hr
Trimethylpentane (2,2,4-)	0.0091% by weight	0.0000 lb/hr	0.0001 tpy	0.0091% by weight	0.0548 lb/hr
Xylenes	0.3706% by weight	0.0010 lb/hr	0.0045 tpy	0.3706% by weight	2.2272 lb/hr

NOTES

1. Separator Characteristics:
   - Orientation: Vertical Fixed Roof Tank
   - Height/Length: 6.00 ft
   - Diameter: 5.33 ft
   - Capacity (physical): 1,000 gal
   - Capacity (liquid): 1,000 gal
2. Liquid input rates:
   - a. maximum hourly based on operator experience; 1,000 gal
   - b. maximum annual based on operating experience and safety factor; and 4,000 gal
   - c. average hourly is just the maximum annual divided by 8,760 hrs/yr.
3. Flash gas density is 110% of the value extracted from TABLE D-3b.
   Density (TABLE D-3b): 0.0699 lb/scf Safety Factor: 110%
4. Flash factor extracted from TABLE D-1.
5. Speciated emissions vapor weight percentages extracted from TABLE D-3b.
6. Included a conservative estimate of volume of liquids gathered at M&R03 station, from maintenance activities

TABLE E-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum			mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ M_i	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	**T** (°F)	P_i (psia)		(mol_i/mol_L) f_{v-i}	(lb_i/lb_L) f_{m-i}	(mol_i/mol_V)	(lb_i/lb_V)
Nitrogen			28.013	3.7362	2.6465E+02	-6.7880E+00	0.0000E+00	0.0000E+00	-345.75	-232.60	68.00			0.000%	0.000%	0.000%	0.000%
Carbon Dioxide	GHG		44.010	35.0169	-1.5119E+03	-1.1334E+01	9.3368E-03	1.7136E-09	-68.80	87.80	68.00	833.1743		0.038%	0.013%	1.087%	2.183%
Methane	GHG		16.042	14.6667	-5.7097E+02	-3.3373E+00	-2.1999E-09	1.3096E-05	-295.60	-115.60	68.00	7,889.8148		0.303%	0.038%	82.053%	60.088%
Ethane			30.069	20.6973	-1.1341E+03	-5.2514E+00	-9.8774E-11	6.7329E-06	-297.40	89.60	68.00	546.5426		0.383%	0.090%	7.185%	9.862%
Propane	VOC		44.096	21.4469	-1.4627E+03	-5.2610E+00	3.2820E-11	3.7349E-06	-306.40	206.60	68.00	121.5870		0.838%	0.288%	3.497%	7.039%
Butane (i-)	VOC		58.122	31.2541	-1.9532E+03	-8.8060E+00	8.9246E-11	5.7501E-06	-254.20	275.00	68.00	44.2751		0.849%	0.385%	1.290%	3.423%
Butane (n-)	VOC		58.122	27.0441	-1.9049E+03	-7.1805E+00	-6.6845E-11	4.2190E-06	-216.40	305.60	68.00	30.1688		1.391%	0.630%	1.440%	3.821%
Pentane (i-)	VOC		72.149	29.2963	-2.1762E+03	-7.8830E+00	-4.6512E-11	3.8997E-06	-256.00	368.60	68.00	11.1082		2.544%	1.430%	0.970%	3.193%
Pentane (n-)	VOC		72.149	33.3239	-2.4227E+03	-9.2354E+00	9.0199E-11	4.1050E-06	-202.00	386.60	68.00	8.1938		1.859%	1.045%	0.523%	1.722%
Dimethylbutane (2,2-)	VOC		86.175	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.227%	0.152%	0.039%	0.155%
Dimethylbutane (2,3-)	VOC		86.175	33.6319	-2.5524E+03	-9.3142E+00	1.4759E-10	3.9140E-06	-223.60	500.00	68.00	3.6998		0.000%	0.000%	0.000%	0.000%
Cyclopentane	VOC		70.133	29.1547	-2.3512E+03	-7.6965E+00	-1.6212E-10	3.1250E-06	-137.20	462.20	68.00	5.0181		0.000%	0.000%	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	30.7477	-2.4888E+03	-8.2295E+00	-2.3723E-11	3.2402E-06	-243.40	437.00	68.00	3.3041		1.586%	1.065%	0.180%	0.707%
Methylpentane (3-)	VOC		86.175	35.2848	-2.6773E+03	-9.8546E+00	2.2352E-11	4.0277E-06	-261.40	447.80	68.00	2.9617		1.188%	0.797%	0.121%	0.475%
Hexane (n-)	VOC	X	86.175	69.7378	-3.6278E+03	-2.3927E+01	1.2810E-02	-1.6844E-16	-139.00	453.20	68.00	2.3626		2.522%	1.693%	0.204%	0.804%
Dimethylpentane (2,2-)	VOC		100.202	6.2875	-2.1682E+03	2.6936E+00	-1.5525E-02	1.0917E-05	-191.20	478.40	68.00	1.6191		0.430%	0.335%	0.024%	0.109%
Methylcyclopentane	VOC		84.159	32.4766	-2.6434E+03	-8.7933E+00	2.0749E-11	3.2158E-06	-223.60	500.00	68.00	2.1257		1.567%	1.027%	0.114%	0.439%
Dimethylpentane (2,4-)	VOC		100.202	35.9436	-2.8460E+03	-9.9938E+00	8.0693E-11	3.6419E-06	-182.20	476.60	68.00	1.5074		0.177%	0.138%	0.009%	0.042%
Trimethylbutane (2,2,3-)	VOC		100.202	32.3633	-2.6614E+03	-8.7743E+00	-7.6870E-10	3.2006E-06	-11.20	496.40	68.00	1.5789		0.000%	0.000%	0.000%	0.000%
Benzene	VOC	X	78.112	31.7718	-2.7254E+03	-8.4443E+00	-5.3534E-09	2.7187E-06	42.80	552.20	68.00	1.4495		2.367%	1.440%	0.118%	0.420%
Dimethylpentane (3,3-)	VOC		100.202	30.2570	-2.6313E+03	-7.9839E+00	4.6848E-13	2.7170E-06	-209.20	505.40	68.00	1.2681		0.305%	0.238%	0.013%	0.061%
Cyclohexane	VOC		84.159	48.5529	-3.0874E+03	-1.5521E+01	7.3830E-03	6.3563E-12	44.60	537.80	68.00	1.5112		1.528%	1.002%	0.079%	0.304%
Methylhexane (2-)	VOC		100.202	54.1075	-3.3785E+03	-1.7547E+01	8.2594E-03	-3.4967E-14	-180.40	494.60	68.00	0.9987		3.167%	2.472%	0.109%	0.496%
Dimethylpentane (2,3-)	VOC		100.202	39.7737	-2.9050E+03	-1.2012E+01	5.1334E-03	-2.3807E-14	-171.40	507.20	68.00	1.0467		0.000%	0.000%	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	58.1943	-3.4151E+03	-1.9294E+01	9.6704E-03	-2.4361E-15	-94.00	525.20	68.00	1.1616		0.833%	0.637%	0.033%	0.149%
Methylhexane (3-)	VOC		100.202	35.2535	-2.9310E+03	-9.6667E+00	-5.2026E-11	3.2107E-06	-182.20	503.60	68.00	0.9291		3.287%	2.566%	0.105%	0.479%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	53.1912	-3.3121E+03	-1.7277E+01	8.3107E-03	5.0896E-14	-209.20	536.00	68.00	0.9791		0.225%	0.172%	0.008%	0.034%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	35.4255	-2.7286E+03	-1.0444E+01	4.6608E-03	1.7565E-14	-209.20	532.40	68.00	1.0075		0.368%	0.281%	0.013%	0.057%
Ethylpentane (3-)	VOC		100.202	8.5463	-2.2979E+03	1.5503E+00	-1.2233E-02	8.2670E-06	-180.40	514.40	68.00	0.8755		0.040%	0.031%	0.001%	0.006%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	36.8109	-2.9536E+03	-1.0275E+01	-4.6212E-12	3.6730E-06	-178.60	536.00	68.00	0.9713		0.307%	0.235%	0.010%	0.046%
Trimethylpentane (2,2,4-)	VOC	X	114.229	50.3422	-3.2789E+03	-1.6111E+01	7.4260E-03	-9.1804E-14	-160.60	519.80	68.00	0.7453		0.029%	0.026%	0.001%	0.004%
Heptane (n-)	VOC		100.202	65.0257	-3.8188E+03	-2.1684E+01	1.0387E-02	1.0206E-14	-130.00	512.60	68.00	0.6808		5.170%	4.036%	0.121%	0.552%
Methylcyclohexane	VOC		98.186	38.0955	-3.0738E+03	-1.0684E+01	-5.1766E-11	3.5282E-06	-194.80	570.20	68.00	0.6925		4.647%	3.555%	0.110%	0.495%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.317%	0.277%	0.000%	0.001%
Dimethylhexane (2,2-)	VOC		114.229	38.7670	-3.1841E+03	-1.0857E+01	1.9275E-12	3.4797E-06	-185.80	530.60	68.00	0.5066		0.134%	0.119%	0.002%	0.012%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	36.3623	-3.0025E+03	-1.0070E+01	-1.0435E-09	3.3726E-06	-65.20	557.60	68.00	0.7110		1.194%	0.913%	0.029%	0.131%
Dimethylhexane (2,5-)	VOC		114.229	40.0260	-3.2647E+03	-1.1282E+01	-6.5408E-10	3.6200E-06	-131.80	530.60	68.00	0.4490		0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	56.2877	-3.6225E+03	-1.8225E+01	8.1864E-03	8.7232E-12	30.20	537.80	68.00	0.4499		0.201%	0.179%	0.003%	0.016%
Ethylcyclopentane	VOC		98.186	36.3631	-3.0448E+03	-1.0038E+01	3.5007E-11	3.2347E-06	-216.40	566.60	68.00	0.5963		0.653%	0.500%	0.013%	0.060%
Trimethylpentane (2,2,3-)	VOC		114.229	35.9540	-3.0569E+03	-9.8896E+00	-7.2916E-11	3.1060E-06	-169.60	555.80	68.00	0.4788		0.039%	0.035%	0.001%	0.003%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	38.0712	-3.1736E+03	-1.0617E+01	6.3090E-11	3.3817E-06	-194.80	552.20	68.00	0.4250		0.000%	0.000%	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	34.1565	-3.0232E+03	-9.2267E+00	2.7691E-11	2.7828E-06	-164.20	559.40	68.00	0.4029		0.000%	0.000%	0.000%	0.000%

TABLE E-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum			mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ M_i	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	**T** (°F)	P_i (psia)		(mol_i/mol_L) f_{v-i}	(lb_i/lb_L) f_{m-i}	(mol_i/mol_V)	(lb_i/lb_V)
Dimethylhexane (2,3-)	VOC		114.229	57.3778	-3.7143E+03	-1.8599E+01	8.2907E-03	-2.8441E-12	30.20	554.00	68.00	0.3451		0.000%	0.000%	0.000%	0.000%
Toluene	VOC	X	92.138	34.0775	-3.0379E+03	-9.1635E+00	1.0289E-11	2.7035E-06	-139.00	606.20	68.00	0.4219		6.256%	4.491%	0.091%	0.381%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.522%	0.457%	0.000%	0.001%
Dimethylhexane (3,4-)	VOC		114.229	38.6119	-3.2685E+03	-1.0752E+01	3.6386E-09	3.2771E-06	30.20	564.80	68.00	0.3186		4.934%	4.391%	0.054%	0.281%
Methylheptane (2-)	VOC		114.229	37.6930	-3.2611E+03	-1.0391E+01	-1.0524E-12	3.0560E-06	-164.20	548.60	68.00	0.3028		0.000%	0.000%	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	40.2080	-3.3661E+03	-1.1279E+01	-8.7855E-11	3.4055E-06	-185.80	552.20	68.00	0.3001		4.077%	3.628%	0.042%	0.219%
Dimethylhexane (3,4-)	VOC		114.229	38.6119	-3.2685E+03	-1.0752E+01	3.6386E-09	3.2771E-06	30.20	564.80	68.00	0.3186		0.000%	0.000%	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	52.8828	-3.6231E+03	-1.6804E+01	7.1828E-03	7.4077E-14	-184.00	555.80	68.00	0.2869		0.586%	0.521%	0.006%	0.030%
Ethylhexane (3-)	VOC		114.229	40.2079	-3.3651E+03	-1.1285E+01	-5.4180E-09	3.4199E-06	30.20	557.60	68.00	0.2931		0.156%	0.139%	0.002%	0.008%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.039%	0.034%	0.000%	0.000%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	32.4775	-3.0067E+03	-8.5896E+00	7.0258E-11	2.1739E-06	-103.00	604.40	68.00	0.3176		0.239%	0.209%	0.003%	0.013%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.239%	0.209%	0.000%	0.001%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	32.5731	-2.9872E+03	-8.6494E+00	-2.1355E-09	2.2946E-06	-34.60	602.60	68.00	0.3364		0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	7.8816	-2.6422E+03	2.3902E+00	-1.5376E-02	9.7931E-06	-158.80	563.00	68.00	0.2426		0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	33.1329	-3.0084E+03	-8.8498E+00	-4.3621E-10	2.3704E-06	-27.40	604.40	68.00	0.3361		0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Cycloheptane	VOC		98.186	54.0858	-3.6109E+03	-1.7331E+01	7.5272E-03	1.7553E-12	17.60	627.80	68.00	0.3185		0.000%	0.000%	0.000%	0.000%
Octane (n-)	VOC		114.229	29.0948	-3.0114E+03	-7.2653E+00	-2.2696E-11	1.4680E-06	-70.60	564.80	68.00	0.2040		6.155%	5.477%	0.043%	0.225%
Trimethylhexane (2,4,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.269%	0.269%	0.047%	0.275%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	-3.8184	-2.2442E+03	7.0671E+00	-1.9644E-02	1.1435E-05	-86.80	568.40	68.00	0.2957		0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	32.4384	-3.0550E+03	-8.5372E+00	2.2892E-10	2.0099E-06	-130.00	617.00	68.00	0.2590		0.075%	0.066%	0.001%	0.003%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	31.9151	-3.0253E+03	-8.3613E+00	5.7055E-12	1.9673E-06	-124.60	617.00	68.00	0.2640		0.075%	0.066%	0.001%	0.003%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.075%	0.066%	0.000%	0.000%
Propylcyclopentane (i-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.493%	0.431%	0.000%	0.001%
Trimethylhexane (2,3,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.009%	0.009%	0.001%	0.009%
Dimethylheptane (2,2-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.224%	0.224%	0.039%	0.228%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.257%	0.224%	0.000%	0.001%
Trimethylhexane (2,2,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	32.1635	-3.0728E+03	-8.4344E+00	6.8943E-10	1.9558E-06	-58.00	631.40	68.00	0.2121		0.723%	0.632%	0.005%	0.027%
Dimethylheptane (2,6-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.159%	0.159%	0.028%	0.162%
Propylcyclopentane (n-)	VOC		112.213	33.9220	-3.2097E+03	-8.9914E+00	-3.2992E-11	2.0684E-06	-178.60	626.00	68.00	0.1793		0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	32.7090	-3.1283E+03	-8.6023E+00	-3.9268E-11	1.9935E-06	-167.80	636.80	68.00	0.1870		1.935%	1.692%	0.012%	0.064%
Dimethylheptane (2,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.095%	0.095%	0.017%	0.097%
Dimethylheptane (3,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.095%	0.095%	0.017%	0.097%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.109%	0.107%	0.000%	0.000%
Trimethylhexane (2,3,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.054%	0.054%	0.009%	0.055%
Dimethylheptane (3,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.054%	0.054%	0.009%	0.055%

TABLE E-1
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data														Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum			mol%	wt%	y_i	$wt\%_i$
Name (i)	Type	HAP	$(lb/mol)_i$ $\mathbf{M_i}$	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	**T** (°F)	P_i (psia)		(mol_i/mol_L) $\mathbf{f_{v-i}}$	(lb_i/lb_L) $\mathbf{f_{m-i}}$	(mol_i/mol_V)	(lb_i/lb_V)
Trimethylcyclohexane (1,1,4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Tetramethylpentane (2,2,3,3-)	VOC		128.255	35.4216	-3.2760E+03	-9.5678E+00	9.0298E-10	2.4355E-06	14.00	640.40	68.00	0.1369		0.370%	0.370%	0.002%	0.010%
Ethylbenzene	VOC	X	106.165	36.1998	-3.3402E+03	-9.7970E+00	-1.1467E-11	2.5758E-06	-139.00	651.20	68.00	0.1388		0.576%	0.476%	0.003%	0.013%
Trimethylhexane (2,3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.010%	0.010%	0.002%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	34.6803	-3.2981E+03	-9.2570E+00	-4.3563E-10	-2.4103E-06	-54.40	649.40	68.00	0.0468		3.491%	2.887%	0.006%	0.027%
Xylene (p-)	VOC	X	106.165	60.0531	-4.0159E+03	-1.9441E+01	8.2881E-03	-2.3647E-12	55.40	649.40	68.00	0.1277		3.491%	2.887%	0.015%	0.074%
Dimethylheptane (3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.130%	0.130%	0.023%	0.133%
Methyloctane (2-)	VOC		128.255	6.0191	-2.8579E+03	3.4068E+00	-1.6572E-02	9.8047E-06	-112.00	597.20	68.00	0.0881		1.109%	1.108%	0.003%	0.020%
Methyloctane (4-)	VOC		128.255	11.2012	-2.9467E+03	1.2133E+00	-1.4423E-02	9.1770E-06	-171.40	599.00	68.00	0.0974		1.109%	1.108%	0.004%	0.022%
Dimethylheptane (3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720		0.000%	0.000%	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	9.8147	-2.9609E+03	1.9061E+00	-1.5675E-02	9.7961E-06	-160.60	602.60	68.00	0.0889		0.000%	0.000%	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.328%	0.322%	0.000%	0.001%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.328%	0.322%	0.000%	0.001%
Xylene (o-)	VOC	X	106.165	37.2413	-3.4573E+03	-1.0126E+01	9.0676E-11	2.6123E-06	-13.00	674.60	68.00	0.0946		0.776%	0.641%	0.003%	0.012%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.284%	0.279%	0.000%	0.001%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130		0.000%	0.000%	0.000%	0.000%
Nonane (n-)	VOC		128.255	8.8817	-2.8042E+03	1.5262E+00	-1.0464E-02	5.7972E-06	-63.40	613.40	68.00	0.0627		4.089%	4.086%	0.009%	0.051%
Unknowns	VOC		283.170	116.5157	-8.0140E+03	-3.8799E+01	1.3398E-02	-4.4444E-13	50.00	813.20	68.00	0.0000		15.292%	33.734%	0.000%	0.000%
Residual Liquid	Liquid	128.362 lb/lb-mol		Vapor	68.00 °F		29.1420 psia		21.907 lb/lb-mol					100.000%	100.000%	100.000%	100.000%
TOC (Total)		128.394 lb/lb-mol			68.00 °F		28.8362 psia		21.664 lb/lb-mol					99.962%	99.987%	98.913%	97.817%
VOC (Total)		129.116 lb/lb-mol			68.00 °F		2.8403 psia		63.095 lb/lb-mol					99.276%	99.859%	9.676%	27.868%
HAP (Total)		95.690 lb/lb-mol			68.00 °F		0.6569 psia		86.481 lb/lb-mol					19.507%	14.542%	0.440%	1.736%
Xylenes		106.165 lb/lb-mol			68.00 °F		0.0880 psia		106.165 lb/lb-mol					7.757%	6.416%	0.023%	0.114%

NOTES

1. Liquid composition of residual liquid based on SPL flash analysis (see TABLE D-3c).
2. Vapor pressure data for unknowns based on: Pentadecane (n-)

TABLE E-2
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		MR03-V01				
Service		Pipeline Liquids				
Capacity		1,000 gal			1,000 gal	
Temperature of Stored Liquid		56.78 °F			82.20 °F	
Vapor Pressure		6.6239 psia			10.3398 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		4.00 turnover/yr				
		4,000 gal/yr			1,000 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					30.1205 lbs/month	
		172.4088 lb/yr			0.0405 lb/hr	
Working Losses		**9.78E-03** lb/gal			**1.24E-02** lb/gal	
		39.1126 lb/yr	Average	Maximum	12.3576 lb/hr	Maximum
Residual Liquid	Stand	358.84% by weight	0.0706 lb/hr	0.3093 tpy	358.84% by weight	0.1453 lb/hr
	Work		0.0160 lb/hr	0.0702 tpy		44.3438 lb/hr
	Total		0.0866 lb/hr	0.3795 tpy		44.4890 lb/hr
CO_{2-e}		5398.27% by weight	1.3035 lb/hr	5.7092 tpy	5398.27% by weight	669.2812 lb/hr
CO_2		7.83% by weight	0.0019 lb/hr	0.0083 tpy	7.83% by weight	0.9712 lb/hr
TOC (Total)		351.00% by weight	0.0848 lb/hr	0.3712 tpy	351.00% by weight	43.5178 lb/hr
Methane		215.62% by weight	0.0521 lb/hr	0.2280 tpy	215.62% by weight	26.7324 lb/hr
Ethane		35.39% by weight	0.0085 lb/hr	0.0374 tpy	35.39% by weight	4.3873 lb/hr
VOC (Total)		100.00% by weight	0.0241 lb/hr	0.1058 tpy	100.00% by weight	12.3981 lb/hr
VOC (non-HAP)		93.77% by weight	0.0226 lb/hr	0.0992 tpy	93.77% by weight	11.6258 lb/hr
HAP (Total)		6.23% by weight	0.0015 lb/hr	0.0066 tpy	6.23% by weight	0.7722 lb/hr
Benzene		1.5063% by weight	3.64E-04 lb/hr	1.59E-03 tpy	1.5063% by weight	1.87E-01 lb/hr
Ethylbenzene		0.0477% by weight	1.15E-05 lb/hr	5.04E-05 tpy	0.0477% by weight	5.91E-03 lb/hr
Hexane (n-)		2.8866% by weight	6.97E-04 lb/hr	3.05E-03 tpy	2.8866% by weight	3.58E-01 lb/hr
Methanol						
Naphthalene						
Toluene		1.3668% by weight	3.30E-04 lb/hr	1.45E-03 tpy	1.3668% by weight	1.69E-01 lb/hr
Trimethylpentane (2,2,4-)		0.0139% by weight	3.35E-06 lb/hr	1.47E-05 tpy	0.0139% by weight	1.72E-03 lb/hr
Xylenes		0.4073% by weight	9.84E-05 lb/hr	4.31E-04 tpy	0.4073% by weight	5.05E-02 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	6.00 ft	Shell/Roof Color	Gray/Medium (or less solar absorptance)
Diameter	5.33 ft	Shell Condition	Good
Capacity (estimated)	1,000 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	1,000 gal	Pressure Setting	0.03 psig

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Cleveland, Ohio
Material	Gasoline (RVP 13)	Selection based on VOC vapor pressure (see TABLE E-1).	
Liquid Molecular Weight	92.00 lb/lb-mol	Vapor Molecular Weight	62.00 lb/lb-mol

Monthly Data	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	4.9635	5.4542	42.60	47.36	4.1347	2.4424	333
February	28	5.1913	5.8469	44.85	50.93	5.1909	2.5545	333
March	31	5.8266	6.7600	50.75	58.54	9.0869	2.8671	333
April	30	6.5962	7.9320	57.24	67.20	14.2682	3.2458	333
May	31	7.3823	9.0680	63.27	74.67	21.3223	3.6325	333
June	30	8.1036	10.0563	68.38	80.59	27.3599	3.9875	333
July	31	8.3713	10.3398	70.18	82.20	30.1205	4.1192	333
August	31	8.0860	9.7860	68.26	79.02	24.7150	3.9788	333
September	30	7.4312	8.7542	63.63	72.68	16.5379	3.6566	333
October	31	6.5426	7.4810	56.81	63.99	10.3828	3.2194	333
November	30	5.8011	6.3837	50.52	55.51	5.4940	2.8545	333
December	31	5.1911	5.6253	44.85	48.94	3.7956	2.5543	333
ALL	365	6.6239	10.3398	56.78	82.20	172.4088	39.1126	4,000

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. Speciation of emissions is based on vapor weight percentages in TABLE E-1 normalized on VOC to assure methodology is conservative.
5. Included a conservative estimate of volume of liquids gathered at M&R03 station, from maintenance activities

TABLE E-3
Volatile Organic Liquids Loading (Tanker Trucks)
Hourly and Annual Emission Estimates

Source	M&R03-TL-PL				
Supply Vessel	MR03-V01				
	Pipeline Liquids				
	1,000 gal			1,000 gal	
Tanker Truck Service	Dedicated Normal			Dedicated Normal	
Loading Method	Submerged			Submerged	
Saturation Factor	0.60 n.d.			0.60 n.d.	
Vapor Molecular Weight	62.00 lb/lb-mol			62.00 lb/lb-mol	
Bulk Liquid Temperature	56.78 °F			82.20 °F	
	516.78 R			542.20 R	
Vapor Pressure	6.6239 psia			10.3398 psia	
Loading Loss Factor	5.9411 lb/kgal			8.8391 lb/kgal	
Pumping Rate				150 gpm	
Throughput	4.00 turnover/yr				
	4,000 gal/yr			1,000 gal/hr	
Loading Losses	23.7646 lb/yr	Average	Maximum	8.8391 lb/hr	Maximum
Residual Liquid	358.84% by weight	0.0097 lb/hr	0.0426 tpy	358.84% by weight	31.7182 lb/hr
CO_{2-e}	5398.27% by weight	0.1464 lb/hr	0.6414 tpy	5398.27% by weight	477.1601 lb/hr
CO_2	7.83% by weight	0.0002 lb/hr	0.0009 tpy	7.83% by weight	0.6924 lb/hr
TOC (Total)	351.00% by weight	0.0095 lb/hr	0.0417 tpy	351.00% by weight	31.0258 lb/hr
Methane	215.62% by weight	0.0058 lb/hr	0.0256 tpy	215.62% by weight	19.0587 lb/hr
Ethane	35.39% by weight	0.0010 lb/hr	0.0042 tpy	35.39% by weight	3.1279 lb/hr
VOC (Total)	100.00% by weight	0.0027 lb/hr	0.0119 tpy	100.00% by weight	8.8391 lb/hr
VOC (non-HAP)	93.77% by weight	0.0025 lb/hr	0.0111 tpy	93.77% by weight	8.2886 lb/hr
HAP (Total)	6.23% by weight	0.0002 lb/hr	0.0007 tpy	6.23% by weight	0.5506 lb/hr
Benzene	1.5063% by weight	4.09E-05 lb/hr	1.79E-04 tpy	1.5063% by weight	1.33E-01 lb/hr
Ethylbenzene	0.0477% by weight	1.29E-06 lb/hr	5.66E-06 tpy	0.0477% by weight	4.21E-03 lb/hr
Hexane (n-)	2.8866% by weight	7.83E-05 lb/hr	3.43E-04 tpy	2.8866% by weight	2.55E-01 lb/hr
Methanol					
Naphthalene					
Toluene	1.3668% by weight	3.71E-05 lb/hr	1.62E-04 tpy	1.3668% by weight	1.21E-01 lb/hr
Trimethylpentane (2,2,4-)	0.0139% by weight	3.77E-07 lb/hr	1.65E-06 tpy	0.0139% by weight	1.23E-03 lb/hr
Xylenes	0.4073% by weight	1.11E-05 lb/hr	4.84E-05 tpy	0.4073% by weight	3.60E-02 lb/hr

NOTES

1. Emissions calculated using methods provided in USEPA, AP-42 Section 5.2 dated 6/2008. $L_L = 12.46[(S)M_V P/T]$
2. Physical property, throughput and speciation data based data from supply vessel emission calculation spreadsheet.
3. Included a conservative estimate of volume of liquids gathered at M&R03 station, from maintenance activities

TABLE F-1
2-Stroke Lean-Burn Reciprocating Engines
Hourly and Annual Emission Estimates
Uncontrolled

Type		2slb				
Service		Emergency				
JJJJ Relevant Date		Manufactured: On or After 01/01/2009				
ZZZZ Status		New RICE at Area HAP Source				
Make		Cummins				
Model		GTA12/GTA743				
Fuel		Natural Gas				
Fuel Higher Heating Value(HHV)		1,020 BTU/scf			1,020 BTU/scf	
Ambient Temperature		80 °F			80 °F	
Power Output		265 bhp (mech.)			265 bhp (mech.)	
		18 kW (elec.)			18 kW (elec.)	
Heat Rate at HHV		8,641 BTU/hp-hr			8,641 BTU/hp-hr	
Operating Hours		500 hrs/yr				
Fuel Consumption		2,245 scfh			2,245 scfh	
		1.122 MMscf/yr				
Heat Input at HHV		2.29 MMBTU/hr			2.29 MMBTU/hr	
		1,145 MMBTU/yr	Uncontrolled			Uncontrolled
Pollutant	Control Efficiency	Uncontrolled	Average Hourly	Maximum Annual	Uncontrolled	Maximum Hourly
NO_X		5,337.59 lb/MMscf	11.9823 lb/hr	2.9956 tpy	5,337.59 lb/MMscf	11.9823 lb/hr
CO		658.42 lb/MMscf	1.4781 lb/hr	0.3695 tpy	658.42 lb/MMscf	1.4781 lb/hr
SO_2		0.60 lb/MMscf	0.0013 lb/hr	0.0003 tpy	0.60 lb/MMscf	0.0013 lb/hr
$PM_{10/2.5}$		49.28 lb/MMscf	0.1106 lb/hr	0.0277 tpy	49.28 lb/MMscf	0.1106 lb/hr
CO_{2-e}		128,349 lb/MMscf	288 lb/hr	72 tpy	128,349 lb/MMscf	288 lb/hr
CO_2		120,161 lb/MMscf	270 lb/hr	67 tpy	120,161 lb/MMscf	270 lb/hr
N_2O		0.23 lb/MMscf	0.0005 lb/hr	0.0001 tpy	0.23 lb/MMscf	0.0005 lb/hr
TOC (Total)		437.21 lb/MMscf	0.9815 lb/hr	0.2454 tpy	437.21 lb/MMscf	0.9815 lb/hr
Methane		386.56 lb/MMscf	0.8678 lb/hr	0.2169 tpy	386.56 lb/MMscf	0.8678 lb/hr
Ethane		18.70 lb/MMscf	0.0420 lb/hr	0.0105 tpy	18.70 lb/MMscf	0.0420 lb/hr
VOC (Total)		31.95 lb/MMscf	0.0717 lb/hr	0.0179 tpy	31.95 lb/MMscf	0.0717 lb/hr
VOC (non-HAP)		10.74 lb/MMscf	0.0241 lb/hr	0.0060 tpy	10.74 lb/MMscf	0.0241 lb/hr
HAP (Total)		21.20 lb/MMscf	0.0476 lb/hr	0.0119 tpy	21.20 lb/MMscf	0.0476 lb/hr
Acetaldehyde		2.07E+00 lb/MMscf	4.64E-03 lb/hr	1.16E-03 tpy	2.07E+00 lb/MMscf	4.64E-03 lb/hr
Acrolein		2.07E+00 lb/MMscf	4.66E-03 lb/hr	1.16E-03 tpy	2.07E+00 lb/MMscf	4.66E-03 lb/hr
Benzene		5.17E-01 lb/MMscf	1.16E-03 lb/hr	2.90E-04 tpy	5.17E-01 lb/MMscf	1.16E-03 lb/hr
Biphenyl		1.05E-03 lb/MMscf	2.36E-06 lb/hr	5.91E-07 tpy	1.05E-03 lb/MMscf	2.36E-06 lb/hr
Butadiene (1,3-)		2.19E-01 lb/MMscf	4.91E-04 lb/hr	1.23E-04 tpy	2.19E-01 lb/MMscf	4.91E-04 lb/hr
Carbon Tetrachloride		1.62E-02 lb/MMscf	3.63E-05 lb/hr	9.08E-06 tpy	1.62E-02 lb/MMscf	3.63E-05 lb/hr
Chlorobenzene		1.18E-02 lb/MMscf	2.66E-05 lb/hr	6.64E-06 tpy	1.18E-02 lb/MMscf	2.66E-05 lb/hr
Chloroform		1.26E-02 lb/MMscf	2.82E-05 lb/hr	7.05E-06 tpy	1.26E-02 lb/MMscf	2.82E-05 lb/hr
Dichloropropene (1,3-)		1.17E-02 lb/MMscf	2.62E-05 lb/hr	6.55E-06 tpy	1.17E-02 lb/MMscf	2.62E-05 lb/hr
Ethylbenzene		2.88E-02 lb/MMscf	6.46E-05 lb/hr	1.62E-05 tpy	2.88E-02 lb/MMscf	6.46E-05 lb/hr
Ethylene Dibromide		1.96E-02 lb/MMscf	4.39E-05 lb/hr	1.10E-05 tpy	1.96E-02 lb/MMscf	4.39E-05 lb/hr
Formaldehyde		1.47E+01 lb/MMscf	3.30E-02 lb/hr	8.26E-03 tpy	1.47E+01 lb/MMscf	3.30E-02 lb/hr
Hexane (n-)		1.19E-01 lb/MMscf	2.66E-04 lb/hr	6.66E-05 tpy	1.19E-01 lb/MMscf	2.66E-04 lb/hr
Methanol		6.61E-01 lb/MMscf	1.48E-03 lb/hr	3.71E-04 tpy	6.61E-01 lb/MMscf	1.48E-03 lb/hr
Methylene Chloride		3.92E-02 lb/MMscf	8.80E-05 lb/hr	2.20E-05 tpy	3.92E-02 lb/MMscf	8.80E-05 lb/hr
Methylnaphthalene (2-)		5.71E-03 lb/MMscf	1.28E-05 lb/hr	3.20E-06 tpy	5.71E-03 lb/MMscf	1.28E-05 lb/hr
Naphthalene		2.57E-02 lb/MMscf	5.76E-05 lb/hr	1.44E-05 tpy	2.57E-02 lb/MMscf	5.76E-05 lb/hr
PAH		3.57E-02 lb/MMscf	8.02E-05 lb/hr	2.00E-05 tpy	3.57E-02 lb/MMscf	8.02E-05 lb/hr
Phenol		1.12E-02 lb/MMscf	2.52E-05 lb/hr	6.30E-06 tpy	1.12E-02 lb/MMscf	2.52E-05 lb/hr
Propylene Oxide						
Styrene		1.46E-02 lb/MMscf	3.28E-05 lb/hr	8.20E-06 tpy	1.46E-02 lb/MMscf	3.28E-05 lb/hr
Tetrachloroethane (1,1,2,2-)		1.77E-02 lb/MMscf	3.97E-05 lb/hr	9.92E-06 tpy	1.77E-02 lb/MMscf	3.97E-05 lb/hr
Toluene		2.57E-01 lb/MMscf	5.76E-04 lb/hr	1.44E-04 tpy	2.57E-01 lb/MMscf	5.76E-04 lb/hr
Trichloroethane (1,1,2-)		1.40E-02 lb/MMscf	3.15E-05 lb/hr	7.88E-06 tpy	1.40E-02 lb/MMscf	3.15E-05 lb/hr
Trimethylpentane (2,2,4-)		2.26E-01 lb/MMscf	5.06E-04 lb/hr	1.27E-04 tpy	2.26E-01 lb/MMscf	5.06E-04 lb/hr
Vinyl Chloride		6.58E-03 lb/MMscf	1.48E-05 lb/hr	3.70E-06 tpy	6.58E-03 lb/MMscf	1.48E-05 lb/hr
Xylenes		7.14E-02 lb/MMscf	1.60E-04 lb/hr	4.01E-05 tpy	7.14E-02 lb/MMscf	1.60E-04 lb/hr

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Maximum hourly emissions based on 100% of rated capacity.
3. Vendor provided data on power output and heat rate.
4. NOX and CO emissions are estimated based on Vendor Data.
5. SO2 and PM10/2.5 emission factors based on AP-42, Section 3.2 (Revised 7/00), Table 3.2-1.
6. CO2 and N2O emission factors based on 40 CFR 98, Subpart C, Table C-1 and 40 CFR 98, Subpart C, Table C-2, respectively.
7. TOC (Total) and TOC species emissions are estimated based on Vendor Data.
   Emission factors based on: $EF_i = [EF_{(TOC)}]/[(EF_{TOC\text{-}AP42})]\ (EF_{i\text{-}AP42})$

TABLE G-1
Heaters
Natural Gas Combustion
Maximum Emission Estimates

Station ID	M&R03_HIG-01				
Agency ID	HIG-01				
Make	Bruest				
Model	SR-8				
Burner	N/A				
Fuel	Natural Gas				
Fuel Higher Heating Value (HHV)	1,020 BTU/scf			1,020 BTU/scf	
Heat Output at HHV	0.0006 MMBTU/hr			0.0007 MMBTU/hr	
Thermal Efficiency	70%			70%	
Operating Hours	8,760 hrs/yr				
Fuel Consumption	0.88 scfh			0.93 scfh	
	0.008 MMscf/yr				
Heat Input at HHV	0.0009 MMBTU/hr			0.0009 MMBTU/hr	
	8 MMBTU/yr	Avg. Hourly	Max. Annual		Max. Hourly
NO_X	73.82 lb/MMscf	0.0001 lb/hr	0.0003 tpy	73.8239 lb/MMscf	0.0001 lb/hr
CO	1,169.14 lb/MMscf	0.0010 lb/hr	0.0045 tpy	1,169.1403 lb/MMscf	0.0011 lb/hr
SO_2	0.60 lb/MMscf	0.0000 lb/hr	0.0000 tpy	0.6000 lb/MMscf	0.0000 lb/hr
$PM_{10/2.5}$	7.60 lb/MMscf	0.0000 lb/hr	0.0000 tpy	7.6000 lb/MMscf	0.0000 lb/hr
$CO_{2\text{-}e}$	121,999.15 lb/MMscf	0.1076 lb/hr	0.4715 tpy	121,999.15 lb/MMscf	0.1130 lb/hr
CO_2	119,926.98 lb/MMscf	0.1058 lb/hr	0.4635 tpy	119,926.98 lb/MMscf	0.1111 lb/hr
N_2O	0.23 lb/MMscf	0.0000 lb/hr	0.0000 tpy	0.23 lb/MMscf	0.0000 lb/hr
TOC (Total)	383.52 lb/MMscf	0.0003 lb/hr	0.0015 tpy	383.52 lb/MMscf	0.0004 lb/hr
Methane	80.19 lb/MMscf	0.0001 lb/hr	0.0003 tpy	80.19 lb/MMscf	0.0001 lb/hr
Ethane	108.08 lb/MMscf	0.0001 lb/hr	0.0004 tpy	108.08 lb/MMscf	0.0001 lb/hr
VOC (Total)	191.76 lb/MMscf	0.0002 lb/hr	0.0007 tpy	191.76 lb/MMscf	0.0002 lb/hr
HAP (Total)	65.82 lb/MMscf	0.0001 lb/hr	0.0003 tpy	65.82 lb/MMscf	0.0001 lb/hr
Acetaldehyde					
Acrolein					
Benzene	7.32E-02 lb/MMscf	6.46E-08 lb/hr	2.83E-07 tpy	7.32E-02 lb/MMscf	6.78E-08 lb/hr
Butadiene (1,3-)					
Carbon Tetrachloride					
Chlorobenzene					
Chloroethane					
Chloroform					
Dichloroethane (1,2-)					
Dichloropropane (1,2-)					
Dichloropropene (1,3-)					
Ethylbenzene					
Ethylene Dibromide					
Formaldehyde	2.61E+00 lb/MMscf	2.31E-06 lb/hr	1.01E-05 tpy	2.61E+00 lb/MMscf	2.42E-06 lb/hr
Hexane (n-)	6.28E+01 lb/MMscf	5.54E-05 lb/hr	2.43E-04 tpy	6.28E+01 lb/MMscf	5.81E-05 lb/hr
Methanol					
Methylene Chloride					
Methylnaphthalene (2-)	8.37E-04 lb/MMscf	7.38E-10 lb/hr	3.23E-09 tpy	8.37E-04 lb/MMscf	7.75E-10 lb/hr
Naphthalene	2.13E-02 lb/MMscf	1.88E-08 lb/hr	8.22E-08 tpy	2.13E-02 lb/MMscf	1.97E-08 lb/hr
PAH	3.08E-03 lb/MMscf	2.71E-09 lb/hr	1.19E-08 tpy	3.08E-03 lb/MMscf	2.85E-09 lb/hr
Phenol					
Propylene Oxide					
Styrene					
Tetrachloroethane (1,1,2,2-)					
Toluene	1.19E-01 lb/MMscf	1.05E-07 lb/hr	4.58E-07 tpy	1.19E-01 lb/MMscf	1.10E-07 lb/hr
Trichloroethane (1,1,2-)					
Trimethylpentane (2,2,4-)					
Vinyl Chloride					
Xylenes					

NOTES

1. Fuel higher heating value selected to correspond to AP-42 emissions factors.
2. Manufacturer provided data on rated capacity and fuel consumption (model SR-8 = model 1800).
3. Maximum output is assumed to be 105% of rated capacity.
4. Manufacturer provided NOx; CO; and HC emission test results (60 ppmvd at 3% O2; 1,560 ppmvd at 3% O2; and 470 ppmvd at 3% O2, respectively).
   Based on data in the North American Combustion Handbook published by North American, Mfg., Co., the NO_X, CO and HC emission conversion factors are:
   0.001206 (lb/MMBTU)/ppmvd at 3% O2; 0.000735(lb/MMBTU)/ppmvd at 3% O2; and 0.000400 (lb/MMBTU)/ppmvd at 3% O2, respectively.
5. CO2 emission factor based on 40 CFR 98, Subpart C, Table C-2 (1,026 BTU/scf; 53.02 kg/MMBTU ==> 119,926.98 lb/MMscf).
6. N2O emission factor based on 40 CFR 98, Subpart C, Table C-2 (1,026 BTU/scf; 0.0001 kg/MMBTU ==> 0.23 lb/MMscf).
7. Remaining emission factors were extracted from Section 1 of AP-42 (date 7/98): Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4.
   Methane, Ethane, VOC, HAP, and Speciate VOC AP-42 emission factors were scaled based on the vendor data for HC: $EF_{Scaled} = (EF_{AP42})(EF_{HC}/EF_{THC\text{-}AP42})$

NEXUS GAS TRANSMISSION, LLC
5400 Westheimer Court
Houston, TX 77056-5310

713.627.5400 main

September 8, 2015

Mr. Kevin Fortune
Ohio EPA – Division of Air Pollution Control
Northeast District Office
2110 E Aurora Rd
Twinsburg, Ohio 44087

Re: NEXUS Gas Transmission, LLC – Kensington, OH
Permit-by-Rule (PBR) Notification – Natural Gas-Fired Emergency Generator

Dear Mr. Fortune:

NEXUS Gas Transmission, LLC (NEXUS) plans to construct a natural gas metering and regulating station (M&R 02&03) near Kensington, in Columbiana County, Ohio. NEXUS plans to install two (2) new natural gas-fired internal combustion engines each rated at a maximum capacity of 265 horsepower (hp) intended to drive generators to supply power to the facility during standby emergency situations. With this letter and the attached notification, NEXUS is requesting authorization for the emergency generators under the Permit-by-Rule (PBR) provided in Ohio Administrative Code (OAC) 3745-31-03(A)(4)(b).

Each of the natural gas-fired emergency generators will operate at M&R 02&03 for no more than 500 hours per rolling twelve-month period. NEXUS will maintain monthly records that contain the rolling twelve-month hours of operation for each emergency engine. Therefore, the emergency engines are eligible for coverage under the PBR provided in OAC 3745-31-03(A)(4)(b).

The PBR notification forms are attached to this letter.

***

NEXUS respectfully requests that Ohio EPA provide a written response to this notification confirming that operation of the emergency engines are authorized under the PBR provided in Ohio Administrative Code (OAC) 3745-31-03(A)(4)(b). If there are any questions concerning these PBR notifications, please do not hesitate to contact Reagan Mayces at (713) 627-4790.

Sincerely,
NEXUS GAS TRANSMISSION, LLC

Brian McKerlie
Vice President

Enclosures

Attachment 1

Permit-by-Rule Notifications

Ohio Environmental Protection Agency
Division of Air Pollution Control

Permit-by-Rule Notification Form
Emergency Generator/Pump/Compressor

Submission of this form constitutes notice that the party identified in Section I of this form intends to be authorized to install/operate a source of air pollution according to the permit-by-rule provisions of OAC 3745-31-03(A)(4)(b). By submitting this form, the applicant agrees to operate and maintain the facility and equipment in accordance with the applicable permit-by-rule provisions. An original signature is needed and forms transmitted by fax will not be accepted. Complete all information as indicated by the instructions.

I. Applicant Information / Mailing Address

Company (Applicant) Name: NEXUS Gas Transmission, LLC

Mailing (Applicant) Address: P.O. Box 1642

City: Houston State: TX Zip Code: 77251-1642

Contact Person: Reagan Mayces Phone: 713-627-4790 Fax: _____ E-mail: rmmayces@spectraenergy.com

II. Facility / Site Location Information

Facility Name: M&R 02&03

Facility Address / Location: Approximately 2 miles east of Kensington on Tunnel Hill Road

City: Kensington State: OH Zip Code 44423

Facility Contact: Reagan Mayces Phone: 713-627-4790 Fax: _____ E-mail: rmmayces@spectraenergy.com

Ohio EPA Facility ID Number (10-digit) – *if known; see Instructions* _____

III. Reason for Submitting Notification:

☒ Initial request ☐ Equipment modification ☐ Ownership change

☐ Request for revocation of current permit - *complete additional information below*

Permit to install (PTI) Number	Emission Unit ID (4-digit)
_____	_____
_____	_____

IV. Type of Unit for Emergency Use

☑ Electrical generator ☐ Water pump ☐ Air compressor

Manufacturer's engine output rating: 265 horsepower (HP) or _____ Kilowatts

Company identification or name of unit: 2-Stroke Lean-Burn Reciprocating Engine #1

V. Type of fuel burned (*check all that apply*)

☑ Natural gas ☐ Propane/LPG ☐ Gasoline ☐ Distillate oil (less than 0.5% wt. sulfur)

I certify under penalty of law that all statements or assertions of fact made in this notification are true and complete, and shall subject the signatory to liability under state laws forbidding false or misleading statements.

Applicant Name (Print): Brian McKerlie Title: Vice President

Applicant Signature: _____ Date: _____

RETAIN A COPY OF THIS FORM FOR YOUR RECORDS

Mail the original, signed form to the appropriate Air Permit Review Agency (District Office/Local Air Agency) for your county. (Please refer to the Agency map in the attached instructions for mailing addresses).

Rev 12/10

For Ohio EPA Use Only:

FAC ID: _____

Date received _____

Ohio Environmental Protection Agency
Division of Air Pollution Control

Permit-by-Rule Notification Form
Emergency Generator/Pump/Compressor

Submission of this form constitutes notice that the party identified in Section I of this form intends to be authorized to install/operate a source of air pollution according to the permit-by-rule provisions of OAC 3745-31-03(A)(4)(b). By submitting this form, the applicant agrees to operate and maintain the facility and equipment in accordance with the applicable permit-by-rule provisions. An original signature is needed and forms transmitted by fax will not be accepted. Complete all information as indicated by the instructions.

I. Applicant Information / Mailing Address

Company (Applicant) Name: NEXUS Gas Transmission, LLC

Mailing (Applicant) Address: P.O. Box 1642

City: Houston State: TX Zip Code: 77251-1642

Contact Person: Reagan Mayces Phone: 713-627-4790 Fax: _____ E-mail: rmmayces@spectraenergy.com

II. Facility / Site Location Information

Facility Name: M&R 02&03

Facility Address / Location: Approximately 2 miles east of Kensington on Tunnel Hill Road

City: Kensington State: OH Zip Code 44423

Facility Contact: Reagan Mayces Phone: 713-627-4790 Fax: _____ E-mail: rmmayces@spectraenergy.com

Ohio EPA Facility ID Number (10-digit) – *if known; see Instructions* _____

III. Reason for Submitting Notification:

☒ Initial request ☐ Equipment modification ☐ Ownership change

☐ Request for revocation of current permit - *complete additional information below*

Permit to install (PTI) Number	Emission Unit ID (4-digit)
_____	_____
_____	_____

IV. Type of Unit for Emergency Use

☑ Electrical generator ☐ Water pump ☐ Air compressor

Manufacturer's engine output rating: 265 horsepower (HP) or _____ Kilowatts

Company identification or name of unit: 2-Stroke Lean-Burn Reciprocating Engine #2

V. Type of fuel burned (*check all that apply*)

☑ Natural gas ☐ Propane/LPG ☐ Gasoline ☐ Distillate oil (less than 0.5% wt. sulfur)

I certify under penalty of law that all statements or assertions of fact made in this notification are true and complete, and shall subject the signatory to liability under state laws forbidding false or misleading statements.

Applicant Name (Print): Brian McKerlie Title: Vice President

Applicant Signature: _____ Date: _____

RETAIN A COPY OF THIS FORM FOR YOUR RECORDS

Mail the original, signed form to the appropriate Air Permit Review Agency (District Office/Local Air Agency) for your county. (Please refer to the Agency map in the attached instructions for mailing addresses).

Rev 12/10

For Ohio EPA Use Only:

FAC ID: _____

Date received _____

APPENDIX 9B

General Conformity Applicability Analysis

Appendix 9B
General Conformity Applicability Analysis

Summary of Applicability Issues

General conformity regulations in 40 CFR Part 93, Subpart B are designed to ensure that Federal actions that occur in nonattainment and maintenance areas do not interfere with a state's ability to attain or maintain compliance with National Ambient Air Quality Standards ("NAAQS"). The general conformity regulations were revised on April 5, 2010, and the changes to the regulations became effective on July 6, 2010.

General conformity only needs to be considered for Federal actions that will be located in nonattainment or maintenance areas. A general conformity applicability analysis determines whether a Federal action will be subject to general conformity requirements. If general conformity applies, then a separate analysis, referred to as a conformity determination is required to document that a Federal action will conform to the applicable implementation plan for the nonattainment or maintenance area and meet other requirements of Subpart B of Part 93.

As part of the general conformity applicability determination process, the sum of non-exempt direct and indirect emissions of nonattainment pollutants or designated precursors associated with a federal action is compared to annual general conformity applicability emissions thresholds in §93.153. The general conformity applicability thresholds are listed in §93.153(b)(1) for nonattainment areas and in §93.153(b)(2) for maintenance areas. If an applicability threshold is exceeded, then general conformity applies and a conformity determination is required. If emissions are below the applicability thresholds, then the emissions are considered to be *de minimis*, general conformity requirements do not apply, and a conformity determination is not required.

Under the revised general conformity regulations, emissions from stationary sources that are covered by any New Source Review ("NSR") permit (major or minor) are exempt from general conformity. Therefore, emissions covered by a NSR permit do not count towards the general conformity applicability thresholds. The emissions associated with operation of the proposed new facilities at affected compressor stations will be permitted and will not count towards the general applicability thresholds. However, emissions from other Project activities, such as emissions from construction and operation of the pipeline and M&R stations, need to be considered. Under the revised regulations, the United States Environmental Protection Agency ("USEPA") clarified that if emissions from a Federal action occur in more than one nonattainment or maintenance area, then each area is evaluated separately. Emissions from separate nonattainment or maintenance areas are treated as if they result from separate actions.

Project Location

The NEXUS Project is considered to be a Federal action, since a Federal agency (i.e., FERC) will be licensing, permitting, or otherwise approving portions of the Project. Parts of the proposed Project activities will occur in federally designated nonattainment and maintenance areas. Consequently, a general conformity applicability analysis is required to determine if general conformity will apply and if a subsequent conformity determination is required.

NEXUS Project activities will occur throughout 17 counties located in Ohio and Michigan. Many portions of the NEXUS Project are currently located in one or more air quality regions that are designated as non-attainment or maintenance for Ozone and $PM_{2.5}$. Consequently, a general conformity applicability analysis is required to determine if a conformity determination is required. A conformity determination, if required, documents that a federal action will conform to the applicable implementation plan for the nonattainment or maintenance area and meets other requirements of Subpart B of Part 93.

Table 9B-1 summarizes the nonattainment and maintenance areas and associated general conformity applicability thresholds that need to be considered for the Project. Of note, USEPA revoked the 1997 8-hour ozone NAAQS in April of 2015 (Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan (SIP) Requirements; Final Rule (March 6, 2015)). Furthermore, with respect to general conformity applicability, areas that were designated as nonattainment or maintenance for the revoked 1997 8-hour ozone NAAQS, are no longer nonattainment or maintenance for the purposes of general conformity with respect to this standard. The EPA notice at 80 FR 12263 specifically indicates that when a specific NAAQS is revoked, general conformity requirements end with respect to that standard.

NO_x and VOC are the designated precursor pollutants for ozone, and the general conformity applicability thresholds in nonattainment areas are 100 tons per year (TPY) for VOC and 100 TPY for NO_x. Therefore emissions from all non-exempt Project sources in Summit, Medina, and Lorain Counties must potentially be considered when assessing the applicability of general conformity with respect to ozone. Emissions of all non-exempt Project sources located in Summit, Medina, Lorain, Stark, Monroe, Washtenaw, and Wayne counties must potentially be considered when assessing the applicability of general conformity with respect to $PM_{2.5}$. The general applicability threshold for direct $PM_{2.5}$ emissions in these areas is 100 TPY. SO_2 is designated in §93.152 as a precursor for $PM_{2.5}$ and has an applicability threshold of 100 TPY. In addition, NO_x is identified as a precursor for $PM_{2.5}$ unless both USEPA and the applicable state(s) make a determination that NO_x is not a significant precursor for $PM_{2.5}$ formation in the area. At this time, no such determination has been made. Therefore, NO_x is also considered a precursor for $PM_{2.5}$ in these areas and has an applicability threshold of 100 TPY. For general conformity applicability purposes, non-exempt Project emissions were separated by County and aggregated across air quality control region for comparison to the general conformity applicability thresholds.

TABLE 9B-1

General Conformity Applicability Thresholds – Nonattainment and Maintenance Areas

Air Quality Region	Nonattainment/ Maintenance Pollutant	County	Project Component	General Conformity Applicability Thresholds (tons/year)
Cleveland - Akron - Lorain, OH	2008 Ozone - Nonattainment 2006 PM-2.5 - Maintenance 2012 - PM2.5 Nonattainment - Lorain County Only	Summit, OH	NEXUS Pipeline - Mainline - 15.3 miles	$PM_{2.5}$ -100 SO_2 – 100 NO_x – 100 VOC – 100
		Medina, OH	NEXUS Pipeline -Mainline - 23.0 miles	
			NEXUS Wadsworth Compressor Station	
		Lorain, OH	NEXUS Pipeline -Mainline - 21.0 miles	
		Air Quality Region	Purge and Blowdown of Pipeline and Compressor Stations	
Canton - Massillon, OH	PM-2.5 - Maintenance	Stark, OH	NEXUS Pipeline – Mainline – 20.5 miles	$PM_{2.5}$ -100 SO_2 – 100 NO_x – 100
Detroit - Ann Arbor, MI	PM-2.5 Maintenance	Monroe, MI	NEXUS Pipeline - Mainline - 6.5 miles	
		Washtenaw, MI	NEXUS Pipeline - Mainline - 17.9 miles	
		Wayne, MI	NEXUS Pipeline - Mainline - 1.1 miles	
		Washtenaw	Willow Run M&R Station Construction	
			Combustion Sources at Willow Run M&R Station	

Project Emissions

Emissions from Project activities during construction and subsequent operational phases were calculated and are presented in the NEXUS Resource Report 9. Emissions associated with operations at the

Wadsworth Compressor Station are summarized in Table 9.2-7. These associated emissions will be issued a minor NSR permit in accordance with the requirements of the Ohio EPA. Therefore, pursuant to §93.153(d)(1), a general conformity determination is not required for these emissions.

As described in Section 9.2.1.4 of the NEXUS Resource Report 9, Project M&R stations will have new natural gas-fired in-line gas heaters. Table 9.2-10 of the NEXUS Resource Report 9 provides estimated emissions from combustion sources at all of the M&R stations combined. While these gas heaters are not large emissions sources, they are typically the primary emissions source if present at an M&R station. Additional sources of air emissions from operation of all Project M&R stations are limited to small amounts of fugitive gas leakage and gas releases from operation and maintenance activities as well as operation of emergency diesel electric generators. Table 9.2-11 of the NEXUS Resource Report 9 provides estimated emissions from non-combustion sources, such as fugitive emissions and non-routine gas releases, from operation of all of the Project M&R stations combined. The new M&R station in Michigan (i.e., the NEXUS/Willow Run M&R Station) will not be required to obtain a permit to install as discussed in Section 9.2.1.4 of the NEXUS Resource Report 9. Thus, the emissions from this M&R Station have been included in Table 9B-2 of this General Conformity Applicability Analysis as non-exempt emissions.

The only source of criteria pollutant emissions from operation of the pipelines are from fugitive VOC releases from piping components and occasional maintenance activities that require venting/blowdown of a section of the pipeline. Table 9.2-12 of the NEXUS Resource Report 9 provides estimated emissions from operation of the pipelines. These pipeline emissions will not be subject to permitting and therefore must be considered in the general conformity analysis.

Emissions from NEXUS Project construction activities are discussed in Section 9.2.5.5 of the NEXUS Resource Report 9 and summarized in Tables 9.2-13 through 9.2-18. Additional detailed documentation for the associated calculations is provided in a series of tables in Appendix 9D of the NEXUS Project Resource Report 9.

The total operating hours utilized in Appendix 9D of the NEXUS Resource Report 9 were developed with a prescriptive process based upon inputs from the Project construction management team. The process has been outlined below:

1. Developed crew sizes and durations (i.e., work hours) for each of the following construction work efforts including: Clearing, Grading and Trenching, Fabrication and Lowering-in, Rock Removal, Testing, Backfilling and ROW Restoration. The durations are based upon the planned work schedule in hours per week with an average of 4.3 weeks per month. The crew sizes and durations were further separated by county for the pipeline segments occurring within multiple counties (and thus, multiple nonattainment/maintenance areas).
2. Developed a list of equipment utilized to support each construction work effort across each pipeline work segment, compressor station, and M&R Station. The equipment was then assigned a unique count by month and by construction work effort (in units of vehicles per month) such that total expected equipment hours are able to be calculated.
3. The total monthly hours of operation were then assigned to the pipeline segment, compressor station, and M&R station construction schedules such that total hours of annual operation were calculated per year for each pipeline segment (by county), each compressor station and each M&R Station.

The calculated Project construction emissions are designed to be conservative estimates and likely overestimate the expected emissions for several reasons, including the following:

- Emission factors for nonroad engines made use of underlying default distributions in the NONROAD model and do not account for the greater availability of newer and lower emitting construction equipment in the Project area;
- Assumptions that likely overestimate the area that is under active, heavy disturbance at any time; and
- Use of default construction fugitive dust emission factors from the Western Regional Air Partnership Fugitive Dust Handbook is conservative, as the climates typical of western states are more arid than in the Project area (i.e., the soil moisture level is lower in the WRAP states compared to Ohio and Michigan).

The Project construction activities summarized in Tables 9.2-13 through 9.2-18 of the NEXUS Resource Report 9 and documented more fully in tables in Appendix 9D were further analyzed to determine those emissions that are projected to occur in various nonattainment and maintenance areas.

In summary, the expected non-exempt Project emissions in Table 9B-2 include the following activities:

- Construction vehicle and equipment emissions including on-road worker commutes and material deliveries;
- Fugitive dust emissions from land clearing, grading, excavation, concrete work, and vehicle traffic on paved and unpaved roads (including brake and tire wear), wind erosion from exposed surfaces, and open burning;
- Gas releases due to blowdowns (i.e., evacuating) the existing facilities prior to tieing-in new equipment/facilities and purging the new facilities with gas prior to start up;
- Operational emissions from the pipeline and M&R stations generally consisting of small amounts of fugitive gas leakage and gas releases from operation and maintenance activities; and
- Operational emissions from the combustion sources and fugitives at non-exempt M&R Stations.

The non-combustion source operational emissions from the pipeline and M&R stations, which were aggregated across all proposed pipeline segments in Table 9.2-12 and all M&R stations in Tables 9.2-11, respectively, of the NEXUS Resource Report 9, were included in Table 9D-5 of the NEXUS Appendix 9D, entitled Blowdown and Purge Emissions - Operational Emissions, broken down by facility, the county in which the pipeline segment or M&R station is located, and year. It should be noted that term "blowdown and purge emissions" in the Appendix 9D tables includes both the "Non-routine Emissions," which are typically blowdown and purge emissions from routine maintenance activities as well as fugitive emissions, which are typically from operation of gas-actuated valves and a conservative (i.e., likely overestimated) assumption of the level of piping component leakage, shown in Tables 9.2-11 and 9.2-12 of Resource Report 9. The pipeline and M&R station operational emissions are then shown aggregated by county and year in the Table 9D-5 section entitled Summary by County. Please also note that the columns in these tables labeled "Ongoing Operation" represent the non-combustion source operational emissions from the pipeline and M&R stations that would continue after the NEXUS Project construction is completed, beginning in 2017.

The aggregate of these operating emissions from pipeline segments, compressor stations, and M&R stations in years in which construction is proposed were also included in Table 9D-2, which further aggregates these emissions by non-attainment/maintenance area. Specifically, the Project component item identified in Table 9D-2 as "Purge and Blowdown of Pipeline, Compressor Stations, and M&R Stations" represents the aggregate of the construction emissions occurring in 2017 taken from the emission summaries located in Table 9D-4 and Table 9D-5.

The resulting summary of Project construction emissions for the construction year and ongoing operation in relevant nonattainment and maintenance areas is summarized in Table 9B-2.

TABLE 9B-2

General Conformity Applicability Analysis

Designated Pollutant	Designated Area	Threshold (TPY)	Pollutant or Precursor	2017 Total Non-Exempt Emissions	2018 Total Non-Exempt Emissions	Ongoing Non-Exempt Operational Emissions
O_3	Cleveland-Akron-Lorain, OH	100	VOC	8.2	1.8	1.8
		100	NO_x	32.8	0.0	0.0
$PM_{2.5}$	Cleveland-Akron-Lorain, OH	100	$PM_{2.5}$	44.7	0.0	0.0
		100	SO_2	0.06	0.0	0.0
		100	NO_x	32.8	0.0	0.0
	Canton-Massillon, OH	100	$PM_{2.5}$	13.5	0.0	0.0
		100	SO_2	0.02	0.0	0.0
		100	NO_x	7.5	0.0	0.0
	Detroit-Ann Arbor, MI	100	$PM_{2.5}$	24.6	0.03	0.03
		100	SO_2	0.03	0.0003	0.0003
		100	NO_x	19.9	3.0	3.0

As discussed in Resource Report 1, NEXUS understands that Texas Eastern will file its own Certificate Application with FERC for approval of its expansion project, which is known as the Texas Eastern Appalachian Lease Project ("TEAL Project"). Note that the TEAL Project (PF15-11) will create the additional firm pipeline capacity necessary to deliver 950,155 dekatherms per day of natural gas production from receipt points in the Appalachian Basin in Texas Eastern's Zone M2, between Berne, Ohio and Uniontown, Pennsylvania, to a proposed interconnection with the NEXUS pipeline in Columbiana County, Ohio. As proposed, the approximate 4.4-mile pipeline looping also includes upgrades to the Colerain Compressor Station in Belmont County, and a new Salineville Compressor Station in Columbiana County, Ohio. The TEAL and NEXUS Projects will both be constructed in 2017 and thus, the potential for cumulative emissions for general conformity applicability purposes from both Projects was assessed. As shown in Table 9B-3, the emissions from the TEAL Project that are subject to general conformity occur within different air quality control regions than the emissions from the NEXUS Project. Thus, the NEXUS and TEAL Projects are located in separate air quality areas for the purposes of general conformity applicability.

TABLE 9B-3

General Conformity Applicability Analysis

Designated Pollutant	Designated Area	Threshold (TPY)	Pollutant or Precursor	2017 Total Non-Exempt Emissions	2018 Total Non-Exempt Emissions	Ongoing Non-Exempt Operational Emissions
O_3	Cleveland-Akron-Lorain, OH	100	VOC	8.2	1.8	1.8
		100	NO_x	32.8	0.0	0.0
$PM_{2.5}$	Wheeling, WV-OH[1]	100	$PM_{2.5}$	2.9	0.2	0.0
		100	SO_2	0.05	0.002	0.0
		100	NO_x	32.3	1.4	0.0
	Cleveland-Akron-Lorain, OH	100	$PM_{2.5}$	44.7	0.0	0.0
		100	SO_2	0.06	0.0	0.0
		100	NO_x	32.8	0.0	0.0
	Canton-Massillon, OH	100	$PM_{2.5}$	13.5	0.0	0.0
		100	SO_2	0.02	0.0	0.0
		100	NO_x	7.5	0.0	0.0
	Detroit-Ann Arbor, MI	100	$PM_{2.5}$	24.6	0.03	0.03
		100	SO_2	0.03	0.0003	0.0003
		100	NO_x	19.9	3.0	3.0

[1]The TEAL Project (PF15-11) is located in this area.

Conclusion

The calculated NEXUS Project non-exempt emissions in federally designated nonattainment or maintenance areas are below the corresponding general conformity applicability thresholds. Therefore, pursuant to §93.153(c)(1), general conformity requirements do not apply to the Project and a general conformity determination is not required.

APPENDIX 9C

Screening Level Ambient Air Quality Analyses

AIR DISPERSION MODELING REPORT

NEXUS Gas Transmission

TRINITY CONSULTANTS
8425 Pulsar Place
Suite 280
Columbus, Ohio 43240
(614) 443-0733

October 2015

Project 143601.0141

Trinity Consultants

Environmental solutions delivered uncommonly well

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1.1. INTRODUCTION

NEXUS Gas Transmission, LLC (NEXUS) is proposing to construct a new natural gas pipeline to facilitate the delivery of natural gas from Appalachian supplies to supply markets in Ohio, Michigan, Chicago, and Ontario. Collectively, this project is referred to as the NEXUS Project. The NEXUS Project includes building the following four compressor stations along the proposed pipeline route:

- Hanoverton Compressor Station in Columbiana County, Ohio;
- Wadsworth Compressor Station in Medina County, Ohio;
- Clyde Compressor Station in Sandusky County, Ohio; and
- Waterville Compressor Station in Lucas County, Ohio.

This report outlines the air dispersion modeling efforts completed in support of the Federal Energy Regulatory Commission ("FERC") filing. Specifically, this report provides the methodology and results of the screening modeling performed for the Hanoverton, Wadsworth, Clyde, and Waterville Compressor Stations, as requested by FERC.

1.2. AIR DISPERSION MODELING SUMMARY

An air dispersion screening analysis has been conducted for the Hanoverton, Wadsworth, Clyde, and Waterville Compressor Stations using the AERSCREEN model. The air quality screening results discussed in this report demonstrate that the compressor stations will not significantly impact the air quality associated with impacts from emissions of particulate matter with an aerodynamic diameter of less than 10 microns, and particulate matter with an aerodynamic diameter of less than 2.5 microns ($PM_{10}/PM_{2.5}$); nitrogen oxides (NO_X); sulfur dioxide (SO_2); and carbon monoxide (CO).

NEXUS conducted a screening analysis to include emissions from the compressor turbines at each of Hanoverton, Wadsworth, Clyde, and Waterville compressor stations. Only the compressor turbines were evaluated as part of the AERSCREEN modeling analysis.

There are only three emission sources present at the compressor stations that could be evaluated for a NAAQS compliance demonstration associated with $PM_{10}/PM_{2.5}$, NO_x, SO_2, and CO are as follows;

1. Solar Titan 250 natural gas fired compressor turbines;
2. Process heaters, fired with natural gas, for each compressor station;
3. A natural gas fired emergency generator.

No other emissions sources are proposed at the compressor stations that have potential emissions of $PM_{10}/PM_{2.5}$, NO_x, SO_2, or CO.

After reviewed the sources above, only the turbines were modeled as part of this modeling analyses. This was due to the following:

1. The natural gas fired emergency generator is an intermittent source of emissions. Based on the March 1, 2011 memo from Tyler Fox of EPA (Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hr NO2 Ambient Air Quality Standard), sources of intermittent emissions can be justifiably excluded from a modeling analysis.

2. The fuel gas heaters are *de minimis* (i.e., emissions less than 10 pounds per day) sources under Ohio Administrative Code (OAC) 3745-15-05. The *de minimis* threshold is specifically designed at conservative levels to ensure only those sources with negligible air impacts are exempted. Therefore, in order to avoid unnecessary analysis for source already identified in EPA-approved State Implementation Plan (SIP) as negligible, the fuel gas heaters were not consequently included within the AERSCREEN modeling assessment for any of the compressor stations evaluated.

Facility-specific design was used for purposes of conducting the air dispersion screening analysis. The turbines were modeled in AERSCREEN using the maximum emission rates for the pollutant of interest at 100% load during normal operations. Normal operations, in this case, are based on operation at annual average temperatures for the compressor station of interest. Startup and shutdown scenarios for the simple cycle compressor turbines at the compressor stations have very brief (sub-hourly) startup and shutdown periods. As these periods are infrequent, and occur over a sub-hourly time period, proper representation of the startup and shutdown period within AERSCREEN (or AERMOD) would be difficult, as the minimum time step evaluated within the AERSCREEN and AERMOD models is one hour. Therefore, a single scenario of evaluating each compressor turbine at 100% load during normal operations was considered for this assessment.

The modeled impacts of the proposed compressor stations were compared against Ohio EPA's Acceptable Incremental Impacts (AII) for each pollutant. Additionally, an appropriate background concentration was added to modeled impacts which were then compared against the respective NAAQS. The primary NAAQS are the maximum concentration ceilings, measured in terms of total concentration of a pollutant in the atmosphere, which define the "levels of air quality which the U.S. EPA judges are necessary, with an adequate margin of safety, to protect the public health."[1] Table 1-1 lists Ohio EPA's AII as well as the respective NAAQS for each pollutant.

[1] 40 CFR §50.2(b).

Table 1-1. Federal and State Modeling Standards

Pollutant	Averaging Period	Primary and Secondary NAAQS ($\mu g/m^3$)	Ohio Acceptable Incremental Impact ($\mu g/m^3$)
$PM_{2.5}$	24-hour	35 [1]	4.5 [3]
	Annual	12 [2]	2 [4]
PM_{10}	24-hour	150 [5]	15 [3]
	Annual	---	8.5 [4]
SO_2	1-hour	196 (0.075ppm) [6]	196 [4]
	3-hour	1300 (0.5 ppm) [3]	256 [3]
	24-hour	365 (0.14 ppm)[3]	45.5 [3]
	Annual	80 (0.030 ppm) [4]	10 [4]
CO	1-hour	40,000 (35 ppm) [3]	10,000 [3]
	8-hour	10,000 (9 ppm) [3]	2,500 [3]
NO_2	1-hour	188 (100 ppb) [7]	188 [4]
	Annual	100 (0.053 ppm) [4]	12.5 [4]

1. The 3-year average of the 98th percentile of 24-hr concentrations.
2. Annual arithmetic mean averaged over 3 years.
3. Not to be exceeded more than once per year.
4. Concentration not to be exceeded.
5. Not to be exceeded more than once per year on average over three years.
6. The 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour concentrations.
7. The 3-year average of the 98th percentile of the annual distribution of daily maximum 1-hour concentrations.

The screening level modeling analysis shows that, even with the conservative modeling representations used, none of the compressor stations will cause a violation of either the NAAQS or Ohio EPA's AII for any criteria pollutant. Therefore, ambient air impacts associated with emissions from the compressor stations as part of the NEXUS Project should not be a concern.

Plot plans of the compressor stations evaluated can be found in Appendix A of this report.

2. HANOVERTON COMPRESSOR STATION

This section summarizes the dispersion modeling analysis conducted for the project at the Hanoverton Compressor Station located in Columbiana County, Ohio. The project includes the installation of two Solar 250 turbines, two small fuel gas heaters, and one natural gas-fired emergency generator. As shown in the results tables in the following section, this modeling analysis predicts project-related concentrations that are below both the NAAQS and Ohio EPA's AII.

2.1. BACKGROUND

The proposed Hanoverton Compressor Station will include the following emission units with potential emissions of $PM_{10}/PM_{2.5}$, NO_x, SO_2, and CO that were included in the screening modeling analysis:

- Two new Solar® Titan 250 26,000 HP (NEMA) natural gas fired turbine-driven compressor units.

As part of its review process, FERC has requested that NEXUS conduct an air dispersion modeling analysis to demonstrate that the proposed project does not violate the NAAQS or Ohio EPA's AII. To meet this requirement, NEXUS has conducted a dispersion modeling analysis using AERSCREEN in a manner that is consistent with modeling performed to satisfy the state modeling requirements. Specifically, AERSCREEN modeling was performed to demonstrate that the proposed project does not result in a violation of the NAAQS standards or Ohio EPA's AII. The following sections outline the modeling procedures followed to complete this screening analysis.

2.2. MODELED EMISSION SOURCES

The AERSCREEN model allows for emission sources to be represented as point, area, or volume sources. For point sources with unobstructed vertical releases, as was the case with all compressor turbines evaluated within this analysis, actual stack parameters (i.e., height, diameter, exhaust gas temperature, and gas exit velocity) were used in the modeling analyses. For sources subject to building downwash (which is the case for all of the compressor turbines evaluated), building information was input into the AERSCREEN model to account for the effects of downwash.

Tables 2-1 and 2-2 present the modeled stack parameters and emission rates, respectively, for the turbines. The coordinates in Table 2-1 are expressed in Universal Transverse Mercator (UTM) North American Datum 83 (NAD83), Zone 17 coordinates.

Table 2-1. Hanoverton Compressor Station Modeling Parameters

ID	Description	UTM East (km)	UTM North (km)	Stack Height (ft)	Stack Temp. (F)	Stack Velocity (ft/s)	Stack Diameter (inch)
P001	Combustion Turbine #1	504.88	4,509.56	51.71	839	60.38	128.64
P002	Combustion Turbine #2	504.91	4,509.58	51.71	839	60.38	128.64

Table 2-2. Hanoverton Compressor Station Modeling Emission Rates

Pollutant	NO_X	CO	SO_2	$PM_{2.5}/PM_{10}$
P001-P002 Emission Rate (lb/hr)	7.78	13.15	0.81	1.58

2.3. MODELING METHODOLOGY

The modeling analysis for the proposed turbines at the Hanoverton Compressor Station was conducted using the EPA AERSCREEN dispersion model. This section describes the modeling methodology and assumptions used to determine model output concentrations resulting from the proposed turbine.

2.3.1. Model Selection

Dispersion models predict pollutant concentrations downwind of a source by simulating the evolution of the pollutant plume over time and space given data inputs that include the quantity of emissions and the initial exhaust release conditions (e.g., velocity, flow rate, and temperature). In accordance with FERC's request, the AERSCREEN model (15181) was used to estimate maximum ground-level concentrations. AERSCREEN is the recommended screening model and is a screening version of AERMOD, EPA's preferred model for near-field dispersion. AERSCREEN interfaces with the MAKEMET, AERMAP, BPIPPRM, and AERMOD programs. The latest version of each program was utilized in these analyses.[2]

AERSCREEN provides results based on 1-hour, 3-hour, 8-hour, 24-hour, and annual averaging periods. AERSCREEN is designed to produce concentration estimates that are more conservative than the results that would be obtained from a similar AERMOD analysis with a fully developed set of meteorological data and receptor grids.

Directly comparing AERSCREEN results (which are highest-1st-high [H1H]) with the NAAQS is extremely conservative since the NAAQS allow for one or more exceedances per year. Table 2-3 summarizes forms of the modeled impacts that would be used to determine compliance with the NAAQS in a true more refined (i.e., less conservative) NAAQS analysis.

[2] The following versions were utilized: MAKEMET version 09183, AERMAP version 11103, BPIPPRM version 04274, and AERMOD version 15181.

Table 2-3. Summary of Forms of Modeled Impacts Used to Determine Compliance

Pollutant	Averaging Period	Form Used to Determine Compliance
PM_{10}	Annual	-
	24-hour	H6H modeled concentration during a five-year meteorological period
$PM_{2.5}$	Annual	Maximum five-year average of the weighted annual mean concentration
	24-hour	Maximum five-year average of the 98th percentile (approximated by the H8H) modeled 24-hour maximum concentration, on a receptor-by-receptor basis
SO_2	Annual	Maximum-modeled annual arithmetic mean impact from five full years of meteorological data
	24-hour	H2H modeled concentration from a five year meteorological period
	3-hour	H2H modeled concentration from a five year meteorological period
	1-hour	Maximum five-year average of the 99th percentile (approximated by the H4H) modeled daily maximum 1-hour concentration, on a receptor-by-receptor basis
NO_2	Annual	Maximum-modeled annual arithmetic mean impact from five full years of meteorological data
	1-hour	Maximum five-year average of the 98th percentile (approximated by the H8H) of modeled daily maximum 1-hour concentration, on a receptor-by-receptor basis
CO	8-hour	H2H modeled concentration from a five year meteorological period
	1-hour	H2H modeled concentration from a five year meteorological period

In contrast, AERSCREEN provides the maximum impacts for each averaging period that occurred over the entire period of meteorological data for each pollutant as opposed to providing the concentration based on both the averaging period specified by each NAAQS standard and ranking from maximum concentration for that averaging period as is done with AERMOD. For example, with the 1-hour NO_2 standard AERMOD provides the maximum 1-hour NO_2 concentration for each day and ranks all the maximums from highest to lowest, and the eighth highest of those concentrations is then selected for comparison with the NAAQS standard. These eighth highest values are then refined further by averaging the value across multiple years, further mitigating infrequent high impacts.

By not using the "form" of the standard as described above, the maximum 1-hour averages resulting from AERSCREEN take the highest impact without regard to how infrequent that scenario may occur or the possible sharp drop-off from the 1st highest impact to the 2nd highest, and so on. AERSCREEN 15181 computed the 1-hour averaged concentrations and scales the results with the following embedded coefficients: the 3-hour coefficient is 1.0, the 8-hour coefficient is 0.9, the 24-hour coefficient is 0.6, and the annual average coefficient is 0.1 of the 1-hour values. The model generated concentrations were used to compare to the different averaging periods of the NAAQS.[3]

In addition to conservatively applying the maximum 1-hour averages without considering the form of each standard, AERSCREEN's predicted impacts themselves are also conservative over-estimates. For example, AERSCREEN calculates values for the plume centerline, regardless of the source-receptor-wind direction orientation.[4] Since AERSCREEN estimates impacts from only one source at a time, the results of each individual

[3] AERSCREEN User's Guide, EPA-454/B-11-001, Research Triangle Park, NC, March 2011.

[4] Ibid.

source were added to each other independent of linear distance. This is very conservative in that it assumes all sources impact the same receptors at the same distance, which they do not when sources have separate stacks. It also assumes the worst case impacts occur from the same meteorological conditions at that distance (ignoring wind direction, source and downwash structure orientation, etc.).[5] In reality, and as accounted for in more refined models, meteorological conditions and building and process equipment configurations will cause the direction of maximum impact vary from source to source.

2.3.2. Building Downwash

Downwash effects are addressed through the use of the AERSCREEN model. Building parameters were input into AERSCREEN, and building downwash were calculated by the Building Profile Input Program (BPIP).

2.3.3. Meteorological Data

Site-specific dispersion models require dispersion meteorology representative of the region within which the source is located. AERSCREEN interfaces with the MAKEMET program to develop a site-specific matrix of screening meteorological conditions based on surface characteristics (i.e., albedo, Bowen Ratio, surface roughness length). The surface characteristics used as input to AERSCREEN were based on AERMET seasonal tables, with the selected surface profile of cultivated land, and climate profile of average. The meteorological data were developed using the latest version of MAKEMET (09183).

2.3.4. Receptor Grids

Ground-level concentrations were calculated for receptors extending 6 kilometers from the compressor station fence line. By default the AERSCREEN model uses 25 meter spacing. The distance from the fence line to the maximum impact, which may lie between receptors, is also explicitly determined by the AERSCREEN model.

2.3.5. NO_2 Modeling Approach

EPA's *Guideline on Air Quality Models* recommends a tiered approach for modeling annual average NO_2 concentrations from point sources. Also, the March 2011 EPA memo Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hr NO_2 National Ambient Air Quality Standard addressed a tiered approach for modeling 1-hr average NO_2. The *Guideline* and memo provides that:

- For Tier 1 estimate modeled concentrations and assume a total conversion of NO to NO_2. If the concentration exceeds the NAAQS for NO_2, proceed to the 2nd level screen.
- For Tier 2 (2nd level) screening analysis, multiply the Tier 1 estimate(s) by an empirically derived NO_2/NO_X value of 0.75 (annual national default) and 0.8 for the 1-hr average derived value.
- For Tier 3 (3rd level) analyses, a detailed screening method may be selected on a case-by-case basis (OLM/PVMRM)

NEXUS's analyses in this report utilized the total NO to NO_2 conversion or Tier 1 approach, for both the 1-hour and annual NO_2 averaging periods to provide a conservative analysis. It was not necessary to use the Tier 2 ratios, as compliance was demonstrated even using the most conservative Tier 1 method.

[5] Maximum impacts from each turbine at the facility were summed together, regardless of the location of the maximum impacts. Each turbine was modeled at a standardized emission rate of 1 lb/hr. The model results were then scaled to the actual emission rate of the unit.

2.3.6. Ambient Background Concentrations

When comparing to the NAAQS, modeled impacts from each compressor station are combined with background concentrations, which represent the air quality concentrations due to sources that are not explicitly modeled (e.g., mobile sources, small stationary sources that do not significantly contribute to regional air quality, non-regulated sources, and large but distant sources). Selection of the existing monitoring station data that is "representative" of the ambient air quality in the area surrounding each compressor station was determined based on the following three criteria:

1. Monitor location,
2. Data quality, and
3. Data currentness.

Table 2-4 summarizes background monitor values used in this modeling analysis.

Table 2-4. Background Concentrations for Hanoverton Compressor Station

Pollutant	Averaging Period	CBSA	Site ID	Background Concentrations ($\mu g/m^3$)
NO_2	1-hour	Athens, OH	39-009-0004	45.90
	Annual			5.74
CO	8-hour	Canton-Massillon, OH	39-151-0020	1,281
	1-hour			1,747
SO_2	Annual	Weirton-Steubenville, WV-OH	54-029-0008	7.48
	24-hour			20.51
	3-hour			69.25
	1-hour			69.25
$PM_{2.5}$	Annual	Weirton-Steubenville, WV-OH	54-009-0011	10.4
	24-hour			24
PM_{10}	Annual	-	-	-
	24-hour	Weirton-Steubenville, WV-OH	54-009-0011	40.33

2.4. ANALYSIS RESULTS

Table 2-5 summarizes the AERSCREEN results for the Hanoverton Compressor Station. The modeled impacts were compared against the respective Ohio AII as well as the NAAQS. All modeling results are below Ohio EPA's AII and the NAAQS.

Table 2-5. Hanoverton Compressor Station AERSCREEN Modeling Results

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)	AERSCREEN Modeled Impact ($\mu g/m^3$)	Combined Impact ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Ohio EPA Acceptable Incremental Impact ($\mu g/m^3$)	PASS/ FAIL
NO_2	Annual	5.74	2.93	8.67	100	12.5	PASS
	1-hour	45.90	29.33	75.24	188	188	PASS
CO	8-hour	1280.89	44.65	1,325.54	10,000	2,500	PASS
	1-hour	1746.67	49.61	1,796.28	40,000	10,000	PASS
SO_2	Annual	7.48	0.31	7.79	80	10	PASS
	24-hour	20.51	1.84	22.35	365	46	PASS
	3-hour	69.25	3.07	72.32	1,300	256	PASS
	1-hour	69.25	3.07	72.32	196	196	PASS
$PM_{2.5}$	Annual	10.40	0.60	11.00	12	2	PASS
	24-hour	24.00	3.58	27.58	35	4.5	PASS
PM_{10}	Annual	-	0.60	0.60	-	8.5	PASS
	24-hour	40.33	3.58	43.91	150	15	PASS

2.5. CLASS I AREA IMPACTS ANALYSIS

Table 2-6 presents the distance to all Class I areas located within 300 km of the proposed Hanoverton Compressor Station. Based on these provided distances and the low potential emissions of the compressor station, the impacts of the project on Class I areas are presumed to be negligible.

Table 2-6. Minimum Distances to the Class I Areas within 300 km of the Hanoverton Compressor Station

Class I Area	Minimum distance from Hanoverton Compressor Station (km)
Dolly Sods Wilderness	239
Otter Creek Wilderness	233

3. WADSWORTH COMPRESSOR STATION

This section summarizes the dispersion modeling analysis conducted for the project at the Wadsworth Compressor Station located in Medina County, Ohio. The project includes the installation of one Solar 250 turbine, one small fuel gas heater, and one natural gas-fired emergency generator. As shown in the results tables in the following section, this modeling analysis predicts project-related concentrations that are below both the NAAQS and Ohio EPA's AII.

3.1. BACKGROUND

The proposed Wadsworth Compressor Station will include the following emission units with potential emissions of $PM_{10}/PM_{2.5}$, NO_x, SO_2, and CO that were included in the modeling analysis:

- One new Solar® Titan 250 26,000 HP (NEMA) natural gas fired turbine-driven compressor unit.

As part of its review process, FERC has requested that NEXUS conduct an air dispersion modeling analysis to demonstrate that the proposed project does not violate the NAAQS or Ohio EPA's AII. To meet this requirement, NEXUS has conducted a dispersion modeling analysis using AERSCREEN in a manner that is consistent with modeling performed to satisfy the state modeling requirements. Specifically, AERSCREEN modeling was performed to demonstrate that the proposed project does not result in a violation of the NAAQS or Ohio EPA's AII. The following sections outline the modeling procedures followed to complete this screening analysis.

3.2. MODELED EMISSION SOURCES

The AERSCREEN model allows for emission sources to be represented as point, area, or volume sources. For point sources with unobstructed vertical releases, as was the case with all compressor turbines evaluated within this analysis, actual stack parameters (i.e., height, diameter, exhaust gas temperature, and gas exit velocity) were used in the modeling analyses. For sources subject to building downwash (which is the case for all of the compressor turbines evaluated), building information was input into the AERSCREEN model to account for the effects of downwash.

Tables 3-1 and 3-2 present the modeled stack parameters and emission rates, respectively, for the turbine. The coordinates in Table 3-1 are expressed in Universal Transverse Mercator (UTM) North American Datum 83 (NAD83), Zone 17 coordinates.

Table 3-1. Wadsworth Compressor Station Modeling Parameters

ID	Description	UTM East (km)	UTM North (km)	Stack Height (ft)	Stack Temp. (F)	Stack Velocity (ft/s)	Stack Diameter (inch)
P001	Combustion Turbine	430.57	4,543.08	51.71	839	60.38	128.64

Table 3-2. Wadsworth Compressor Station Modeling Emission Rates

Pollutant	NO_X	CO	SO_2	$PM_{2.5}/PM_{10}$
P001 Emission Rate (lb/hr)	7.78	13.15	0.81	1.58

3.3. MODELING METHODOLOGY

The modeling analysis for the proposed turbine at the Wadsworth Compressor Station was conducted using the EPA AERSCREEN dispersion model. This section describes the modeling methodology and assumptions used to determine model output concentrations resulting from the proposed turbine.

3.3.1. Model Selection

Dispersion models predict pollutant concentrations downwind of a source by simulating the evolution of the pollutant plume over time and space given data inputs that include the quantity of emissions and the initial exhaust release conditions (e.g., velocity, flow rate, and temperature). In accordance with FERC's request, the AERSCREEN model (15181) was used to estimate maximum ground-level concentrations. AERSCREEN is the recommended screening model and is a screening version of AERMOD, EPA's preferred model for near-field dispersion. AERSCREEN interfaces with the MAKEMET, AERMAP, BPIPPRM, and AERMOD programs. The latest version of each program was utilized in these analyses.[6]

AERSCREEN provides results based on 1-hour, 3-hour, 8-hour, 24-hour, and annual averaging periods. AERSCREEN is designed to produce concentration estimates that are more conservative than the results that would be obtained from a similar AERMOD analysis with a fully developed set of meteorological data and receptor grids.

Directly comparing AERSCREEN results (which are highest-1st-high [H1H]) with the NAAQS is extremely conservative since the NAAQS allow for one or more exceedances per year. Table 3-3 summarizes forms of the modeled impacts that would be used to determine compliance with the NAAQS in a true more refined (i.e., less conservative) NAAQS analysis.

[6] The following versions were utilized: MAKEMET version 09183, AERMAP version 11103, BPIPPRM version 04274, and AERMOD version 15181.

Table 3-3. Summary of Forms of Modeled Impacts Used to Determine Compliance

Pollutant	Averaging Period	Form Used to Determine Compliance
PM_{10}	Annual	-
	24-hour	H6H modeled concentration during a five-year meteorological period
$PM_{2.5}$	Annual	Maximum five-year average of the weighted annual mean concentration
	24-hour	Maximum five-year average of the 98th percentile (approximated by the H8H) modeled 24-hour maximum concentration, on a receptor-by-receptor basis
SO_2	Annual	Maximum-modeled annual arithmetic mean impact from five full years of meteorological data
	24-hour	H2H modeled concentration from a five year meteorological period
	3-hour	H2H modeled concentration from a five year meteorological period
	1-hour	Maximum five-year average of the 99th percentile (approximated by the H4H) modeled daily maximum 1-hour concentration, on a receptor-by-receptor basis
NO_2	Annual	Maximum-modeled annual arithmetic mean impact from five full years of meteorological data
	1-hour	Maximum five-year average of the 98th percentile (approximated by the H8H) of modeled daily maximum 1-hour concentration, on a receptor-by-receptor basis
CO	8-hour	H2H modeled concentration from a five year meteorological period
	1-hour	H2H modeled concentration from a five year meteorological period

In contrast, AERSCREEN provides the maximum impacts for each averaging period that occurred over the entire period of meteorological data for each pollutant as opposed to providing the concentration based on both the averaging period specified by each NAAQS standard and ranking from maximum concentration for that averaging period as is done with AERMOD. For example, with the 1-hour NO_2 standard AERMOD provides the maximum 1-hour NO_2 concentration for each day and ranks all the maximums from highest to lowest, and the eighth highest of those concentrations is then selected for comparison with the NAAQS standard. These eighth highest values are then refined further by averaging the value across multiple years, further mitigating infrequent high impacts.

By not using the "form" of the standard as described above, the maximum 1-hour averages resulting from AERSCREEN take the highest impact without regard to how infrequent that scenario may occur or the possible sharp drop-off from the 1st highest impact to the 2nd highest, and so on. AERSCREEN 15181 computed the 1-hour averaged concentrations and scales the results with the following embedded coefficients: the 3-hour coefficient is 1.0, the 8-hour coefficient is 0.9, the 24-hour coefficient is 0.6, and the annual average coefficient is 0.1 of the 1-hour values. The model generated concentrations were used to compare to the different averaging periods of the NAAQS.[7]

In addition to conservatively applying the maximum 1-hour averages without considering the form of each standard, AERSCREEN's predicted impacts themselves are also conservative over-estimates. For example, AERSCREEN calculates values for the plume centerline, regardless of the source-receptor-wind direction orientation.[8]

[7] AERSCREEN User's Guide, EPA-454/B-11-001, Research Triangle Park, NC, March 2011.

[8] Ibid.

3.3.2. Building Downwash

Downwash effects are addressed through the use of the AERSCREEN model. Building parameters were input into AERSCREEN, and building downwash were calculated by the Building Profile Input Program (BPIP).

3.3.3. Meteorological Data

Site-specific dispersion models require dispersion meteorology representative of the region within which the source is located. AERSCREEN interfaces with the MAKEMET program to develop a site-specific matrix of screening meteorological conditions based on surface characteristics (i.e., albedo, Bowen Ratio, surface roughness length). The surface characteristics used as input to AERSCREEN were based on AERMET seasonal tables, with the selected surface profile of cultivated land, and climate profile of average. The meteorological data were developed using the latest version of MAKEMET (09183).

3.3.4. Receptor Grids

Ground-level concentrations were calculated for receptors extending 6 kilometers from the compressor station fence line. By default the AERSCREEN model uses 25 meter spacing. The distance from the fence line to the maximum impact, which may lie between receptors, is also explicitly determined by the AERSCREEN model.

3.3.5. NO_2 Modeling Approach

EPA's *Guideline on Air Quality Models* recommends a tiered approach for modeling annual average NO_2 concentrations from point sources. Also, the March 2011 EPA memo Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hr NO_2 National Ambient Air Quality Standard addressed a tiered approach for modeling 1-hr average NO_2. The *Guideline* and memo provides that:

- For Tier 1 estimate modeled concentrations and assume a total conversion of NO to NO_2. If the concentration exceeds the NAAQS for NO_2, proceed to the 2nd level screen.
- For Tier 2 (2nd level) screening analysis, multiply the Tier 1 estimate(s) by an empirically derived NO_2/NO_X value of 0.75 (annual national default) and 0.8 for the 1-hr average derived value.
- For Tier 3 (3rd level) analyses, a detailed screening method may be selected on a case-by-case basis (OLM/PVMRM)

NEXUS's analyses in this report utilized the total NO to NO_2 conversion or Tier 1 approach, for both the 1-hour and annual NO_2 averaging periods to provide a conservative analysis. It was not necessary to use the Tier 2 ratios, as compliance was demonstrated even using the most conservative Tier 1 method.

3.3.6. Ambient Background Concentrations

In the screening analyses, modeled impacts from each compressor station are combined with background concentrations, which represent the air quality concentrations due to sources that are not explicitly modeled (e.g., mobile sources, small stationary sources that do not significantly contribute to regional air quality, non-regulated sources, and large but distant sources). Selection of the existing monitoring station data that is "representative" of the ambient air quality in the area surrounding each compressor station was determined based on the following three criteria:

1. Monitor location,
2. Data quality, and

3. Data currentness.

Table 3-4 summarizes background monitor values used in this modeling analysis.

Table 3-4. Background Concentrations for Wadsworth Compressor Station

Pollutant	Averaging Period	CBSA	Site ID	Background Concentrations ($\mu g/m^3$)
NO_2	1-hour	Athens, OH	39-009-0004	45.90
	Annual			5.74
CO	8-hour	Akron, OH	39-153-0020	932
	1-hour			1,630
SO_2	Annual	Akron, OH	39-153-0017	4.31
	24-hour			19.18
	3-hour			58.59
	1-hour			58.59
$PM_{2.5}$	Annual	Cleveland-Elyria-Mentor, OH	39-035-1002	9.5
	24-hour			22
PM_{10}	Annual	-	-	-
	24-hour	Cleveland-Elyria-Mentor, OH	39-035-1002	29

3.4. ANALYSIS RESULTS

Table 3-5 summarizes the AERSCREEN results for the Wadsworth Compressor Station. The modeled impacts were compared against the respective Ohio AII as well as the NAAQS. All modeling results are below Ohio EPA's AII and the NAAQS.

Table 3-5. Wadsworth Compressor Station AERSCREEN Modeling Results

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)	AERSCREEN Modeled Impact ($\mu g/m^3$)	Combined Impact ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Ohio EPA Acceptable Incremental Impact ($\mu g/m^3$)	PASS/ FAIL
NO_2	Annual	5.74	2.19	7.93	100	12.5	PASS
	1-hour	45.90	21.95	67.85	188	188	PASS
CO	8-hour	931.56	33.40	964.96	10,000	2,500	PASS
	1-hour	1630.23	37.11	1,667.34	40,000	10,000	PASS
SO_2	Annual	4.31	0.23	4.54	80	10	PASS

	24-hour	19.18	1.38	20.55	365	46	PASS
	3-hour	58.59	2.30	60.89	1,300	256	PASS
	1-hour	58.59	2.30	60.89	196	196	PASS
$PM_{2.5}$	Annual	9.50	0.45	9.95	12	2	PASS
	24-hour	22.00	2.68	24.68	35	4.5	PASS
PM_{10}	Annual	-	0.45	0.45	-	8.5	PASS
	24-hour	29.00	2.68	31.68	150	15	PASS

3.5. CLASS I AREA IMPACTS ANALYSIS

There is no Class I area located within 300 km of the proposed Wadsworth Compressor Station. Therefore, the impacts of the project on Class I areas are presumed to be negligible.

This section summarizes the dispersion modeling analysis conducted for the project at the Clyde Compressor Station located in Sandusky County, Ohio. The project includes the installation of one Solar 250 turbine, one small fuel gas heater, and one natural gas-fired emergency generator. As shown in the results tables in the following section, this modeling analysis predicts project-related concentrations that are below both the NAAQS, and Ohio EPA's AII.

4.1. BACKGROUND

The proposed Clyde Compressor Station will include the following emission units with potential emissions of $PM_{10}/PM_{2.5}$, NO_x, SO_2, and CO that were included in the modeling analysis:

- One new Solar® Titan 250 26,000 HP (NEMA) natural gas fired turbine-driven compressor unit.

As part of its review process, FERC has requested that NEXUS conduct an air dispersion modeling analysis to demonstrate that the proposed project does not violate the NAAQS or Ohio EPA's AII. To meet this requirement, NEXUS has conducted a dispersion modeling analysis using AERSCREEN in a manner that is consistent with modeling performed to satisfy the state modeling requirements. Specifically, AERSCREEN modeling was performed to demonstrate that the proposed project does not result in a violation of the NAAQS or Ohio EPA's AII. The following sections outline the modeling procedures followed to complete this screening analysis.

4.2. MODELED EMISSION SOURCES

The AERSCREEN model allows for emission sources to be represented as point, area, or volume sources. For point sources with unobstructed vertical releases, as is the case with all compressor turbines evaluated within this analysis, actual stack parameters (i.e., height, diameter, exhaust gas temperature, and gas exit velocity) were used in the modeling analyses. For sources subject to building downwash (which is the case for all of the compressor turbines evaluated), building information was input into the AERSCREEN model to account for the effects of downwash.

Tables 4-1 and 4-2 present the modeled stack parameters and emission rates, respectively, for the turbine. The coordinates in Table 4-1 are expressed in Universal Transverse Mercator (UTM) North American Datum 83 (NAD83), Zone 17 coordinates.

Table 4-1. Clyde Compressor Station Modeling Parameters

ID	Description	UTM East (km)	UTM North (km)	Stack Height (ft)	Stack Temp. (F)	Stack Velocity (ft/s)	Stack Diameter (inch)
P001	Combustion Turbine	341.93	4,579.55	51.71	839	60.38	128.64

Table 4-2. Clyde Compressor Station Modeling Emission Rates

Pollutant	NO_X	CO	SO_2	$PM_{2.5}/PM_{10}$
P001 Emission Rate (lb/hr)	7.78	13.15	0.81	1.58

4.3. MODELING METHODOLOGY

The modeling analysis for the proposed turbine at the Clyde Compressor Station was conducted using the EPA AERSCREEN dispersion model. This section describes the modeling methodology and assumptions used to determine model output concentrations resulting from the proposed turbine.

4.3.1. Model Selection

Dispersion models predict pollutant concentrations downwind of a source by simulating the evolution of the pollutant plume over time and space given data inputs that include the quantity of emissions and the initial exhaust release conditions (e.g., velocity, flow rate, and temperature). In accordance with FERC's request, the AERSCREEN model (15181) was used to estimate maximum ground-level concentrations. AERSCREEN is the recommended screening model and is a screening version of AERMOD, EPA's preferred model for near-field dispersion. AERSCREEN interfaces with the MAKEMET, AERMAP, BPIPPRM, and AERMOD programs. The latest version of each program was utilized in these analyses.[9]

AERSCREEN provides results based on 1-hour, 3-hour, 8-hour, 24-hour, and annual averaging periods. AERSCREEN is designed to produce concentration estimates that are more conservative than the results that would be obtained from a similar AERMOD analysis with a fully developed set of meteorological data and receptor grids.

Directly comparing AERSCREEN results (which are highest-1st-high [H1H]) with the NAAQS is extremely conservative since the NAAQS allow for one or more exceedances per year. Table 4-3 summarizes forms of the modeled impacts that would be used to determine compliance with the NAAQS in a true more refined (i.e., less conservative) NAAQS analysis.

In contrast, AERSCREEN provides the maximum impacts for each averaging period that occurred over the entire period of meteorological data for each pollutant as opposed to providing the concentration based on both the averaging period specified by each NAAQS standard and ranking from maximum concentration for that averaging period as is done with AERMOD. For example, with the 1-hour NO_2 standard AERMOD provides the maximum 1-hour NO_2 concentration for each day and ranks all the maximums from highest to lowest, and the eighth highest of those concentrations is then selected for comparison with the NAAQS standard. These eighth highest values are then refined further by averaging the value across multiple years, further mitigating infrequent high impacts.

[9] The following versions were utilized: MAKEMET version 09183, AERMAP version 11103, BPIPPRM version 04274, and AERMOD version 15181.

Table 4-3. Summary of Forms of Modeled Impacts Used to Determine Compliance

Pollutant	Averaging Period	Form Used to Determine Compliance
PM_{10}	Annual	-
	24-hour	H6H modeled concentration during a five-year meteorological period
$PM_{2.5}$	Annual	Maximum five-year average of the weighted annual mean concentration
	24-hour	Maximum five-year average of the 98th percentile (approximated by the H8H) modeled 24-hour maximum concentration, on a receptor-by-receptor basis
SO_2	Annual	Maximum-modeled annual arithmetic mean impact from five full years of meteorological data
	24-hour	H2H modeled concentration from a five year meteorological period
	3-hour	H2H modeled concentration from a five year meteorological period
	1-hour	Maximum five-year average of the 99th percentile (approximated by the H4H) modeled daily maximum 1-hour concentration, on a receptor-by-receptor basis
NO_2	Annual	Maximum-modeled annual arithmetic mean impact from five full years of meteorological data
	1-hour	Maximum five-year average of the 98th percentile (approximated by the H8H) of modeled daily maximum 1-hour concentration, on a receptor-by-receptor basis
CO	8-hour	H2H modeled concentration from a five year meteorological period
	1-hour	H2H modeled concentration from a five year meteorological period

By not using the "form" of the standard as described above, the maximum 1-hour averages resulting from AERSCREEN take the highest impact without regard to how infrequent that scenario may occur or the possible sharp drop-off from the 1st highest impact to the 2nd highest, and so on. AERSCREEN 15181 computed the 1-hour averaged concentrations and scales the results with the following embedded coefficients: the 3-hour coefficient is 1.0, the 8-hour coefficient is 0.9, the 24-hour coefficient is 0.6, and the annual average coefficient is 0.1 of the 1-hour values. The model generated concentrations were used to compare to the different averaging periods of the NAAQS.[10]

In addition to conservatively applying the maximum 1-hour averages without considering the form of each standard, AERSCREEN's predicted impacts themselves are also conservative over-estimates. For example, AERSCREEN calculates values for the plume centerline, regardless of the source-receptor-wind direction orientation.[11]

4.3.2. Building Downwash

Downwash effects are addressed through the use of the AERSCREEN model. Building parameters were input into AERSCREEN, and building downwash were calculated by the Building Profile Input Program (BPIP).

[10] AERSCREEN User's Guide, EPA-454/B-11-001, Research Triangle Park, NC, March 2011.

[11] Ibid.

4.3.3. Meteorological Data

Site-specific dispersion models require dispersion meteorology representative of the region within which the source is located. AERSCREEN interfaces with the MAKEMET program to develop a site-specific matrix of screening meteorological conditions based on surface characteristics (i.e., albedo, Bowen Ratio, surface roughness length). The surface characteristics used as input to AERSCREEN were based on AERMET seasonal tables, with the selected surface profile of cultivated land, and climate profile of average. The meteorological data were developed using the latest version of MAKEMET (09183).

4.3.4. Receptor Grids

Ground-level concentrations were calculated for receptors extending 6 kilometers from the compressor station fence line. By default the AERSCREEN model uses 25 meter spacing. The distance from the fence line to the maximum impact, which may lie between receptors, is also explicitly determined by the AERSCREEN model.

4.3.5. NO_2 Modeling Approach

EPA's *Guideline on Air Quality Models* recommends a tiered approach for modeling annual average NO_2 concentrations from point sources. Also, the March 2011 EPA memo Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hr NO_2 National Ambient Air Quality Standard addressed a tiered approach for modeling 1-hr average NO_2. The *Guideline* and memo provides that:

- For Tier 1 estimate modeled concentrations and assume a total conversion of NO to NO_2. If the concentration exceeds the NAAQS for NO_2, proceed to the 2nd level screen.
- For Tier 2 (2nd level) screening analysis, multiply the Tier 1 estimate(s) by an empirically derived NO_2/NO_X value of 0.75 (annual national default) and 0.8 for the 1-hr average derived value.
- For Tier 3 (3rd level) analyses, a detailed screening method may be selected on a case-by-case basis (OLM/PVMRM)

NEXUS's analyses in this report utilized the total NO to NO_2 conversion or Tier 1 approach, for both the 1-hour and annual NO_2 averaging periods to provide a conservative analysis. It was not necessary to use the Tier 2 ratios, as compliance was demonstrated even using the most conservative Tier 1 method.

4.3.6. Ambient Background Concentrations

In the screening analyses, modeled impacts from each compressor station are combined with background concentrations, which represent the air quality concentrations due to sources that are not explicitly modeled (e.g., mobile sources, small stationary sources that do not significantly contribute to regional air quality, non-regulated sources, and large but distant sources). Selection of the existing monitoring station data that is "representative" of the ambient air quality in the area surrounding each compressor station was determined based on the following three criteria:

1. Monitor location,
2. Data quality, and
3. Data currentness.

Table 4-4 summarizes background monitor values used in this modeling analysis.

Table 4-4. Background Concentrations for Clyde Compressor Station

Pollutant	Averaging Period	CBSA	Site ID	Background Concentrations ($\mu g/m^3$)
NO_2	1-hour	Athens, OH	39-009-0004	45.90
	Annual			5.74
CO	8-hour	Cleveland-Elyria-Mentor, OH	39-035-0051	4,308
	1-hour			8,268
SO_2	Annual	Cleveland-Elyria-Mentor, OH	39-035-0038	9.35
	24-hour			57.53
	3-hour			186.44
	1-hour			186.44
$PM_{2.5}$	Annual	Cleveland-Elyria-Mentor, OH	39-035-1002	9.5
	24-hour			22
PM_{10}	Annual	-	-	-
	24-hour	Cleveland-Elyria-Mentor, OH	39-035-1002	29

4.4. ANALYSIS RESULTS

Table 4-5 summarizes the AERSCREEN results for the Clyde Compressor Station. The modeled impacts were compared against the respective Ohio AII as well as the NAAQS. All modeling results are below Ohio EPA's AII and the NAAQS.

Table 4-5. Clyde Compressor Station AERSCREEN Modeling Results

Pollutant	Averaging Period	Background Concentration (µg/m³)	AERSCREEN Modeled Impact (µg/m³)	Combined Impact (µg/m³)	NAAQS (µg/m³)	Ohio EPA Acceptable Incremental Impact (µg/m³)	PASS/ FAIL
NO_2	Annual	5.74	2.08	7.81	100	12.5	PASS
	1-hour	45.90	20.76	66.66	188	188	PASS
CO	8-hour	4308.46	31.59	4,340.05	10,000	2,500	PASS
	1-hour	8267.58	35.10	8,302.68	40,000	10,000	PASS
SO_2	Annual	9.35	0.22	9.57	80	10	PASS
	24-hour	57.53	1.30	58.83	365	46	PASS
	3-hour	186.44	2.17	188.61	1,300	256	PASS
	1-hour	186.44	2.17	188.61	196	196	PASS
$PM_{2.5}$	Annual	9.50	0.42	9.92	12	2	PASS
	24-hour	22.00	2.53	24.53	35	4.5	PASS
PM_{10}	Annual	-	0.42	0.42	-	8.5	PASS
	24-hour	29.00	2.53	31.53	150	15	PASS

4.5. CLASS I AREA IMPACTS ANALYSIS

There is no Class I area located within 300 km of the proposed Clyde Compressor Station. Therefore, the impacts of the project on Class I areas are presumed to be negligible.

5. WATERVILLE COMPRESSOR STATION

This section summarizes the dispersion modeling analysis conducted for the project at the Waterville Compressor Station located in Lucas County, OH. The project includes the installation of one Solar 250 turbine, one small fuel gas heater, and one natural gas-fired emergency generator. As shown in the results tables in the following section, this modeling analysis predicts project-related concentrations that are below both the NAAQS and Ohio EPA's AII.

5.1. BACKGROUND

The proposed Waterville Compressor Station will include the following emission units with potential emissions of $PM_{10}/PM_{2.5}$, NO_x, SO_2, and CO that were included in the modeling analysis:

- One new Solar® Titan 250 26,000 HP (NEMA) natural gas fired turbine-driven compressor unit.

As part of its review process, FERC has requested that NEXUS conduct an air dispersion modeling analysis to demonstrate that the proposed project does not violate the NAAQS or Ohio EPA's AII. To meet this requirement, NEXUS has conducted a dispersion modeling analysis using AERSCREEN in a manner that is consistent with modeling performed to satisfy the state modeling requirements. Specifically, AERSCREEN modeling was performed to demonstrate that the proposed project does not result in a violation of the NAAQS or Ohio EPA's AII. The following sections outline the modeling procedures followed to complete this screening analysis.

5.2. MODELED EMISSION SOURCES

The AERSCREEN model allows for emission sources to be represented as point, area, or volume sources. For point sources with unobstructed vertical releases, as was the case with all compressor turbines evaluated within this analysis, actual stack parameters (i.e., height, diameter, exhaust gas temperature, and gas exit velocity) were used in the modeling analyses. For sources subject to building downwash (which is the case for all of the compressor turbines evaluated), building information was input into the AERSCREEN model to account for the effects of downwash.

Tables 5-1 and 5-2 present the modeled stack parameters and emission rates, respectively, for the turbine. The coordinates in Table 5-1 are expressed in Universal Transverse Mercator (UTM) North American Datum 83 (NAD83), Zone 17 coordinates.

Table 5-1. Waterville Compressor Station Modeling Parameters

ID	Description	UTM East (km)	UTM North (km)	Stack Height (ft)	Stack Temp. (F)	Stack Velocity (ft/s)	Stack Diameter (inch)
P001	Combustion Turbine	268.57	4,596.89	51.71	839	60.38	128.64

Table 5-2. Waterville Compressor Station Modeling Emission Rates

Pollutant	NO_X	CO	SO_2	$PM_{2.5}/PM_{10}$
P001 Emission Rate (lb/hr)	7.78	13.15	0.81	1.58

5.3. MODELING METHODOLOGY

The modeling analysis for the proposed turbine at the Waterville Compressor Station was conducted using the EPA AERSCREEN dispersion model. This section describes the modeling methodology and assumptions used to determine model output concentrations resulting from the proposed turbines.

5.3.1. Model Selection

Dispersion models predict pollutant concentrations downwind of a source by simulating the evolution of the pollutant plume over time and space given data inputs that include the quantity of emissions and the initial exhaust release conditions (e.g., velocity, flow rate, and temperature). In accordance with FERC's request, the AERSCREEN model (15181) was used to estimate maximum ground-level concentrations. AERSCREEN is the recommended screening model and is a screening version of AERMOD, EPA's preferred model for near-field dispersion. AERSCREEN interfaces with the MAKEMET, AERMAP, BPIPPRM, and AERMOD programs. The latest version of each program was utilized in these analyses.[12]

AERSCREEN provides results based on 1-hour, 3-hour, 8-hour, 24-hour, and annual averaging periods. AERSCREEN is designed to produce concentration estimates that are more conservative than the results that would be obtained from a similar AERMOD analysis with a fully developed set of meteorological data and receptor grids.

Directly comparing AERSCREEN results (which are highest-1st-high [H1H]) with the NAAQS is extremely conservative since the NAAQS allow for one or more exceedances per year. Table 5-3 summarizes forms of the modeled impacts that would be used to determine compliance with the NAAQS in a true more refined (i.e., less conservative) NAAQS analysis.

[12] The following versions were utilized: MAKEMET version 09183, AERMAP version 11103, BPIPPRM version 04274, and AERMOD version 15181.

Table 5-3. Summary of Forms of Modeled Impacts Used to Determine Compliance

Pollutant	Averaging Period	Form Used to Determine Compliance
PM_{10}	Annual	-
	24-hour	H6H modeled concentration during a five-year meteorological period
$PM_{2.5}$	Annual	Maximum five-year average of the weighted annual mean concentration
	24-hour	Maximum five-year average of the 98th percentile (approximated by the H8H) modeled 24-hour maximum concentration, on a receptor-by-receptor basis
SO_2	Annual	Maximum-modeled annual arithmetic mean impact from five full years of meteorological data
	24-hour	H2H modeled concentration from a five year meteorological period
	3-hour	H2H modeled concentration from a five year meteorological period
	1-hour	Maximum five-year average of the 99th percentile (approximated by the H4H) modeled daily maximum 1-hour concentration, on a receptor-by-receptor basis
NO_2	Annual	Maximum-modeled annual arithmetic mean impact from five full years of meteorological data
	1-hour	Maximum five-year average of the 98th percentile (approximated by the H8H) of modeled daily maximum 1-hour concentration, on a receptor-by-receptor basis
CO	8-hour	H2H modeled concentration from a five year meteorological period
	1-hour	H2H modeled concentration from a five year meteorological period

In contrast, AERSCREEN provides the maximum impacts for each averaging period that occurred over the entire period of meteorological data for each pollutant as opposed to providing the concentration based on both the averaging period specified by each NAAQS standard and ranking from maximum concentration for that averaging period as is done with AERMOD. For example, with the 1-hour NO_2 standard AERMOD provides the maximum 1-hour NO_2 concentration for each day and ranks all the maximums from highest to lowest, and the eighth highest of those concentrations is then selected for comparison with the NAAQS standard. These eighth highest values are then refined further by averaging the value across multiple years, further mitigating infrequent high impacts.

By not using the "form" of the standard as described above, the maximum 1-hour averages resulting from AERSCREEN take the highest impact without regard to how infrequent that scenario may occur or the possible sharp drop-off from the 1st highest impact to the 2nd highest, and so on. AERSCREEN 15181 computed the 1-hour averaged concentrations and scales the results with the following embedded coefficients: the 3-hour coefficient is 1.0, the 8-hour coefficient is 0.9, the 24-hour coefficient is 0.6, and the annual average coefficient is 0.1 of the 1-hour values. The model generated concentrations were used to compare to the different averaging periods of the NAAQS.[13]

In addition to conservatively applying the maximum 1-hour averages without considering the form of each standard, AERSCREEN's predicted impacts themselves are also conservative over-estimates. For example, AERSCREEN calculates values for the plume centerline, regardless of the source-receptor-wind direction orientation.[14]

[13] AERSCREEN User's Guide, EPA-454/B-11-001, Research Triangle Park, NC, March 2011.

[14] Ibid.

5.3.2. Building Downwash

Downwash effects are addressed through the use of the AERSCREEN model. Building parameters were input into AERSCREEN, and building downwash were calculated by the Building Profile Input Program (BPIP).

5.3.3. Meteorological Data

Site-specific dispersion models require dispersion meteorology representative of the region within which the source is located. AERSCREEN interfaces with the MAKEMET program to develop a site-specific matrix of screening meteorological conditions based on surface characteristics (i.e., albedo, Bowen Ratio, surface roughness length). The surface characteristics used as input to AERSCREEN were based on AERMET seasonal tables, with the selected surface profile of cultivated land, and climate profile of average. The meteorological data were developed using the latest version of MAKEMET (09183).

5.3.4. Receptor Grids

Ground-level concentrations were calculated for receptors extending 6 kilometers from the compressor station fence line. By default the AERSCREEN model uses 25 meter spacing. The distance from the fence line to the maximum impact, which may lie between receptors, is also explicitly determined by the AERSCREEN model.

5.3.5. NO_2 Modeling Approach

EPA's *Guideline on Air Quality Models* recommends a tiered approach for modeling annual average NO_2 concentrations from point sources. Also, the March 2011 EPA memo Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hr NO_2 National Ambient Air Quality Standard addressed a tiered approach for modeling 1-hr average NO_2. The *Guideline* and memo provides that:

- For Tier 1 estimate modeled concentrations and assume a total conversion of NO to NO_2. If the concentration exceeds the NAAQS for NO_2, proceed to the 2nd level screen.
- For Tier 2 (2nd level) screening analysis, multiply the Tier 1 estimate(s) by an empirically derived NO_2/NO_X value of 0.75 (annual national default) and 0.8 for the 1-hr average derived value.
- For Tier 3 (3rd level) analyses, a detailed screening method may be selected on a case-by-case basis (OLM/PVMRM)

NEXUS's analyses in this report utilized the total NO to NO_2 conversion or Tier 1 approach, for both the 1-hour and annual NO_2 averaging periods to provide a conservative analysis. It was not necessary to use the Tier 2 ratios, as compliance was demonstrated even using the most conservative Tier 1 method.

5.3.6. Ambient Background Concentrations

In the screening analyses, modeled impacts from each compressor station are combined with background concentrations, which represent the air quality concentrations due to sources that are not explicitly modeled (e.g., mobile sources, small stationary sources that do not significantly contribute to regional air quality, non-regulated sources, and large but distant sources). Selection of the existing monitoring station data that is "representative" of the ambient air quality in the area surrounding each compressor station was determined based on the following three criteria:

1. Monitor location,
2. Data quality, and
3. Data currentness.

Table 5-4 summarizes background monitor values used in this modeling analysis.

Table 5-4. Background Concentrations for Waterville Compressor Station

Pollutant	Averaging Period	CBSA	Site ID	Background Concentrations ($\mu g/m^3$)
NO_2	1-hour	Athens, OH	39-009-0004	45.90
	Annual			5.74
CO	8-hour	Detroit-Warren-Livonia, MI	26-163-0001	1,281
	1-hour			1,747
SO_2	Annual	Lima, OH	39-003-0009	2.66
	24-hour			13.32
	3-hour			29.30
	1-hour			29.30
$PM_{2.5}$	Annual	Detroit-Warren-Livonia, MI	26-163-0001	9.9
	24-hour			24
PM_{10}	Annual	-	-	-
	24-hour	Detroit-Warren-Livonia, MI	26-163-0001	30.33

5.4. ANALYSIS RESULTS

Table 5-5 summarizes the AERSCREEN results for the Waterville Compressor Station. The modeled impacts were compared against the respective Ohio AII as well as the NAAQS. All modeling results are below Ohio EPA's AII and the NAAQS.

Table 5-5. Waterville Compressor Station AERSCREEN Modeling Results

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)	AERSCREEN Modeled Impact ($\mu g/m^3$)	Combined Impact ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Ohio EPA Acceptable Incremental Impact ($\mu g/m^3$)	PASS/ FAIL
NO_2	Annual	5.74	2.14	7.88	100	12.5	PASS
	1-hour	45.90	21.41	67.31	188	188	PASS
CO	8-hour	1280.89	32.59	1,313.48	10,000	2,500	PASS
	1-hour	1746.67	36.20	1,782.88	40,000	10,000	PASS
SO_2	Annual	2.66	0.22	2.89	80	10	PASS
	24-hour	13.32	1.34	14.66	365	46	PASS
	3-hour	29.30	2.24	31.54	1,300	256	PASS
	1-hour	29.30	2.24	31.54	196	196	PASS
$PM_{2.5}$	Annual	9.90	0.44	10.34	12	2	PASS
	24-hour	24.00	2.61	26.61	35	4.5	PASS
PM_{10}	Annual	-	0.44	0.44	-	8.5	PASS
	24-hour	30.33	2.61	32.94	150	15	PASS

5.5. CLASS I AREA IMPACTS ANALYSIS

There is no Class I area located within 300 km of the proposed Waterville Compressor Station. Therefore, the impacts of the project on Class I areas are presumed to be negligible.

APPENDIX A: COMPRESSOR STATION PLOT PLANS

APPENDIX A: COMPRESSOR STATION PLOT PLANS BOUND SEPARATELY UNDER VOLUME IV – CRITICAL ENERGY INFRASTRUCUTRE INFORMATION – NOT FOR PUBLIC RELEASE

APPENDIX 9D

Construction Emissions Calculations

Table 9D-1

NEXUS Project
Construction Period Emissions Summary

		2017 Emission Totals (Tons)							
County	**Activity**	**CO_2**	**CO**	**NOx**	**PM_{10}**	**PM_{25}**	**SO_2**	**VOC**	**HAPS**
Columbiana	Non-Road and On-Road Construction Vehicles and Worker Commutes	5,576.3	76.5	18.6	1.1	1.0	0.039	3.1	0.34
	Fugitive Dust	0.0	0.00	0.00	150.7	15.4	0.000	0.00	0.00
	Blowdown and Purge - Construction	552.2	0.00	0.00	0.0	0.0	0.000	0.14	0.00
	Blowdown and Purge - Operation	602.80	0.00	0.00	0.0	0.0	0.000	2.27	0.00
	Open Burning	0.00	14.68	0.41	1.4	1.4	0.000	0.36	0.00
	TOTAL	**6,731.3**	**91.2**	**19.0**	**153.2**	**17.9**	**0.039**	**5.9**	**0.34**
Stark	Non-Road and On-Road Construction Vehicles	2,392.8	9.1	7.1	0.4	0.4	0.016	0.9	0.15
	Fugitive Dust	0.0	0.00	0.00	108.9	11.6	0.000	0.00	0.00
	Blowdown and Purge - Construction	0.0	0.00	0.00	0.0	0.0	0.000	0.00	0.00
	Blowdown and Purge - Operation	114.89	0.00	0.00	0.0	0.0	0.000	0.15	0.00
	Open Burning	0.00	15.41	0.43	1.5	1.5	0.000	0.38	0.00
	TOTAL	**2,507.7**	**24.5**	**7.5**	**110.8**	**13.5**	**0.016**	**1.4**	**0.15**
Summit	Non-Road and On-Road Construction Vehicles and Worker Commutes	2,024.7	12.3	7.4	0.4	0.4	0.014	0.9	0.13
	Fugitive Dust	0.0	0.00	0.00	65.7	7.0	0.000	0.00	0.00
	Blowdown and Purge - Construction	0.0	0.00	0.00	0.0	0.0	0.000	0.00	0.00
	Blowdown and Purge - Operation	85.75	0.00	0.00	0.0	0.0	0.000	0.11	0.00
	Open Burning	0.00	35.66	0.99	3.5	3.5	0.000	0.87	0.00
	TOTAL	**2,110.4**	**47.9**	**8.4**	**69.6**	**10.9**	**0.014**	**1.9**	**0.13**
Wayne	Non-Road and On-Road Construction Vehicles and Worker Commutes	856.4	5.0	2.1	0.1	0.1	0.006	0.3	0.08
	Fugitive Dust	0.0	0.00	0.00	34.8	3.7	0.000	0.00	0.00
	Blowdown and Purge - Construction	0.0	0.00	0.00	0.0	0.0	0.000	0.00	0.00
	Blowdown and Purge - Operation	34.19	0.00	0.00	0.0	0.0	0.000	0.04	0.00
	Open Burning	0.00	14.34	0.40	1.4	1.4	0.000	0.35	0.00
	TOTAL	**890.6**	**19.3**	**2.5**	**36.3**	**5.2**	**0.006**	**0.7**	**0.08**
Medina	Non-Road and On-Road Construction Vehicles	5,054.6	59.4	16.3	0.9	0.9	0.035	2.6	0.30
	Fugitive Dust	0.0	0.00	0.00	163.8	17.2	0.000	0.00	0.00
	Blowdown and Purge - Construction	4,657.7	0.00	0.00	0.0	0.0	0.000	1.15	0.00
	Blowdown and Purge - Operation	128.90	0.00	0.00	0.0	0.0	0.000	0.17	0.00
	Open Burning	0.00	33.49	0.93	3.3	3.3	0.000	0.82	0.00
	TOTAL	**9,841.1**	**92.9**	**17.3**	**168.0**	**21.4**	**0.035**	**4.7**	**0.30**
Lorain	Non-Road and On-Road Construction Vehicles	1,931.0	9.7	6.5	0.4	0.4	0.013	0.8	0.12
	Fugitive Dust	0.0	0.00	0.00	88.5	9.4	0.000	0.00	0.00
	Blowdown and Purge - Construction	0.0	0.00	0.00	0.0	0.0	0.000	0.00	0.00
	Blowdown and Purge - Operation	117.69	0.00	0.00	0.0	0.0	0.000	0.15	0.00
	Open Burning	0.00	26.44	0.74	2.6	2.6	0.000	0.64	0.00
	TOTAL	**2,048.7**	**36.1**	**7.2**	**91.5**	**12.4**	**0.013**	**1.6**	**0.12**
Huron	Non-Road and On-Road Construction Vehicles	464.7	3.4	1.8	0.1	0.1	0.003	0.2	0.03
	Fugitive Dust	0.0	0.00	0.00	13.0	1.4	0.000	0.00	0.00
	Blowdown and Purge - Construction	0.0	0.00	0.00	0.0	0.0	0.000	0.00	0.00
	Blowdown and Purge - Operation	19.06	0.00	0.00	0.0	0.0	0.000	0.03	0.00
	Open Burning	0.00	0.88	0.02	0.1	0.1	0.000	0.02	0.00
	TOTAL	**483.7**	**4.3**	**1.9**	**13.2**	**1.6**	**0.003**	**0.3**	**0.03**
Erie	Non-Road and On-Road Construction Vehicles and Worker Commutes	2,971.2	18.3	10.9	0.6	0.6	0.020	1.3	0.15
	Fugitive Dust	0.0	0.00	0.00	135.9	14.4	0.000	0.00	0.00
	Blowdown and Purge - Construction	0.0	0.00	0.00	0.0	0.0	0.000	0.0000	0.00
	Blowdown and Purge - Operation	339.92	0.00	0.00	0.0	0.0	0.000	0.94	0.00
	Open Burning	0.00	29.63	0.82	2.9	2.9	0.000	0.72	0.00
	TOTAL	**3,311.1**	**47.9**	**11.8**	**139.4**	**18.0**	**0.020**	**3.0**	**0.15**
Sandusky	Non-Road and On-Road Construction Vehicles and Worker Commutes	6,019.0	65.4	20.0	1.1	1.1	0.042	3.0	0.36
	Fugitive Dust	0.0	0.00	0.00	191.1	19.7	0.000	0.00	0.00
	Blowdown and Purge - Construction	0.0	0.00	0.00	0.0	0.0	0.000	0.0000	0.00

Table 9D-1

	Blowdown and Purge - Operation	176.54	0.00	0.00	0.0	0.0	0.000	0.23	0.00
	Open Burning	0.00	20.82	0.58	2.0	2.0	0.000	0.51	0.00
	TOTAL	**6,195.5**	**86.2**	**20.6**	**194.3**	**22.8**	**0.042**	**3.8**	**0.36**
Wood	Non-Road and On-Road Construction Vehicles and Worker Commutes	2,031.9	11.1	7.4	0.4	0.4	0.014	0.9	0.12
	Fugitive Dust	0.0	0.00	0.00	92.1	9.8	0.000	0.00	0.00
	Blowdown and Purge - Construction	0.0	0.00	0.00	0.0	0.0	0.000	0.0000	0.00
	Blowdown and Purge - Operation	98.08	0.00	0.00	0.0	0.0	0.000	0.13	0.00
	Open Burning	0.00	6.12	0.17	0.6	0.6	0.000	0.15	0.00
	TOTAL	**2,130.0**	**17.2**	**7.6**	**93.2**	**10.8**	**0.014**	**1.1**	**0.12**
Lucas	Non-Road and On-Road Construction Vehicles and Worker Commutes	3,560.9	51.9	11.4	0.7	0.6	0.025	2.0	0.21
	Fugitive Dust	0.0	0.00	0.00	88.2	9.3	0.000	0.00	0.00
	Blowdown and Purge - Construction	10,075.0	0.00	0.00	0.0	0.0	0.000	2.4790	0.00
	Blowdown and Purge - Operation	43.72	0.00	0.00	0.0	0.0	0.000	0.06	0.00
	Open Burning	0.00	1.47	0.04	0.1	0.1	0.000	0.04	0.00
	TOTAL	**13,679.6**	**53.4**	**11.5**	**89.0**	**10.1**	**0.025**	**4.6**	**0.21**
Henry	Non-Road and On-Road Construction Vehicles and Worker Commutes	89.6	0.3	0.3	0.0	0.0	0.001	0.0	0.01
	Fugitive Dust	0.0	0.00	0.00	4.0	0.4	0.000	0.00	0.00
	Blowdown and Purge - Construction	0.0	0.00	0.00	0.0	0.0	0.000	0.000	0.00
	Blowdown and Purge - Operation	5.04	0.00	0.00	0.0	0.0	0.000	0.01	0.00
	Open Burning	0.00	3.91	0.11	0.4	0.4	0.000	0.10	0.00
	TOTAL	**94.6**	**4.2**	**0.4**	**4.4**	**0.8**	**0.001**	**0.1**	**0.01**
Fulton	Non-Road and On-Road Construction Vehicles and Worker Commutes	1,515.8	5.8	4.5	0.3	0.3	0.010	0.6	0.09
	Fugitive Dust	0.0	0.00	0.00	78.5	8.3	0.000	0.00	0.00
	Blowdown and Purge - Construction	0.0	0.00	0.00	0.0	0.0	0.000	0.000	0.00
	Blowdown and Purge - Operation	100.32	0.00	0.00	0.0	0.0	0.000	0.13	0.00
	Open Burning	0.00	5.22	0.15	0.5	0.5	0.000	0.13	0.00
	TOTAL	**1,616.2**	**11.0**	**4.7**	**79.3**	**9.1**	**0.010**	**0.8**	**0.09**
Lenawee	Non-Road and On-Road Construction Vehicles and Worker Commutes	2,862.2	13.5	9.0	0.5	0.5	0.019	1.1	0.19
	Fugitive Dust	0.0	0.00	0.00	106.9	11.4	0.000	0.00	0.00
	Blowdown and Purge - Construction	52.3	0.00	0.00	0.0	0.0	0.000	0.013	0.00
	Blowdown and Purge - Operation	122.74	0.00	0.00	0.0	0.0	0.000	0.16	0.00
	Open Burning	0.00	0.88	0.02	0.1	0.1	0.000	0.02	0.00
	TOTAL	**3,037.1**	**14.4**	**9.0**	**107.5**	**12.0**	**0.019**	**1.3**	**0.19**
Monroe	Non-Road and On-Road Construction Vehicles and Worker Commutes	713.6	3.2	2.0	0.1	0.1	0.005	0.3	0.05
	Fugitive Dust	0.0	0.00	0.00	28.5	3.0	0.000	0.00	0.00
	Blowdown and Purge - Construction	0.0	0.00	0.00	0.0	0.0	0.000	0.000	0.00
	Blowdown and Purge - Operation	36.43	0.00	0.00	0.0	0.0	0.000	0.05	0.00
	Open Burning	0.00	33.49	0.93	3.3	3.3	0.000	0.82	0.00
	TOTAL	**750.0**	**36.7**	**3.0**	**31.9**	**6.4**	**0.005**	**1.1**	**0.05**
Washtenaw	Non-Road and On-Road Construction Vehicles and Worker Commutes	3,005.1	24.9	11.5	0.6	0.6	0.021	1.5	0.20
	Fugitive Dust	0.0	0.00	0.00	88.2	9.4	0.000	0.00	0.00
	Blowdown and Purge - Construction	5,282.8	0.00	0.00	0.0	0.0	0.000	1.300	0.00
	Blowdown and Purge - Operation	278.27	0.00	0.00	0.0	0.0	0.000	0.86	0.00
	Open Burning	0.00	71.33	1.98	6.9	6.9	0.000	1.74	0.00
	TOTAL	**8,566.2**	**24.88**	**11.52**	**88.9**	**10.0**	**0.021**	**3.63**	**0.20**
Wayne	Non-Road and On-Road Construction Vehicles and Worker Commutes	780.4	8.5	2.4	0.2	0.2	0.006	0.4	0.04
	Fugitive Dust	0.0	0.00	0.00	4.1	0.4	0.000	0.00	0.00
	Blowdown and Purge - Construction	0.0	0.00	0.00	0.0	0.0	0.000	0.000	0.00
	Blowdown and Purge - Operation	6.16	0.00	0.00	0.0	0.0	0.000	0.01	0.00
	Open Burning	0.00	6.12	0.17	0.6	0.6	0.000	0.15	0.00
	TOTAL	**786.6**	**14.6**	**2.6**	**4.8**	**1.2**	**0.006**	**0.6**	**0.04**
PROJECT TOTAL		**64,780.5**	**626.8**	**146.4**	**1475.3**	**184.0**	**0.289**	**36.6**	**2.58**

Table 9D-2

NEXUS Project
General Conformity Emissions Estimate
Construction Year 2017 and Ongoing Operation

Air Quality Region	Nonattainment/ Maintenance Pollutant	County	Project Component	Estimate of Emissions (tons/year)								General Conformity Applicability Thresholds (tons/year)			
				2017				Ongoing Operation[2]							
				PM2.5	SO2	NOX	VOC	PM2.5	SO2	NOX	VOC	PM2.5	SO2	NOX	VOC
		Summit, OH	Pipeline - Mainline - 15.3 miles	10.87	0.014	8.37	1.75	0.00	0.00	0.00	0.45				
			Pipeline -Mainline - 23.0 miles	14.66	0.014	7.74	1.65	0.00	0.00	0.00	0.68				
		Medina, OH	Wadsworth Compressor Station	6.77	0.021	9.52	1.78	0.00	0.00	0.00	0.00				
	2008 Ozone	Lorain, OH	Pipeline -Mainline - 21.0 miles	12.36	0.013	7.21	1.43	0.00	0.00	0.00	0.62				
	2006 PM-2.5 - Maintenance		Purge and Blowdown of Pipeline and Compressor Stations - Construction												
	2012 - PM2.5 Nonattaiment - Lorain	Air Quality Region	Period Only[1]	0.00	0.00	0.00	1.58	0.00	0.00	0.00	0.00				
Cleveland - Akron - Lorain, OH	County Only	NA	**TOTALS**	**44.65**	**0.06**	**32.84**	**8.20**	**0.00**	**0.00**	**0.00**	**1.75**	100	100	100	50
		Stark, OH	Pipeline - Mainline - 20.5 miles	13.50	0.02	7.51	NA	0.00	0.00	0.00	NA				
Canton - Massillon, OH	PM-2.5 - Maintenance	NA	**TOTALS**	**13.50**	**0.02**	**7.51**	**NA**	**0.00**	**0.00**	**0.00**	**NA**	100	100	100	NA
		Monroe, MI	Pipeline - Mainline - 6.5 miles	6.42	0.005	2.98	NA	0.00	0.00	0.00	NA				
		Washtenaw, MI	Pipeline - Mainline - 17.9 miles	16.81	0.018	12.10	NA	0.00	0.00	0.00	NA				
		Wayne, MI	Pipeline - Mainline - 1.1 miles	1.19	0.006	2.61	NA	0.00	0.00	0.00	NA				
			Willow Run M&R Station Construction	0.13	0.003	1.40	NA	0.00	0.00	0.00	NA				
			Purge and Blowdown of M&R Station - Construction Period Only[1]	0.00	0.00	0.00	NA	0.00	0.00	0.00	NA				
		Washtenaw, MI	Combustion Sources at Willow Run M&R Station[2]	0.01	0.0001	0.75	NA	0.03	0.0003	3.00	NA				
Detroit - Ann Arbor, MI	PM-2.5 Maintenance	NA	**TOTALS**	**24.55**	**0.03**	**19.85**	**NA**	**0.03**	**0.0003**	**3.00**	**NA**	100	100	100	NA

1. Also includes the maintenance blowdown and fugitive operational emissions from the pipeline and M&R components that will occur in the same year as construction.
2. Represents the ongoing operational emissions beginning in 2017 and includes the operational emissions from M&R components (i.e., combustion source operational emissions from the M&R Station).

Table 9D-3

NEXUS Project
Construction Activity Summary

Summary of Construction Activity and Material Delivery Emissions

Activity	2017 Emission Totals (Tons)							
	CO_2	CO	NOx	PM_{10}	PM_{25}	SO_2	VOC	HAPS
Mainline Route - Stark, OH	2.12E+03	6.06E+00	6.79E+00	4.24E-01	4.19E-01	1.41E-02	7.79E-01	9.93E-02
Mainline Route - Summit, OH	1.82E+03	9.98E+00	7.16E+00	4.05E-01	4.01E-01	1.27E-02	8.15E-01	9.51E-02
Mainline Route - Medina, OH	1.92E+03	7.66E+00	6.59E+00	4.01E-01	3.96E-01	1.31E-02	7.62E-01	9.36E-02
Mainline Route - Lorain, OH	1.75E+03	7.75E+00	6.29E+00	3.74E-01	3.69E-01	1.20E-02	7.23E-01	8.63E-02
Mainline Route - Wayne, OH	5.61E+02	1.73E+00	1.82E+00	1.14E-01	1.12E-01	3.77E-03	2.08E-01	2.67E-02
Mainline Route - Huron, OH	4.36E+02	3.12E+00	1.80E+00	9.72E-02	9.64E-02	3.05E-03	2.12E-01	2.27E-02
Mainline Route - Erie, OH	2.35E+03	9.35E+00	9.30E+00	5.53E-01	5.47E-01	1.60E-02	1.01E+00	8.22E-02
Mainline Route - Sandusky, OH	2.80E+03	1.27E+01	1.02E+01	6.01E-01	5.94E-01	1.92E-02	1.17E+00	1.38E-01
Mainline Route - Fulton, OH	1.35E+03	4.02E+00	4.37E+00	2.74E-01	2.70E-01	9.10E-03	5.00E-01	6.42E-02
Mainline Route - Henry, OH	8.06E+01	2.41E-01	2.67E-01	1.64E-02	1.62E-02	5.37E-04	2.99E-02	3.66E-03
Mainline Route - Wood, OH	1.87E+03	9.37E+00	7.24E+00	4.13E-01	4.09E-01	1.28E-02	8.18E-01	8.99E-02
Mainline Route - Lucas, OH	5.63E+02	1.67E+00	1.81E+00	1.14E-01	1.12E-01	3.79E-03	2.08E-01	2.68E-02
Mainline Route - Monroe, MI	6.18E+02	2.12E+00	1.95E+00	1.23E-01	1.21E-01	4.25E-03	2.33E-01	3.31E-02
Mainline Route - Washtenaw, MI	2.36E+03	1.57E+01	9.85E+00	5.40E-01	5.35E-01	1.67E-02	1.14E+00	1.31E-01
Mainline Route - Lenawee, MI	2.54E+03	1.00E+01	8.69E+00	5.24E-01	5.17E-01	1.74E-02	1.01E+00	1.29E-01
Mainline Route - Wayne, MI	7.72E+02	8.42E+00	2.43E+00	1.63E-01	1.60E-01	5.76E-03	4.15E-01	4.14E-02
Hanoverton Compressor Station - Columbiana, OH	2.62E+03	4.61E+01	9.20E+00	5.32E-01	5.25E-01	1.85E-02	1.68E+00	1.18E-01
Wadsworth Compressor Station - Medina, OH	2.62E+03	4.61E+01	9.20E+00	5.32E-01	5.25E-01	1.85E-02	1.68E+00	1.18E-01
Clyde Compressor Station - Sandusky, OH	2.62E+03	4.61E+01	9.20E+00	5.32E-01	5.25E-01	1.85E-02	1.68E+00	1.18E-01
Waterville Compressor Station - Lucas - OH	2.62E+03	4.61E+01	9.20E+00	5.32E-01	5.25E-01	1.85E-02	1.68E+00	1.18E-01
NEXUS/Kensington M&R Station - Columbiana, OH	3.47E+02	5.91E+00	1.35E+00	7.87E-02	7.78E-02	2.45E-03	2.28E-01	1.66E-02
NEXUS/Texas Eastern M&R Station - Columbiana, OH	3.47E+02	5.91E+00	1.35E+00	7.87E-02	7.78E-02	2.45E-03	2.28E-01	1.66E-02
NEXUS/TGP M&R Station - Columbiana, OH	3.47E+02	5.91E+00	1.35E+00	7.87E-02	7.78E-02	2.45E-03	2.28E-01	1.66E-02
NEXUS/Dominion East Ohio M&R Station - Erie, OH	3.47E+02	5.91E+00	1.35E+00	7.87E-02	7.78E-02	2.45E-03	2.28E-01	1.66E-02
NEXUS/Willow Run M&R Station - Washtenaw, MI	3.47E+02	5.89E+00	1.35E+00	7.87E-02	7.78E-02	2.45E-03	2.28E-01	1.66E-02
TOTAL	**37,444.5**	**330.0**	**134.8**	**7.9**	**7.8**	**0.3**	**18.4**	**1.8**

Summary of Commuting Emissions

Activity	2017 Emission Totals (Tons)							
	CO_2	CO	NOx	PM_{10}	PM_{25}	SO_2	VOC	HAPS
Mainline Route - Columbiana, OH	1.58E+02	1.73E+00	1.68E-01	4.07E-03	3.60E-03	1.05E-03	5.41E-02	2.85E-02
Mainline Route - Stark, OH	2.76E+02	3.02E+00	2.93E-01	7.11E-03	6.29E-03	1.84E-03	9.44E-02	4.96E-02
Mainline Route - Summit, OH	2.07E+02	2.27E+00	2.20E-01	5.34E-03	4.73E-03	1.38E-03	7.09E-02	3.73E-02
Mainline Route - Medina, OH	2.04E+02	2.23E+00	2.17E-01	5.26E-03	4.65E-03	1.36E-03	6.98E-02	3.67E-02
Mainline Route - Lorain, OH	1.78E+02	1.95E+00	1.89E-01	4.60E-03	4.07E-03	1.19E-03	6.10E-02	3.21E-02
Mainline Route - Wayne, OH	2.96E+02	3.24E+00	3.14E-01	7.62E-03	6.74E-03	1.97E-03	1.01E-01	5.32E-02
Mainline Route - Huron, OH	2.88E+01	3.15E-01	3.06E-02	7.43E-04	6.57E-04	1.92E-04	9.86E-03	5.19E-03
Mainline Route - Erie, OH	2.29E+02	2.50E+00	2.43E-01	5.90E-03	5.22E-03	1.52E-03	7.83E-02	4.12E-02
Mainline Route - Sandusky, OH	2.89E+02	3.17E+00	3.07E-01	7.46E-03	6.60E-03	1.93E-03	9.90E-02	5.21E-02
Mainline Route - Fulton, OH	1.62E+02	1.77E+00	1.71E-01	4.16E-03	3.68E-03	1.07E-03	5.53E-02	2.91E-02
Mainline Route - Henry, OH	9.00E+00	9.85E-02	9.55E-03	2.32E-04	2.05E-04	5.99E-05	3.08E-03	1.62E-03
Mainline Route - Wood, OH	1.57E+02	1.72E+00	1.67E-01	4.05E-03	3.58E-03	1.05E-03	5.37E-02	2.83E-02
Mainline Route - Lucas, OH	7.09E+01	7.76E-01	7.53E-02	1.83E-03	1.62E-03	4.72E-04	2.43E-02	1.28E-02
Mainline Route - Monroe, MI	9.52E+01	1.04E+00	1.01E-01	2.45E-03	2.17E-03	6.34E-04	3.26E-02	1.71E-02
Mainline Route - Washtenaw, MI	2.54E+02	2.78E+00	2.70E-01	6.55E-03	5.79E-03	1.69E-03	8.69E-02	4.57E-02
Mainline Route - Lenawee, MI	3.19E+02	3.49E+00	3.38E-01	8.22E-03	7.27E-03	2.12E-03	1.09E-01	5.74E-02
Mainline Route - Wayne, MI	8.66E+00	9.48E-02	9.19E-03	2.23E-04	1.98E-04	5.76E-05	2.96E-03	1.56E-03
Hanoverton Compressor Station - Columbiana, OH	3.06E+02	3.35E+00	3.25E-01	7.89E-03	6.98E-03	2.04E-03	1.05E-01	5.51E-02
Wadsworth Compressor Station - Medina, OH	3.06E+02	3.35E+00	3.25E-01	7.89E-03	6.98E-03	2.04E-03	1.05E-01	5.51E-02
Clyde Compressor Station - Sandusky, OH	3.06E+02	3.35E+00	3.25E-01	7.89E-03	6.98E-03	2.04E-03	1.05E-01	5.51E-02
Waterville Compressor Station - Lucas - OH	3.06E+02	3.35E+00	3.25E-01	7.89E-03	6.98E-03	2.04E-03	1.05E-01	5.51E-02
NEXUS/Kensington M&R Station - Columbiana, OH	4.76E+01	5.20E-01	5.05E-02	1.23E-03	1.08E-03	3.17E-04	1.63E-02	8.56E-03
NEXUS/Texas Eastern M&R Station - Columbiana, OH	4.76E+01	5.20E-01	5.05E-02	1.23E-03	1.08E-03	3.17E-04	1.63E-02	8.56E-03
NEXUS/TGP M&R Station - Columbiana, OH	4.76E+01	5.20E-01	5.05E-02	1.23E-03	1.08E-03	3.17E-04	1.63E-02	8.56E-03
NEXUS/Dominion East Ohio M&R Station - Erie, OH	4.76E+01	5.20E-01	5.05E-02	1.23E-03	1.08E-03	3.17E-04	1.63E-02	8.56E-03
NEXUS/Willow Run M&R Station - Washtenaw, MI	4.76E+01	5.20E-01	5.05E-02	1.23E-03	1.08E-03	3.17E-04	1.63E-02	8.56E-03
TOTAL	**4,405.6**	**48.2**	**4.7**	**0.1**	**0.1**	**0.03**	**1.5**	**0.8**

Summary of Fugitive Dust Emissions

Activity	2017 Emission Totals (Tons)	
	PM_{10}	PM_{25}
Mainline Route - Columbiana, OH	5.00E+01	5.00E+00
Mainline Route - Stark, OH	1.09E+02	1.16E+01
Mainline Route - Summit, OH	6.57E+01	6.99E+00
Mainline Route - Medina, OH	1.03E+02	1.10E+01
Mainline Route - Lorain, OH	8.85E+01	9.41E+00
Mainline Route - Wayne, OH	3.48E+01	3.67E+00
Mainline Route - Huron, OH	1.30E+01	1.39E+00

Table 9D-3

Mainline Route - Erie, OH	1.31E+02	1.40E+01
Mainline Route - Sandusky, OH	1.36E+02	1.40E+01
Mainline Route - Fulton, OH	7.85E+01	8.35E+00
Mainline Route - Henry, OH	3.98E+00	4.23E-01
Mainline Route - Wood, OH	9.21E+01	9.79E+00
Mainline Route - Lucas, OH	5.27E+01	5.60E+00
Mainline Route - Monroe, MI	2.85E+01	3.03E+00
Mainline Route - Washtenaw, MI	8.78E+01	9.33E+00
Mainline Route - Lenawee, MI	1.07E+02	1.14E+01
Mainline Route - Wayne, MI	4.06E+00	4.32E-01
Hanoverton Compressor Station - Columbiana, OH	9.08E+01	9.38E+00
Wadsworth Compressor Station - Medina, OH	6.03E+01	6.24E+00
Clyde Compressor Station - Sandusky, OH	5.53E+01	5.63E+00
Waterville Compressor Station - Lucas - OH	3.55E+01	3.67E+00
NEXUS/Kensington M&R Station - Columbiana, OH	2.46E+00	2.55E-01
NEXUS/Texas Eastern M&R Station - Columbiana, OH	4.76E+00	4.84E-01
NEXUS/TGP M&R Station - Columbiana, OH	2.63E+00	2.79E-01
NEXUS/Dominion East Ohio M&R Station - Erie, OH	4.42E+00	4.70E-01
NEXUS/Willow Run M&R Station - Washtenaw, MI	4.68E-01	4.84E-02
TOTAL	**1443.07**	**151.82**

Table 9D-4

NEXUS Project
Blowdown and Purge Emissions - Construction Period

		Construction Year 2017						
Component	**County**	**Natural Gas Loss (mmscf)**	**Natural Gas Loss[1] (lbs)**	**Total VOC[2] (lbs)**	**Total VOC (tons)**	**Total CO2 (tons)**	**Methane (tons)**	**Total CO2e (tons)**
Pipeline								
	Columbinana	0.2	7,899	47	0.02	0.0	3.8	94.7
	Medina	9.2	388,487	2,292	1.15	1.1	186.3	4,657.7
	Lucas	20.0	840,336	4,958	2.48	2.5	402.9	10,075.0
Mainline	Washtenaw	10.4	436,275	2,574	1.29	1.3	209.2	5,230.6
M&R Stations								
NEXUS/Kensington M&R Station	Columbiana	0.1336	5,614	33.1	0.01656	0.0166	2.692	67.3
NEXUS/Texas Eastern M&R Station	Columbiana	0.6881	28,911	170.6	0.08529	0.0853	13.861	346.62
NEXUS/TGP M&R Station	Columbiana	0.0864	3,632	21.43	0.01071	0.0107	1.741	43.55
NEXUS/Willow Run M&R Station	Washtenaw	0.1037	4,359	25.7	0.01286	0.0129	2.090	52.3

Notes:

1. Taken from AP-42 Appendix A stating density of Natural Gas is approximatley (1 lb/23.8 ft^3)

1. Based upon VOC, CO2, and methane contents of 0.85%, 0.51%, and 95.39%, respectively, based upon the expected natural gas composition.

3. The global warming potential of CO2 and Methane is 1 and 25, respectively

Summary by County

	Construction Year 2017	
County	**Total VOC**	**Total CO2e**
Columbiana	0.14	552.2
Medina	1.15	4,657.7
Lucas	2.48	10,074.96
Washtenaw	1.30	5,282.8

NEXUS Project
Maintenance Blowdown and Fugitive Emissions - Operational Emissions

			Construction Year 2017					Ongoing Operation				
Component	County	Length (miles)	Total VOC[1] (lbs)	Total VOC (tons)	Total CO2 (tons)	Methane (tons)	Total CO2e (tons)	Total VOC[1] (lbs)	Total VOC (tons)	Total CO2 (tons)	Methane (tons)	Total CO2e (tons)
Pipeline[3]												
	Columbiana	12.3	181	0.09	0.044	2.8	68.9	724	0.36	0.176	11.0	275.7
	Stark	20.5	302	0.15	0.073	4.6	114.9	1,207	0.60	0.293	18.4	459.6
	Summit	15.3	225	0.11	0.055	3.4	85.7	901	0.45	0.218	13.7	343.0
	Wayne	6.1	90	0.04	0.022	1.4	34.2	359	0.18	0.087	5.5	136.7
	Medina	23.0	339	0.17	0.082	5.2	128.9	1,354	0.68	0.328	20.6	515.6
	Lorain	21.0	309	0.15	0.075	4.7	117.7	1,236	0.62	0.300	18.8	470.8
	Huron	3.4	50	0.03	0.012	0.8	19.1	200	0.10	0.049	3.0	76.2
	Erie	28.9	425	0.21	0.103	6.5	162.0	1,702	0.85	0.413	25.9	647.9
	Sandusky	31.5	464	0.23	0.112	7.1	176.5	1,855	0.93	0.450	28.2	706.2
	Wood	17.5	258	0.13	0.062	3.9	98.1	1,030	0.52	0.250	15.7	392.3
	Lucas	7.8	115	0.06	0.028	1.7	43.7	459	0.23	0.111	7.0	174.9
	Henry	0.9	13	0.01	0.003	0.2	5.0	53	0.03	0.013	0.8	20.2
	Fulton	17.9	263	0.13	0.064	4.0	100.3	1,054	0.53	0.256	16.0	401.3
	Lenawee	21.9	322	0.16	0.078	4.9	122.7	1,289	0.64	0.313	19.6	491.0
	Monroe	6.5	96	0.05	0.023	1.5	36.4	383	0.19	0.093	5.8	145.7
	Washtenaw	17.9	263	0.13	0.064	4.0	100.3	1,054	0.53	0.256	16.0	401.3
Mainline	Wayne	1.1	16	0.01	0.004	0.2	6.2	65	0.03	0.016	1.0	24.7
M&R Stations[4]												
NEXUS/Kensington M&R Station	Columbiana	NA	1,454	0.727	NA	NA	178.0	5,817	2.91	NA	NA	711.8
NEXUS/Texas Eastern M&R Station	Columbiana	NA	1,454	0.727	NA	NA	178.0	5,817	2.91	NA	NA	711.8
NEXUS/TGP M&R Station	Columbiana	NA	1,454	0.727	NA	NA	178.0	5,817	2.91	NA	NA	711.8
NEXUS/Dominion East Ohio M&R Station	Erie	NA	1,454	0.727	NA	NA	178.0	5,817	2.91	NA	NA	711.8
NEXUS/Willow Run M&R Station	Washtenaw	NA	1,454	0.727	NA	NA	178.0	5,817	2.91	NA	NA	711.8

Notes:
1. Based upon VOC, CO2, and methane contents of 0.85%, 0.51%, and 95.39%, respectively, based upon the expected natural gas composition.
2. The global warming potential of CO2 and Methane is 1 and 25, respectively
3. Based upon the API Compendum Methodology provided below.
4. Estimates based on vendor data, emission calculation techniques provided in AP-42, 40 CFR Part 98, U.S. EPA's Protocol for Equipment Leak Emissions Estimates (EPA 453/R-95-017), and historic sampling data for similar sites.

Summary by County

	Construction Year 2017		Ongoing Operation	
County	Total VOC	Total CO2e	Total VOC	Total CO2e
Columbiana	2.272	602.8	9.087	2,411.2
Stark	0.151	114.9	0.603	459.6
Summit	0.113	85.7	0.450	343.0
Wayne	0.045	34.2	0.180	136.7
Medina	0.169	128.9	0.677	515.6
Lorain	0.155	117.7	0.618	470.8
Huron	0.025	19.1	0.100	76.2
Erie	0.940	339.9	3.759	1,359.7
Sandusky	0.232	176.5	0.927	706.2
Wood	0.129	98.1	0.515	392.3
Lucas	0.057	43.7	0.230	174.9
Henry	0.007	5.0	0.026	20.2
Fulton	0.132	100.3	0.527	401.3
Lenawee	0.161	122.7	0.645	491.0
Monroe	0.048	36.4	0.191	145.7
Washtenaw	0.859	278.3	3.435	1,113.1
Wayne	0.008	6.2	0.032	24.7

Basis - American Petroleum Institute Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry, August 2009 ("API Compendium")

	Fugitive	Blowdown
M&R	Table 6-6	Table 5-26 - Miscellaneous
Pipeline	Table 6-6	Table 5-26 - Pipeline

Fugitive

Table 6-6 Fugitive Emission factors for NG Transmission and Storage Equipment

Transmission Pipeline	1.32E-06	ton CH4/mile-hr	1.35E-06
Transmission Pipeline - CO2 from Oxidation	4.33E-07	ton CO2/mile-hr	1.11E-07
Transmission Pipeline - CO2 from Leaks	8.69E-08	ton CO2/mile-hr	2.23E-08
		tonVOC/mile-hr	4.44E-08
M&R Stations	1.44E-04	ton CH4/Station-hr	1.47E-04
		ton CO2/Station-hr	2.19E-06
		ton VOC/Station-hr	4.84E-06

Blowdown

Table 5-26 Transmission Segment CH4 Emission Factors for Non-Routine Activities

Miscellaneous Blowdown (M&R, Pigging, and etc	23.9752425	ton CH4/Station-yr	24.486
		ton CO2/Station-yr	0.363
		ton VOC/Station-yr	0.804
Transmission Pipeline Venting/Blowdown	0.865864505	ton CH4/mile-yr	0.884
		ton CO2/mile-yr	0.013
		ton VOC/mile-yr	0.029

Table 9D-6

NEXUS Project
Open Burning Emissions During Construction

County	Open Burning (acres)	Emissions (tons/year)			
		CO	NOx	$PM_{10}/PM_{2.5}$	VOC
Columbiana	9	14.68	0.41	1.43	0.36
Stark	9	15.41	0.43	1.50	0.38
Summit	21	35.66	0.99	3.47	0.87
Wayne	8	14.34	0.40	1.40	0.35
Medina	19	33.49	0.93	3.26	0.82
Lorain	15	26.44	0.74	2.57	0.64
Huron	1	0.88	0.02	0.09	0.02
Erie	17	29.63	0.82	2.89	0.72
Sandusky	12	20.82	0.58	2.03	0.51
Wood	4	6.12	0.17	0.60	0.15
Lucas	1	1.47	0.04	0.14	0.04
Henry	2	3.91	0.11	0.38	0.10
Fulton	3	5.22	0.15	0.51	0.13
Lenawee	1	0.88	0.02	0.09	0.02
Monroe	19	33.49	0.93	3.26	0.82
Washtenaw	41	71.33	1.98	6.94	1.74
Wayne	4	6.12	0.17	0.60	0.15
Total	**185**	**319.91**	**8.90**	**31.15**	**7.79**

Open Burning Emission Factors

$PM_{10}/PM_{2.5}$[1]	14.0	g/kg
CO[1]	143.8	g/kg
NOx[2]	4.0	g/kg
VOC[2]	3.5	g/kg
Fuel Loading[3]	12.0	tons fuel/acre burned

[1]U.S. EPA AP42 Emission Factor Table 13.1.4
[2]U.S. EPA AP42 Emission Factors Section and Table 13.1.3
[3]U.S. EPA AP42 Emission Factor Table 13.1-1
[4]Emissions of SO_2 are negligible per U.S. EPA AP42 Section 13.1.3

Table 9D-7

NEXUS Project
Fugitive Dust Emissions During Construction (Wind Erosion)

County	Exposed Soils (acre-months)	PM Emissions (tons)	
		PM_{10}	$PM_{2.5}$
Columbiana	1,763	13.96	2.09
Stark	1,730	13.70	2.05
Summit	1,045	8.27	1.24
Wayne	484	3.83	0.57
Medina	2,156	17.07	2.56
Lorain	1,407	11.14	1.67
Huron	207	1.64	0.25
Erie	2,160	17.10	2.56
Sandusky	1,394	11.04	1.66
Wood	1,464	11.59	1.74
Lucas	1,139	9.02	1.35
Henry	63	0.50	0.08
Fulton	1,248	9.88	1.48
Lenawee	1,699	13.45	2.02
Monroe	454	3.59	0.54
Washtenaw	1,399	11.08	1.66
Wayne	65	0.51	0.08
Total	19,878	157.37	23.61

Fugitive Dust Emission Factors (Wind Erosion)

PM_{10}[2]	7.92E-03	ton/acre-month
$PM_{2.5}$[1,2]	1.19E-03	ton/acre-month

1. Wind erosion of exposed areas (seeded land, stripped or graded overburden) = 0.38 ton TSP/acre/yr (WRAP Fugitive Dust Handbook, Table 11-6)
2. PM_{10}/TSP = 0.5, $PM_{2.5}$/PM_{10} = 0.15, (WRAP Fugitive Dust Handbook, Section 7-2)
3. Water and other approved dust suppressants would be used at construction sites (50% minumum control applied per WRAP Fugitive Dust Handbook).

Table 9D-8
NEXUS Project Construction Equipment Air Emissions - SP 1 Columbiana Co. MP 0-12.5

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	x		6	9	2270002069	62	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	6.57	0.010	0.024	0.0015	0.0015	0.0000	0.0019	0.0002
Dozer - D8 w/Winch	305	x		6	9	2270002069	455	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	48.42	0.071	0.175	0.0108	0.0108	0.0003	0.0141	0.0011
Dozer - D7 w/Winch	235	x		6	9	2270002069	509	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	41.73	0.033	0.099	0.0060	0.0060	0.0002	0.0119	0.0010
Dozer - D7	235	x		6	9	2270002069	108	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	8.85	0.007	0.021	0.0013	0.0013	0.0000	0.0025	0.0002
Tac rig (Auto) D6	200	x		6	9	2270002069	231	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	16.14	0.013	0.038	0.0023	0.0023	0.0001	0.0046	0.0004
Sideboom - 583	310	x		6	9	2270002069	1,589	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	171.83	0.251	0.620	0.0382	0.0382	0.0010	0.0500	0.0039
Sideboom - 572	240	x		6	9	2270002069	69	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	5.81	0.005	0.014	0.0008	0.0008	0.0000	0.0017	0.0001
Bend Machine - PB 32-42	173	x		6	9	2270002033	108	530.03	1.10	3.87	0.24	0.24	0.0033	0.32	0.012	0.43	4.69	0.010	0.034	0.0021	0.0021	0.0000	0.0028	0.0001
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	440	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	58.28	0.072	0.177	0.0112	0.0112	0.0003	0.0162	0.0013
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	779	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	81.53	0.100	0.248	0.0157	0.0157	0.0005	0.0226	0.0019
Backhoe - 325 (1.38 cy)	180	x		6	9	2270002036	872	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	54.73	0.033	0.109	0.0057	0.0057	0.0003	0.0148	0.0013
Backhoe - 325 w/Hoe-Ram	180	x		6	9	2270002036	177	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	11.14	0.007	0.022	0.0012	0.0012	0.0001	0.0030	0.0003
Backhoe, 215 / 320 w/hyd. Saw (feller buncher)	140	x		6	9	2270002036	108	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	5.27	0.005	0.012	0.0011	0.0011	0.0000	0.0015	0.0001
Backhoe, 215 / 320 w/hyd. Thumb	140	x		6	9	2270002036	108	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	5.27	0.005	0.012	0.0011	0.0011	0.0000	0.0015	0.0001
Clearing/brushing, Log Skidder	200	x		6	9	2270007015	108	638.34	0.29	1.10	0.05	0.05	0.0032	0.17	0.012	0.54	8.22	0.004	0.014	0.0006	0.0006	0.0000	0.0021	0.0002
Clearing/Brushing, Loader, Brush Cutter Attachment	80	x		6	9	2270007015	108	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	3.65	0.007	0.008	0.0008	0.0008	0.0000	0.0009	0.0001
Clearing/brushing, Delimber	140	x		6	9	2270007015	108	638.31	0.50	1.26	0.11	0.11	0.0033	0.17	0.012	0.54	5.75	0.005	0.011	0.0010	0.0010	0.0000	0.0016	0.0001
Clearing/brushing, Loader, Brush Rake Attachment	80	x		6	9	2270007015	216	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	7.30	0.014	0.015	0.0017	0.0017	0.0000	0.0019	0.0001
Clearing/brushing, Wood chipper	70	x		6	9	2270007015	108	708.88	1.40	3.64	0.13	0.13	0.0039	0.19	0.012	0.54	3.19	0.006	0.016	0.0006	0.0006	0.0000	0.0008	0.0001
Backhoe/Loader - 430	100	X		6	9	2270002060	903	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	31.48	0.043	0.102	0.0103	0.0103	0.0002	0.0104	0.0007
Backhoe/Loader - 420	93	X		6	9	2270002060	62	595.50	2.00	2.08	0.26	0.26	0.0034	0.20	0.012	0.59	2.22	0.007	0.008	0.0010	0.0010	0.0000	0.0008	0.0000
Loader - 980 Wheel	392	X		6	9	2270002060	108	536.28	0.97	2.40	0.14	0.14	0.0031	0.17	0.012	0.59	14.77	0.027	0.066	0.0039	0.0039	0.0001	0.0047	0.0003
Loader - 966 Wheel	262	X		6	9	2270002060	339	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	31.02	0.031	0.093	0.0061	0.0061	0.0002	0.0096	0.0007
Motor Grader - 14M	259	X		6	9	2270002048	201	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	18.12	0.014	0.042	0.0025	0.0025	0.0001	0.0051	0.0004
Trencher - Trencor 1660 HD	800	X		6	9	2270002030	116	535.80	1.69	4.56	0.24	0.24	0.0032	0.32	0.012	0.59	32.26	0.102	0.275	0.0142	0.0142	0.0002	0.0195	0.0007
Crane - 50 Ton Truck	280	X		6	5	2270002045	133	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	9.35	0.007	0.029	0.0013	0.0013	0.0001	0.0029	0.0002
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	111	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	4.48	0.004	0.015	0.0011	0.0011	0.0000	0.0015	0.0001
Crane - 150 Ton	170	X		6	5	2270002045	0	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Ozzie Padder	400	X		6	9	2270002036	224	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	31.21	0.038	0.095	0.0060	0.0060	0.0002	0.0087	0.0007
Drill, Boring mach. 16"-42" (600,000 #)	95	X		7	9	2270002033	378	589.01	2.17	4.03	0.40	0.40	0.0036	0.43	0.012	0.43	10.03	0.037	0.069	0.0068	0.0068	0.0001	0.0072	0.0002
CAT 815 COMPACTOR	200	X		6	9	2270002015	108	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	7.53	0.008	0.022	0.0015	0.0015	0.0000	0.0023	0.0002
Farm Tractor	175	X		6	9	2270002075	139	536.32	0.48	1.42	0.09	0.09	0.0029	0.16	0.012	0.59	8.48	0.008	0.022	0.0014	0.0014	0.0000	0.0025	0.0002
Nonroad Industrial Equipment																								
Compressor - 1600 CFM	590	X		6	9	2270006015	46	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	6.87	0.011	0.039	0.0017	0.0017	0.0000	0.0026	0.0002
Compressor - 1200 CFM	590	X		6	9	2270006015	46	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	6.87	0.011	0.039	0.0017	0.0017	0.0000	0.0026	0.0002
Compressor - 600 CFM	185	X		6	9	2270006015	231	530.45	0.45	2.05	0.09	0.09	0.0030	0.19	0.012	0.43	10.76	0.009	0.042	0.0019	0.0019	0.0001	0.0038	0.0002
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	231	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	2.91	0.003	0.018	0.0005	0.0005	0.0000	0.0009	0.0001
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	658	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	2.20	0.009	0.017	0.0013	0.0013	0.0000	0.0018	0.0000
Welders	46	X		6	9	2270006025	2,561	693.43	3.59	4.72	0.58	0.58	0.0043	0.80	0.012	0.21	18.91	0.098	0.129	0.0159	0.0159	0.0001	0.0219	0.0003
Pressure washers	10		X	6	7	2265006030	96	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.94	0.250	0.002	0.0001	0.0001	0.0000	0.0046	0.0002
Chain Saw	1		X	6	9	2265004021	648	1,227.52	206.95	2.52	0.31	0.31	0.0224	7.08	0.229	0.40	0.35	0.059	0.001	0.0001	0.0001	0.0000	0.0020	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	2,181	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	37.36	0.836	0.090	0.0037	0.0037	0.0007	0.0263	0.0122
Pump - 1500 GPM Fill	32		X	6	8	2265006010	219	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	3.76	0.084	0.009	0.0004	0.0004	0.0001	0.0026	0.0012
Pump - Test	32		X	6	8	2265006010	219	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	3.76	0.084	0.009	0.0004	0.0004	0.0001	0.0026	0.0012
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**
Welding Rig w/ 2 x 300 Amp	45	X		6	9		38,417	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		50.72	0.061	0.153	0.0091	0.0084	0.0004	0.0217	0.0021
Pickup 4 x 4	300		X	6	4		111,034	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		57.66	0.631	0.061	0.0015	0.0013	0.0004	0.0197	0.0104
SUV 4 x 4	250		X	6	4		12,034	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		6.25	0.068	0.007	0.0002	0.0001	0.0000	0.0021	0.0011
Truck, Crewcab, 4x4	400	X		6	4		1,543	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.04	0.002	0.006	0.0004	0.0003	0.0000	0.0009	0.0001
Suburban	300		X	6	4		411	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.21	0.002	0.000	0.0000	0.0000	0.0000	0.0001	0.0000
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		3,471	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.58	0.006	0.014	0.0008	0.0008	0.0000	0.0020	0.0002

Table 9D-8
NEXUS Project Construction Equipment Air Emissions - SP 1 Columbiana Co. MP 0-12.5

AUT Equipment Unit & 4 Wheel Drive Crew Cab Truck	400	X		6	6		2,314	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.06	0.004	0.009	0.0005	0.0005	0.0000	0.0013	0.0001
Auto maintenance Truck	300		X	6	4		10,903	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		5.66	0.062	0.006	0.0001	0.0001	0.0000	0.0019	0.0010
Truck - 1 Ton Flatbed	300	X		6	4		1,440	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.90	0.002	0.006	0.0003	0.0003	0.0000	0.0008	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		12,394	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		16.36	0.020	0.049	0.0029	0.0027	0.0001	0.0070	0.0007
Truck - 6 Ton Flatbed	330	X		6	4		3,137	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.14	0.005	0.012	0.0007	0.0007	0.0000	0.0018	0.0002
Truck - 6 Ton Winch	330	X		6	4		5,349	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		7.06	0.009	0.021	0.0013	0.0012	0.0001	0.0030	0.0003
Truck - 5 CY Dump	300	X		6	9		1,736	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.29	0.003	0.007	0.0004	0.0004	0.0000	0.0010	0.0001
Truck - 12 YD Dump	330	X		6	9		10,414	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		13.75	0.017	0.041	0.0025	0.0023	0.0001	0.0059	0.0006
Truck - Medium Duty Tractor	300	X		6	9		11,571	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		15.28	0.019	0.046	0.0027	0.0025	0.0001	0.0065	0.0006
Truck - Concrete Mixer	350	X		6	9		2,661	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.51	0.004	0.011	0.0006	0.0006	0.0000	0.0015	0.0001
Bus - Minibus	180	X		6	4		1,234	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.63	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Bus - 26 Passenger	300	X		6	4		4,783	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.31	0.008	0.019	0.0011	0.0010	0.0001	0.0027	0.0003
Bus - 45 Passenger	300	X		6	4		771	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.02	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Truck, End Dump 12cy	350	X		6	9		8,100	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		10.69	0.013	0.032	0.0019	0.0018	0.0001	0.0046	0.0005
Truck, Skid	300	X		6	9		2,083	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.75	0.003	0.008	0.0005	0.0005	0.0000	0.0012	0.0001
Truck, Stringing Tractor (25 Ton)	300	X		6	9		15,621	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		20.62	0.025	0.062	0.0037	0.0034	0.0002	0.0088	0.0009
Truck, Tire truck	300	X		6	4		3,189	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.21	0.005	0.013	0.0008	0.0007	0.0000	0.0018	0.0002
Truck, Wrecker truck	300	X		6	4		2,726	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.60	0.004	0.011	0.0006	0.0006	0.0000	0.0015	0.0002

Construction Workers				**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
				2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Worker Commutes				304,514	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		158.14	1.729	0.168	0.0041	0.0036	0.0011	0.0541	0.0285

Deliveries / Removals	**Empty Vehicle Weight (tons)**	**Full Vehicle Weight (tons)**	**Round Trip Distance (miles)**		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
					2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
On-road delivery vehicles																					
Truck - 4000 Gallon Fuel	13.5	27.5	50.0		5,467	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		6.78	0.008	0.018	0.0011	0.0010	0.0001	0.0028	0.0005
Truck - Fuel/Lube	5.0	10.0	50.0		5,467	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		6.78	0.008	0.018	0.0011	0.0010	0.0001	0.0028	0.0005
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		6,399	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		7.94	0.009	0.021	0.0012	0.0011	0.0001	0.0033	0.0006
On-road material removal vehicles																					
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		7,640	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		9.48	0.011	0.025	0.0015	0.0014	0.0001	0.0039	0.0007

Construction Areas				**Disturbed Acreage (acre-months)**	**WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)**									**2017 Emission Totals (Tons)**							
					CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Area under construction (Exposed Soils)				455	NA	NA	NA	0.11	0.01	NA	NA	NA		NA	NA	NA	50.0281	5.0028	NA	NA	NA

Table 9D-9
NEXUS Project Construction Equipment Air Emissions - Mainline - Stark - MP 12.5-34.2

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	x		6	9	2270002069	100	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	10.67	0.016	0.038	0.0024	0.0024	0.0001	0.0031	0.0002
Dozer - D8 w/Winch	305	x		6	9	2270002069	756	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	80.43	0.118	0.290	0.0179	0.0179	0.0005	0.0234	0.0018
Dozer - D7 w/Winch	235	x		6	9	2270002069	825	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	67.66	0.053	0.161	0.0097	0.0097	0.0004	0.0193	0.0016
Dozer - D7	235	x		6	9	2270002069	625	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	51.22	0.040	0.122	0.0073	0.0073	0.0003	0.0146	0.0012
Tac rig (Auto) D6	200	x		6	9	2270002069	370	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	25.83	0.020	0.062	0.0037	0.0037	0.0001	0.0074	0.0006
Sideboom - 583	310	x		6	9	2270002069	2,553	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	276.10	0.404	0.996	0.0613	0.0613	0.0016	0.0804	0.0063
Sideboom - 572	240	x		6	9	2270002069	116	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	9.69	0.008	0.023	0.0014	0.0014	0.0001	0.0028	0.0002
Bend Machine - PB 32-42	173	x		6	9	2270002033	177	530.03	1.10	3.87	0.24	0.24	0.0033	0.32	0.012	0.43	7.71	0.016	0.056	0.0035	0.0035	0.0000	0.0046	0.0002
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	725	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	96.12	0.118	0.292	0.0185	0.0185	0.0005	0.0267	0.0022
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	1,296	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	135.62	0.167	0.413	0.0261	0.0261	0.0008	0.0377	0.0031
Backhoe - 325 (1.38 cy)	180	x		6	9	2270002036	1,443	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	90.58	0.055	0.181	0.0094	0.0094	0.0005	0.0245	0.0021
Backhoe - 325 w/Hoe-Ram	180	x		6	9	2270002036	285	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	17.92	0.011	0.036	0.0019	0.0019	0.0001	0.0049	0.0004
Backhoe, 215 / 320 w/hyd. Saw (feller buncher)	140	x		6	9	2270002036	193	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	9.42	0.009	0.021	0.0021	0.0021	0.0001	0.0027	0.0002
Backhoe, 215 / 320 w/hyd. Thumb	140	x		6	9	2270002036	193	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	9.42	0.009	0.021	0.0021	0.0021	0.0001	0.0027	0.0002
Clearing/brushing, Log Skidder	200	x		6	9	2270007015	193	638.34	0.29	1.10	0.05	0.05	0.0032	0.17	0.012	0.54	14.68	0.007	0.025	0.0010	0.0010	0.0001	0.0038	0.0003
Clearing/Brushing, Loader, Brush Cutter Attachment	80	x		6	9	2270007015	193	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	6.52	0.013	0.014	0.0015	0.0015	0.0000	0.0017	0.0001
Clearing/brushing, Delimber	140	x		6	9	2270007015	193	638.31	0.50	1.26	0.11	0.11	0.0033	0.17	0.012	0.54	10.27	0.008	0.020	0.0018	0.0018	0.0001	0.0028	0.0002
Clearing/brushing, Loader, Brush Rake Attachment	80	x		6	9	2270007015	386	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	13.04	0.025	0.027	0.0029	0.0029	0.0001	0.0033	0.0002
Clearing/brushing, Wood chipper	70	x		6	9	2270007015	193	708.88	1.40	3.64	0.13	0.13	0.0039	0.19	0.012	0.54	5.71	0.011	0.029	0.0011	0.0011	0.0000	0.0015	0.0001
Backhoe/Loader - 430	100	X		6	9	2270002060	2,407	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	83.94	0.115	0.271	0.0276	0.0276	0.0005	0.0278	0.0019
Backhoe/Loader - 420	93	X		6	9	2270002060	100	595.50	2.00	2.08	0.26	0.26	0.0034	0.20	0.012	0.59	3.61	0.012	0.013	0.0016	0.0016	0.0000	0.0012	0.0001
Loader - 980 Wheel	392	X		6	9	2270002060	185	536.28	0.97	2.40	0.14	0.14	0.0031	0.17	0.012	0.59	25.31	0.046	0.113	0.0067	0.0067	0.0001	0.0081	0.0006
Loader - 966 Wheel	262	X		6	9	2270002060	555	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	50.76	0.051	0.151	0.0099	0.0099	0.0003	0.0157	0.0012
Motor Grader - 14M	259	X		6	9	2270002048	771	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	69.69	0.053	0.162	0.0096	0.0096	0.0004	0.0197	0.0016
Trencher - Trencor 1660 HD	800	X		6	9	2270002030	185	535.80	1.69	4.56	0.24	0.24	0.0032	0.32	0.012	0.59	51.61	0.163	0.440	0.0227	0.0227	0.0003	0.0311	0.0012
Crane - 50 Ton Truck	280	X		6	5	2270002045	236	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	16.60	0.012	0.052	0.0024	0.0024	0.0001	0.0052	0.0004
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	433	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	17.41	0.016	0.060	0.0042	0.0042	0.0001	0.0059	0.0004
Ozzie Padder	400	X		6	9	2270002036	370	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	51.67	0.064	0.157	0.0099	0.0099	0.0003	0.0143	0.0012
Drill, Boring mach. 16"-42" (600,000 #)	95	X		7	9	2270002033	630	589.01	2.17	4.03	0.40	0.40	0.0036	0.43	0.012	0.43	16.71	0.062	0.114	0.0113	0.0113	0.0001	0.0121	0.0003
CAT 815 COMPACTOR	200	X		6	9	2270002015	617	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	43.05	0.044	0.128	0.0084	0.0084	0.0002	0.0134	0.0010
Farm Tractor	175	X		6	9	2270002075	239	536.32	0.48	1.42	0.09	0.09	0.0029	0.16	0.012	0.59	14.60	0.013	0.039	0.0025	0.0025	0.0001	0.0043	0.0003
Nonroad Industrial Equipment																								
Compressor - 1600 CFM	590	X		6	9	2270006015	77	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	11.44	0.018	0.065	0.0029	0.0029	0.0001	0.0044	0.0003
Compressor - 1200 CFM	590	X		6	9	2270006015	77	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	11.44	0.018	0.065	0.0029	0.0029	0.0001	0.0044	0.0003
Compressor - 600 CFM	185	X		6	9	2270006015	370	530.45	0.45	2.05	0.09	0.09	0.0030	0.19	0.012	0.43	17.22	0.015	0.067	0.0030	0.0030	0.0001	0.0060	0.0004
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	370	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	4.66	0.005	0.028	0.0009	0.0009	0.0000	0.0014	0.0001
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	1,111	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	3.72	0.015	0.029	0.0022	0.0022	0.0000	0.0030	0.0001
Welders	46	X		6	9	2270006025	4,212	693.43	3.59	4.72	0.58	0.58	0.0043	0.80	0.012	0.21	31.10	0.161	0.212	0.0261	0.0261	0.0002	0.0360	0.0006
Pressure washers	10		X	6	7	2265006030	156	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	1.53	0.406	0.003	0.0002	0.0002	0.0000	0.0074	0.0003
Chain Saw	1		X	6	9	2265004021	1,157	1,227.52	206.95	2.52	0.31	0.31	0.0224	7.08	0.229	0.40	0.63	0.106	0.001	0.0002	0.0002	0.0000	0.0036	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	3,662	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	62.74	1.403	0.150	0.0061	0.0061	0.0011	0.0442	0.0204
Pump - 1500 GPM Fill	32		X	6	8	2265006010	370	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	6.34	0.142	0.015	0.0006	0.0006	0.0001	0.0045	0.0021
Pump - Test	32		X	6	8	2265006010	370	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	6.34	0.142	0.015	0.0006	0.0006	0.0001	0.0045	0.0021
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		63,180	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		83.41	0.101	0.251	0.0150	0.0138	0.0007	0.0357	0.0035
Pickup 4 x 4	300		X	6	4		190,646	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		99.00	1.083	0.105	0.0026	0.0023	0.0007	0.0339	0.0178
SUV 4 x 4	250		X	6	4		20,726	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		10.76	0.118	0.011	0.0003	0.0002	0.0001	0.0037	0.0019
Truck, Crewcab, 4x4	400	X		6	4		2,469	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.26	0.004	0.010	0.0006	0.0005	0.0000	0.0014	0.0001
Suburban	300		X	6	4		617	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.32	0.004	0.000	0.0000	0.0000	0.0000	0.0001	0.0001
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		5,554	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		7.33	0.009	0.022	0.0013	0.0012	0.0001	0.0031	0.0003

Table 9D-9
NEXUS Project Construction Equipment Air Emissions - Mainline - Stark - MP 12.5-34.2

AUT Equipment Unit & 4 Wheel Drive Crew Cab Truck	400	X		6	6		3,703	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.89	0.006	0.015	0.0009	0.0008	0.0000	0.0021	0.0002
Auto maintenance Truck	300		X	6	4		18,926	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		9.83	0.107	0.010	0.0003	0.0002	0.0001	0.0034	0.0018
Truck - 1 Ton Flatbed	300	X		6	4		2,469	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.26	0.004	0.010	0.0006	0.0005	0.0000	0.0014	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		26,537	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		35.04	0.042	0.106	0.0063	0.0058	0.0003	0.0150	0.0015
Truck - 6 Ton Flatbed	330	X		6	4		5,349	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		7.06	0.009	0.021	0.0013	0.0012	0.0001	0.0030	0.0003
Truck - 6 Ton Winch	330	X		6	4		9,000	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		11.88	0.014	0.036	0.0021	0.0020	0.0001	0.0051	0.0005
Truck - 5 CY Dump	300	X		6	9		2,777	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.67	0.004	0.011	0.0007	0.0006	0.0000	0.0016	0.0002
Truck - 12 YD Dump	330	X		6	9		29,623	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		39.11	0.047	0.118	0.0070	0.0065	0.0003	0.0168	0.0017
Truck - Medium Duty Tractor	300	X		6	9		26,730	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		35.29	0.043	0.106	0.0063	0.0058	0.0003	0.0151	0.0015
Truck - Concrete Mixer	350	X		6	9		4,629	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.11	0.007	0.018	0.0011	0.0010	0.0001	0.0026	0.0003
Bus - Minibus	180	X		6	4		2,006	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.65	0.003	0.008	0.0005	0.0004	0.0000	0.0011	0.0001
Bus - 26 Passenger	300	X		6	4		7,457	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		9.85	0.012	0.030	0.0018	0.0016	0.0001	0.0042	0.0004
Bus - 45 Passenger	300	X		6	4		1,234	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.63	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Truck, End Dump 12cy	350	X		6	9		13,886	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		18.33	0.022	0.055	0.0033	0.0030	0.0002	0.0079	0.0008
Truck, Skid	300	X		6	9		3,471	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.58	0.006	0.014	0.0008	0.0008	0.0000	0.0020	0.0002
Truck, Stringing Tractor (25 Ton)	300	X		6	9		26,036	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		34.37	0.042	0.104	0.0062	0.0057	0.0003	0.0147	0.0015
Truck, Tire truck	300	X		6	4		5,503	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		7.27	0.009	0.022	0.0013	0.0012	0.0001	0.0031	0.0003
Truck, Wrecker truck	300	X		6	4		4,731	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.25	0.008	0.019	0.0011	0.0010	0.0001	0.0027	0.0003

Construction Workers				**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
				2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Worker Commutes				531,205	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		275.86	3.017	0.293	0.0071	0.0063	0.0018	0.0944	0.0496

Deliveries / Removals	**Empty Vehicle Weight (tons)**	**Full Vehicle Weight (tons)**	**Round Trip Distance (miles)**		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**								**2017 Emission Totals (Tons)**							
					2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
On-road delivery vehicles																					
Truck - 4000 Gallon Fuel	13.5	27.5	50.0		9,524	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	11.81	0.013	0.032	0.0019	0.0017	0.0001	0.0049	0.0009
Truck - Fuel/Lube	5.0	10.0	50.0		9,524	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	11.81	0.013	0.032	0.0019	0.0017	0.0001	0.0049	0.0009
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		11,146	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	13.82	0.015	0.037	0.0022	0.0020	0.0001	0.0057	0.0010
On-road material removal vehicles																					
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		13,309	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	16.51	0.018	0.044	0.0026	0.0024	0.0001	0.0068	0.0012

Construction Areas		**Disturbed Acreage (acre-months)**	**WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)**								**2017 Emission Totals (Tons)**							
			CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Area under construction (Exposed Soils)		865	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	95.1584	9.5158	NA	NA	NA

Table 9D-10
NEXUS Project Construction Equipment Air Emissions - Mainline- Summit MP - 34.2-50.4

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	x		6	9	2270002069	77	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	8.21	0.012	0.030	0.0018	0.0018	0.0000	0.0024	0.0002
Dozer - D8 w/Winch	305	x		6	9	2270002069	571	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	60.73	0.089	0.219	0.0135	0.0135	0.0003	0.0177	0.0014
Dozer - D7 w/Winch	235	x		6	9	2270002069	617	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	50.59	0.040	0.121	0.0072	0.0072	0.0003	0.0145	0.0012
Dozer - D7	235	x		6	9	2270002069	147	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	12.01	0.009	0.029	0.0017	0.0017	0.0001	0.0034	0.0003
Tac rig (Auto) D6	200	x		6	9	2270002069	278	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	19.37	0.015	0.046	0.0028	0.0028	0.0001	0.0055	0.0004
Sideboom - 583	310	x		6	9	2270002069	1,913	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	206.87	0.302	0.746	0.0460	0.0460	0.0012	0.0602	0.0047
Sideboom - 572	240	x		6	9	2270002069	77	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	6.46	0.005	0.015	0.0009	0.0009	0.0000	0.0018	0.0001
Bend Machine - PB 32-42	173	x		6	9	2270002033	131	530.03	1.10	3.87	0.24	0.24	0.0033	0.32	0.012	0.43	5.70	0.012	0.042	0.0026	0.0026	0.0000	0.0034	0.0001
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	540	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	71.58	0.088	0.218	0.0138	0.0138	0.0004	0.0199	0.0016
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	972	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	101.72	0.125	0.309	0.0196	0.0196	0.0006	0.0282	0.0023
Backhoe - 325 (1.38 cy)	180	x		6	9	2270002036	1,095	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	68.78	0.042	0.137	0.0071	0.0071	0.0004	0.0186	0.0016
Backhoe - 325 w/Hoe-Ram	180	x		6	9	2270002036	216	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	13.56	0.008	0.027	0.0014	0.0014	0.0001	0.0037	0.0003
Backhoe, 215 / 320 w/hyd. Saw (feller buncher)	140	x		6	9	2270002036	147	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	7.16	0.007	0.016	0.0016	0.0016	0.0000	0.0020	0.0002
Backhoe, 215 / 320 w/hyd. Thumb	140	x		6	9	2270002036	147	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	7.16	0.007	0.016	0.0016	0.0016	0.0000	0.0020	0.0002
Clearing/brushing, Log Skidder	200	x		6	9	2270007015	147	638.34	0.29	1.10	0.05	0.05	0.0032	0.17	0.012	0.54	11.16	0.005	0.019	0.0008	0.0008	0.0001	0.0029	0.0002
Clearing/Brushing, Loader, Brush Cutter Attachment	80	x		6	9	2270007015	147	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	4.96	0.010	0.010	0.0011	0.0011	0.0000	0.0013	0.0001
Clearing/brushing, Delimber	140	x		6	9	2270007015	147	638.31	0.50	1.26	0.11	0.11	0.0033	0.17	0.012	0.54	7.81	0.006	0.015	0.0014	0.0014	0.0000	0.0021	0.0002
Clearing/brushing, Loader, Brush Rake Attachment	80	x		6	9	2270007015	293	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	9.91	0.019	0.021	0.0022	0.0022	0.0001	0.0025	0.0002
Clearing/brushing, Wood chipper	70	x		6	9	2270007015	147	708.88	1.40	3.64	0.13	0.13	0.0039	0.19	0.012	0.54	4.34	0.009	0.022	0.0008	0.0008	0.0000	0.0011	0.0001
Backhoe/Loader - 430	100	X		6	9	2270002060	1,165	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	40.63	0.056	0.131	0.0134	0.0134	0.0002	0.0135	0.0009
Backhoe/Loader - 420	93	X		6	9	2270002060	77	595.50	2.00	2.08	0.26	0.26	0.0034	0.20	0.012	0.59	2.78	0.009	0.010	0.0012	0.0012	0.0000	0.0010	0.0001
Loader - 980 Wheel	392	X		6	9	2270002060	139	536.28	0.97	2.40	0.14	0.14	0.0031	0.17	0.012	0.59	18.98	0.034	0.085	0.0050	0.0050	0.0001	0.0061	0.0004
Loader - 966 Wheel	262	X		6	9	2270002060	417	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	38.07	0.038	0.114	0.0075	0.0075	0.0002	0.0118	0.0009
Motor Grader - 14M	259	X		6	9	2270002048	255	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	23.00	0.017	0.053	0.0032	0.0032	0.0001	0.0065	0.0005
Trencher - Trencor 1660 HD	800	X		6	9	2270002030	139	535.80	1.69	4.56	0.24	0.24	0.0032	0.32	0.012	0.59	38.71	0.122	0.330	0.0170	0.0170	0.0002	0.0234	0.0009
Crane - 50 Ton Truck	280	X		6	5	2270002045	167	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	11.77	0.008	0.037	0.0017	0.0017	0.0001	0.0037	0.0003
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	137	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	5.52	0.005	0.019	0.0013	0.0013	0.0000	0.0019	0.0001
Ozzie Padder	400	X		6	9	2270002036	278	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	38.75	0.048	0.118	0.0075	0.0075	0.0002	0.0108	0.0009
Drill, Boring mach. 16"-42" (600,000 #)	95	X		7	9	2270002033	468	589.01	2.17	4.03	0.40	0.40	0.0036	0.43	0.012	0.43	12.41	0.046	0.085	0.0084	0.0084	0.0001	0.0090	0.0003
CAT 815 COMPACTOR	200	X		6	9	2270002015	139	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	9.69	0.010	0.029	0.0019	0.0019	0.0001	0.0030	0.0002
Farm Tractor	175	X		6	9	2270002075	177	536.32	0.48	1.42	0.09	0.09	0.0029	0.16	0.012	0.59	10.83	0.010	0.029	0.0018	0.0018	0.0001	0.0032	0.0002
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	0	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Compressor - 1600 CFM	590	X		6	9	2270006015	46	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	6.87	0.011	0.039	0.0017	0.0017	0.0000	0.0026	0.0002
Compressor - 1200 CFM	590	X		6	9	2270006015	46	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	6.87	0.011	0.039	0.0017	0.0017	0.0000	0.0026	0.0002
Compressor - 600 CFM	185	X		6	9	2270006015	278	530.45	0.45	2.05	0.09	0.09	0.0030	0.19	0.012	0.43	12.92	0.011	0.050	0.0023	0.0023	0.0001	0.0045	0.0003
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	278	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	3.49	0.004	0.021	0.0006	0.0006	0.0000	0.0011	0.0001
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	864	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	2.89	0.012	0.022	0.0017	0.0017	0.0000	0.0023	0.0001
Welders	46	X		6	9	2270006025	3,140	693.43	3.59	4.72	0.58	0.58	0.0043	0.80	0.012	0.21	23.18	0.120	0.158	0.0195	0.0195	0.0001	0.0268	0.0004
Pressure washers	10		X	6	7	2265006030	120	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	1.18	0.312	0.002	0.0001	0.0001	0.0000	0.0057	0.0003
Generator - 250 KW	433	X		6	9	2270006005	0	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Chain Saw	1		X	6	9	2265004021	879	1,227.52	206.95	2.52	0.31	0.31	0.0224	7.08	0.229	0.40	0.48	0.080	0.001	0.0001	0.0001	0.0000	0.0027	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	2,798	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	47.94	1.072	0.115	0.0047	0.0047	0.0009	0.0338	0.0156
Pump - 1500 GPM Fill	32		X	6	8	2265006010	288	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	4.93	0.110	0.012	0.0005	0.0005	0.0001	0.0035	0.0016
Pump - Test	32		X	6	8	2265006010	288	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	4.93	0.110	0.012	0.0005	0.0005	0.0001	0.0035	0.0016
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**
Welding Rig w/ 2 x 300 Amp	45	X		6	9		47,096	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		62.18	0.075	0.187	0.0112	0.0103	0.0005	0.0266	0.0026
Pickup 4 x 4	300		X	6	4		141,480	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		73.47	0.804	0.078	0.0019	0.0017	0.0005	0.0251	0.0132
SUV 4 x 4	250		X	6	4		15,377	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		7.99	0.087	0.008	0.0002	0.0002	0.0001	0.0027	0.0014
Truck, Crewcab, 4x4	400	X		6	4		1,851	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.44	0.003	0.007	0.0004	0.0004	0.0000	0.0010	0.0001
Suburban	300		X	6	4		514	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.27	0.003	0.000	0.0000	0.0000	0.0000	0.0001	0.0000
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		4,166	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		5.50	0.007	0.017	0.0010	0.0009	0.0000	0.0024	0.0002

Table 9D-10
NEXUS Project Construction Equipment Air Emissions - Mainline- Summit MP - 34.2-50.4

AUT Equipment Unit & 4 Wheel Drive Crew Cab Truck	400	X		6	6		2,777	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.67	0.004	0.011	0.0007	0.0006	0.0000	0.0016	0.0002
Auto maintenance Truck	300		X	6	4		13,989	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		7.26	0.079	0.008	0.0002	0.0002	0.0000	0.0025	0.0013
Truck - 1 Ton Flatbed	300	X		6	4		1,851	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.44	0.003	0.007	0.0004	0.0004	0.0000	0.0010	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		15,480	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		20.44	0.025	0.062	0.0037	0.0034	0.0002	0.0088	0.0009
Truck - 6 Ton Flatbed	330	X		6	4		3,909	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		5.16	0.006	0.016	0.0009	0.0009	0.0000	0.0022	0.0002
Truck - 6 Ton Winch	330	X		6	4		6,686	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		8.83	0.011	0.027	0.0016	0.0015	0.0001	0.0038	0.0004
Truck - 5 CY Dump	300	X		6	9		2,083	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.75	0.003	0.008	0.0005	0.0005	0.0000	0.0012	0.0001
Truck - 12 YD Dump	330	X		6	9		12,497	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		16.50	0.020	0.050	0.0030	0.0027	0.0001	0.0071	0.0007
Truck - Medium Duty Tractor	300	X		6	9		15,159	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		20.01	0.024	0.060	0.0036	0.0033	0.0002	0.0086	0.0008
Truck - Concrete Mixer	350	X		6	9		3,356	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.43	0.005	0.013	0.0008	0.0007	0.0000	0.0019	0.0002
Bus - Minibus	180	X		6	4		1,440	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.90	0.002	0.006	0.0003	0.0003	0.0000	0.0008	0.0001
Bus - 26 Passenger	300	X		6	4		5,966	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		7.88	0.010	0.024	0.0014	0.0013	0.0001	0.0034	0.0003
Bus - 45 Passenger	300	X		6	4		926	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.22	0.001	0.004	0.0002	0.0002	0.0000	0.0005	0.0001
Truck, End Dump 12cy	350	X		6	9		10,414	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		13.75	0.017	0.041	0.0025	0.0023	0.0001	0.0059	0.0006
Truck, Skid	300	X		6	9		2,314	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.06	0.004	0.009	0.0005	0.0005	0.0000	0.0013	0.0001
Truck, Stringing Tractor (25 Ton)	300	X		6	9		17,357	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		22.92	0.028	0.069	0.0041	0.0038	0.0002	0.0098	0.0010
Truck, Tire truck	300	X		6	4		4,011	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		5.30	0.006	0.016	0.0010	0.0009	0.0000	0.0023	0.0002
Truck, Wrecker truck	300	X		6	4		3,497	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.62	0.006	0.014	0.0008	0.0008	0.0000	0.0020	0.0002

Construction Workers				**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
				2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Worker Commutes				399,337	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		207.38	2.268	0.220	0.0053	0.0047	0.0014	0.0709	0.0373

Deliveries / Removals	**Empty Vehicle Weight (tons)**	**Full Vehicle Weight (tons)**	**Round Trip Distance (miles)**		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
					2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
On-road delivery vehicles																						
Truck - 4000 Gallon Fuel	13.5	27.5	50.0		7,020	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		8.71	0.010	0.023	0.0014	0.0013	0.0001	0.0036	0.0007
Truck - Fuel/Lube	5.0	10.0	50.0		7,020	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		8.71	0.010	0.023	0.0014	0.0013	0.0001	0.0036	0.0007
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		8,216	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		10.19	0.011	0.027	0.0016	0.0015	0.0001	0.0042	0.0008
On-road material removal vehicles																						
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		9,810	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		12.17	0.014	0.033	0.0019	0.0018	0.0001	0.0050	0.0009

Construction Areas				**Disturbed Acreage (acre-months)**	**WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)**									**2017 Emission Totals (Tons)**							
					CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Area under construction (Exposed Soils)				523	NA	NA	NA	0.11	0.01	NA	NA	NA		NA	NA	NA	57.4751	5.7475	NA	NA	NA

Table 9D-11
NEXUS Project Construction Equipment Air Emissions - SP 1 Wayne Co. MP 50.4-53.5.

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	x		6	9	2270002069	15	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	1.64	0.002	0.006	0.0004	0.0004	0.0000	0.0005	0.0000
Dozer - D8 w/Winch	305	x		6	9	2270002069	116	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	12.31	0.018	0.044	0.0027	0.0027	0.0001	0.0036	0.0003
Dozer - D7 w/Winch	235	x		6	9	2270002069	131	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	10.75	0.008	0.026	0.0015	0.0015	0.0001	0.0031	0.0002
Dozer - D7	235	x		6	9	2270002069	31	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	2.53	0.002	0.006	0.0004	0.0004	0.0000	0.0007	0.0001
Tac rig (Auto) D6	200	x		6	9	2270002069	62	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	4.31	0.003	0.010	0.0006	0.0006	0.0000	0.0012	0.0001
Sideboom - 583	310	x		6	9	2270002069	424	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	45.88	0.067	0.165	0.0102	0.0102	0.0003	0.0134	0.0011
Sideboom - 572	240	x		6	9	2270002069	23	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	1.94	0.002	0.005	0.0003	0.0003	0.0000	0.0006	0.0000
Bend Machine - PB 32-42	173	x		6	9	2270002033	31	530.03	1.10	3.87	0.24	0.24	0.0033	0.32	0.012	0.43	1.34	0.003	0.010	0.0006	0.0006	0.0000	0.0008	0.0000
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	108	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	14.32	0.018	0.044	0.0028	0.0028	0.0001	0.0040	0.0003
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	216	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	22.60	0.028	0.069	0.0043	0.0043	0.0001	0.0063	0.0005
Backhoe - 325 (1.38 cy)	180	x		6	9	2270002036	208	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	13.08	0.008	0.026	0.0014	0.0014	0.0001	0.0035	0.0003
Backhoe - 325 w/Hoe-Ram	180	x		6	9	2270002036	46	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	2.91	0.002	0.006	0.0003	0.0003	0.0000	0.0008	0.0001
Backhoe, 215 / 320 w/hyd. Saw (feller buncher)	140	x		6	9	2270002036	31	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	1.51	0.001	0.003	0.0003	0.0003	0.0000	0.0004	0.0000
Backhoe, 215 / 320 w/hyd. Thumb	140	x		6	9	2270002036	31	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	1.51	0.001	0.003	0.0003	0.0003	0.0000	0.0004	0.0000
Clearing/brushing, Log Skidder	200	x		6	9	2270007015	31	638.34	0.29	1.10	0.05	0.05	0.0032	0.17	0.012	0.54	2.35	0.001	0.004	0.0002	0.0002	0.0000	0.0006	0.0000
Clearing/Brushing, Loader, Brush Cutter Attachment	80	x		6	9	2270007015	31	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	1.04	0.002	0.002	0.0002	0.0002	0.0000	0.0003	0.0000
Clearing/brushing, Delimber	140	x		6	9	2270007015	31	638.31	0.50	1.26	0.11	0.11	0.0033	0.17	0.012	0.54	1.64	0.001	0.003	0.0003	0.0003	0.0000	0.0005	0.0000
Clearing/brushing, Loader, Brush Rake Attachment	80	x		6	9	2270007015	62	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	2.09	0.004	0.004	0.0005	0.0005	0.0000	0.0005	0.0000
Clearing/brushing, Wood chipper	70	x		6	9	2270007015	31	708.88	1.40	3.64	0.13	0.13	0.0039	0.19	0.012	0.54	0.91	0.002	0.005	0.0002	0.0002	0.0000	0.0002	0.0000
Backhoe/Loader - 430	100	X		6	9	2270002060	247	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	8.61	0.012	0.028	0.0028	0.0028	0.0000	0.0029	0.0002
Backhoe/Loader - 420	93	X		6	9	2270002060	15	595.50	2.00	2.08	0.26	0.26	0.0034	0.20	0.012	0.59	0.56	0.002	0.002	0.0002	0.0002	0.0000	0.0002	0.0000
Loader - 980 Wheel	392	X		6	9	2270002060	31	536.28	0.97	2.40	0.14	0.14	0.0031	0.17	0.012	0.59	4.22	0.008	0.019	0.0011	0.0011	0.0000	0.0014	0.0001
Loader - 966 Wheel	262	X		6	9	2270002060	93	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	8.46	0.009	0.025	0.0017	0.0017	0.0000	0.0026	0.0002
Motor Grader - 14M	259	X		6	9	2270002048	54	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	4.88	0.004	0.011	0.0007	0.0007	0.0000	0.0014	0.0001
Trencher - Trencor 1660 HD	800	X		6	9	2270002030	31	535.80	1.69	4.56	0.24	0.24	0.0032	0.32	0.012	0.59	8.60	0.027	0.073	0.0038	0.0038	0.0001	0.0052	0.0002
Crane - 50 Ton Truck	280	X		6	5	2270002045	39	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	2.72	0.002	0.009	0.0004	0.0004	0.0000	0.0008	0.0001
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	30	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	1.21	0.001	0.004	0.0003	0.0003	0.0000	0.0004	0.0000
Ozzie Padder	400	X		6	9	2270002036	62	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	8.61	0.011	0.026	0.0017	0.0017	0.0000	0.0024	0.0002
Drill, Boring mach. 16"-42" (600,000 #)	95	X		7	9	2270002033	90	589.01	2.17	4.03	0.40	0.40	0.0036	0.43	0.012	0.43	2.39	0.009	0.016	0.0016	0.0016	0.0000	0.0017	0.0000
CAT 815 COMPACTOR	200	X		6	9	2270002015	31	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	2.15	0.002	0.006	0.0004	0.0004	0.0000	0.0007	0.0000
Farm Tractor	175	X		6	9	2270002075	39	536.32	0.48	1.42	0.09	0.09	0.0029	0.16	0.012	0.59	2.35	0.002	0.006	0.0004	0.0004	0.0000	0.0007	0.0001
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	0	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Compressor - 1600 CFM	590	X		6	9	2270006015	15	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	2.29	0.004	0.013	0.0006	0.0006	0.0000	0.0009	0.0001
Compressor - 1200 CFM	590	X		6	9	2270006015	15	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	2.29	0.004	0.013	0.0006	0.0006	0.0000	0.0009	0.0001
Compressor - 600 CFM	185	X		6	9	2270006015	62	530.45	0.45	2.05	0.09	0.09	0.0030	0.19	0.012	0.43	2.87	0.002	0.011	0.0005	0.0005	0.0000	0.0010	0.0001
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	62	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.78	0.001	0.005	0.0001	0.0001	0.0000	0.0002	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	165	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	0.55	0.002	0.004	0.0003	0.0003	0.0000	0.0004	0.0000
Welders	46	X		6	9	2270006025	671	693.43	3.59	4.72	0.58	0.58	0.0043	0.80	0.012	0.21	4.96	0.026	0.034	0.0042	0.0042	0.0000	0.0057	0.0001
Pressure washers	10		X	6	7	2265006030	24	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.24	0.062	0.000	0.0000	0.0000	0.0000	0.0011	0.0001
Generator - 250 KW	433	X		6	9	2270006005	0	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Chain Saw	1		X	6	9	2265004021	185	1,227.52	206.95	2.52	0.31	0.31	0.0224	7.08	0.229	0.40	0.10	0.017	0.000	0.0000	0.0000	0.0000	0.0006	0.0000
Pump - 6-Inch Water	32		X	6	24	2265006010	535	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	9.16	0.205	0.022	0.0009	0.0009	0.0002	0.0065	0.0030
Pump - 1500 GPM Fill	32		X	6	8	2265006010	55	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	0.94	0.021	0.002	0.0001	0.0001	0.0000	0.0007	0.0003
Pump - Test	32		X	6	8	2265006010	55	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	0.94	0.021	0.002	0.0001	0.0001	0.0000	0.0007	0.0003
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**
Welding Rig w/ 2 x 300 Amp	45	X		6	9		10,067	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		13.29	0.016	0.040	0.0024	0.0022	0.0001	0.0057	0.0006
Pickup 4 x 4	300		X	6	4		29,263	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		15.20	0.166	0.016	0.0004	0.0003	0.0001	0.0052	0.0027
SUV 4 x 4	250		X	6	4		3,189	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		1.66	0.018	0.002	0.0000	0.0000	0.0000	0.0006	0.0003
Truck, Crewcab, 4x4	400	X		6	4		411	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.54	0.001	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Suburban	300		X	6	4		103	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.05	0.001	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		926	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.22	0.001	0.004	0.0002	0.0002	0.0000	0.0005	0.0001

Table 9D-11
NEXUS Project Construction Equipment Air Emissions - SP 1 Wayne Co. MP 50.4-53.5.

AUT Equipment Unit & 4 Wheel Drive Crew Cab Truck	400	X		6	6		617	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.81	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Auto maintenance Truck	300		X	6	4		2,880	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		1.50	0.016	0.002	0.0000	0.0000	0.0000	0.0005	0.0003
Truck - 1 Ton Flatbed	300	X		6	4		411	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.54	0.001	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Truck - 3 Ton Flatbed	330	X		6	4		3,291	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.35	0.005	0.013	0.0008	0.0007	0.0000	0.0019	0.0002
Truck - 6 Ton Flatbed	330	X		6	4		823	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.09	0.001	0.003	0.0002	0.0002	0.0000	0.0005	0.0000
Truck - 6 Ton Winch	330	X		6	4		1,389	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.83	0.002	0.006	0.0003	0.0003	0.0000	0.0008	0.0001
Truck - 5 CY Dump	300	X		6	9		463	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.61	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck - 12 YD Dump	330	X		6	9		2,777	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.67	0.004	0.011	0.0007	0.0006	0.0000	0.0016	0.0002
Truck - Medium Duty Tractor	300	X		6	9		3,124	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.12	0.005	0.012	0.0007	0.0007	0.0000	0.0018	0.0002
Truck - Concrete Mixer	350	X		6	9		694	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.92	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Bus - Minibus	180	X		6	4		360	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.48	0.001	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
Bus - 26 Passenger	300	X		6	4		1,286	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.70	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Bus - 45 Passenger	300	X		6	4		206	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.27	0.000	0.001	0.0000	0.0000	0.0000	0.0001	0.0000
Truck, End Dump 12cy	350	X		6	9		2,314	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.06	0.004	0.009	0.0005	0.0005	0.0000	0.0013	0.0001
Truck, Skid	300	X		6	9		694	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.92	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Truck, Stringing Tractor (25 Ton)	300	X		6	9		5,207	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.87	0.008	0.021	0.0012	0.0011	0.0001	0.0029	0.0003
Truck, Tire truck	300	X		6	4		874	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.15	0.001	0.003	0.0002	0.0002	0.0000	0.0005	0.0000
Truck, Wrecker truck	300	X		6	4		720	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.95	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000

Construction Workers				**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
				2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Worker Commutes				76,800	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		39.88	0.436	0.042	0.0010	0.0009	0.0003	0.0136	0.0072

Deliveries / Removals	**Empty Vehicle Weight (tons)**	**Full Vehicle Weight (tons)**	**Round Trip Distance (miles)**		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**								**2017 Emission Totals (Tons)**							
					2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
On-road delivery vehicles																					
Truck - 4000 Gallon Fuel	13.5	27.5	50.0		1,404	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	1.74	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Truck - Fuel/Lube	5.0	10.0	50.0		1,404	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	1.74	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		1,643	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	2.04	0.002	0.005	0.0003	0.0003	0.0000	0.0008	0.0002
On-road material removal vehicles																					
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		1,962	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	2.43	0.003	0.007	0.0004	0.0004	0.0000	0.0010	0.0002

Construction Areas		**Disturbed Acreage (acre-months)**	**WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)**								**2017 Emission Totals (Tons)**							
			CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Area under construction (Exposed Soils)		197	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	21.6534	2.1653	NA	NA	NA

Table 9D-12
NEXUS Project Construction Equipment Air Emissions - SP 2 Wayne Co. MP 53.5-56.6

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	x		6	9	2270002069	15	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	1.64	0.002	0.006	0.0004	0.0004	0.0000	0.0005	0.0000
Dozer - D8 w/Winch	305	x		6	9	2270002069	100	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	10.67	0.016	0.038	0.0024	0.0024	0.0001	0.0031	0.0002
Dozer - D7 w/Winch	235	x		6	9	2270002069	123	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	10.12	0.008	0.024	0.0014	0.0014	0.0001	0.0029	0.0002
Dozer - D7	235	x		6	9	2270002069	23	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	1.90	0.001	0.005	0.0003	0.0003	0.0000	0.0005	0.0000
Tac rig (Auto) D6	200	x		6	9	2270002069	62	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	4.31	0.003	0.010	0.0006	0.0006	0.0000	0.0012	0.0001
Sideboom - 583	310	x		6	9	2270002069	417	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	45.04	0.066	0.162	0.0100	0.0100	0.0003	0.0131	0.0010
Sideboom - 572	240	x		6	9	2270002069	15	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	1.29	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Bend Machine - PB 32-42	173	x		6	9	2270002033	31	530.03	1.10	3.87	0.24	0.24	0.0033	0.32	0.012	0.43	1.34	0.003	0.010	0.0006	0.0006	0.0000	0.0008	0.0000
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	93	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	12.27	0.015	0.037	0.0024	0.0024	0.0001	0.0034	0.0003
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	201	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	20.99	0.026	0.064	0.0040	0.0040	0.0001	0.0058	0.0005
Backhoe - 325 (1.38 cy)	180	x		6	9	2270002036	201	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	12.59	0.008	0.025	0.0013	0.0013	0.0001	0.0034	0.0003
Backhoe - 325 w/Hoe-Ram	180	x		6	9	2270002036	46	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	2.91	0.002	0.006	0.0003	0.0003	0.0000	0.0008	0.0001
Backhoe, 215 / 320 w/hyd. Saw (feller buncher)	140	x		6	9	2270002036	23	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	1.13	0.001	0.003	0.0002	0.0002	0.0000	0.0003	0.0000
Backhoe, 215 / 320 w/hyd. Thumb	140	x		6	9	2270002036	23	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	1.13	0.001	0.003	0.0002	0.0002	0.0000	0.0003	0.0000
Clearing/brushing, Log Skidder	200	x		6	9	2270007015	23	638.34	0.29	1.10	0.05	0.05	0.0032	0.17	0.012	0.54	1.76	0.001	0.003	0.0001	0.0001	0.0000	0.0005	0.0000
Clearing/Brushing, Loader, Brush Cutter Attachment	80	x		6	9	2270007015	23	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	0.78	0.002	0.002	0.0002	0.0002	0.0000	0.0002	0.0000
Clearing/brushing, Delimber	140	x		6	9	2270007015	23	638.31	0.50	1.26	0.11	0.11	0.0033	0.17	0.012	0.54	1.23	0.001	0.002	0.0002	0.0002	0.0000	0.0003	0.0000
Clearing/brushing, Loader, Brush Rake Attachment	80	x		6	9	2270007015	46	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	1.56	0.003	0.003	0.0004	0.0004	0.0000	0.0004	0.0000
Clearing/brushing, Wood chipper	70	x		6	9	2270007015	23	708.88	1.40	3.64	0.13	0.13	0.0039	0.19	0.012	0.54	0.68	0.001	0.004	0.0001	0.0001	0.0000	0.0002	0.0000
Backhoe/Loader - 430	100	X		6	9	2270002060	154	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	5.38	0.007	0.017	0.0018	0.0018	0.0000	0.0018	0.0001
Backhoe/Loader - 420	93	X		6	9	2270002060	15	595.50	2.00	2.08	0.26	0.26	0.0034	0.20	0.012	0.59	0.56	0.002	0.002	0.0002	0.0002	0.0000	0.0002	0.0000
Loader - 980 Wheel	392	X		6	9	2270002060	23	536.28	0.97	2.40	0.14	0.14	0.0031	0.17	0.012	0.59	3.16	0.006	0.014	0.0008	0.0008	0.0000	0.0010	0.0001
Loader - 966 Wheel	262	X		6	9	2270002060	85	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	7.75	0.008	0.023	0.0015	0.0015	0.0000	0.0024	0.0002
Motor Grader - 14M	259	X		6	9	2270002048	39	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	3.48	0.003	0.008	0.0005	0.0005	0.0000	0.0010	0.0001
Trencher - Trencor 1660 HD	800	X		6	9	2270002030	31	535.80	1.69	4.56	0.24	0.24	0.0032	0.32	0.012	0.59	8.60	0.027	0.073	0.0038	0.0038	0.0001	0.0052	0.0002
Crane - 50 Ton Truck	280	X		6	5	2270002045	30	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	2.11	0.001	0.007	0.0003	0.0003	0.0000	0.0007	0.0000
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	26	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	1.03	0.001	0.004	0.0002	0.0002	0.0000	0.0003	0.0000
Ozzie Padder	400	X		6	9	2270002036	62	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	8.61	0.011	0.026	0.0017	0.0017	0.0000	0.0024	0.0002
Drill, Boring mach. 16"-42" (600,000 #)	95	X		7	9	2270002033	72	589.01	2.17	4.03	0.40	0.40	0.0036	0.43	0.012	0.43	1.91	0.007	0.013	0.0013	0.0013	0.0000	0.0014	0.0000
CAT 815 COMPACTOR	200	X		6	9	2270002015	23	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	1.61	0.002	0.005	0.0003	0.0003	0.0000	0.0005	0.0000
Farm Tractor	175	X		6	9	2270002075	23	536.32	0.48	1.42	0.09	0.09	0.0029	0.16	0.012	0.59	1.41	0.001	0.004	0.0002	0.0002	0.0000	0.0004	0.0000
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	0	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Compressor - 1600 CFM	590	X		6	9	2270006015	15	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	2.29	0.004	0.013	0.0006	0.0006	0.0000	0.0009	0.0001
Compressor - 1200 CFM	590	X		6	9	2270006015	15	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	2.29	0.004	0.013	0.0006	0.0006	0.0000	0.0009	0.0001
Compressor - 600 CFM	185	X		6	9	2270006015	62	530.45	0.45	2.05	0.09	0.09	0.0030	0.19	0.012	0.43	2.87	0.002	0.011	0.0005	0.0005	0.0000	0.0010	0.0001
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	62	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.78	0.001	0.005	0.0001	0.0001	0.0000	0.0002	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	165	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	0.55	0.002	0.004	0.0003	0.0003	0.0000	0.0004	0.0000
Welders	46	X		6	9	2270006025	609	693.43	3.59	4.72	0.58	0.58	0.0043	0.80	0.012	0.21	4.50	0.023	0.031	0.0038	0.0038	0.0000	0.0052	0.0001
Pressure washers	10		X	6	7	2265006030	48	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.47	0.125	0.001	0.0001	0.0001	0.0000	0.0023	0.0001
Generator - 250 KW	433	X		6	9	2270006005	0	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Chain Saw	1		X	6	9	2265004021	139	1,227.52	206.95	2.52	0.31	0.31	0.0224	7.08	0.229	0.40	0.08	0.013	0.000	0.0000	0.0000	0.0000	0.0004	0.0000
Pump - 6-Inch Water	32		X	6	24	2265006010	494	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	8.46	0.189	0.020	0.0008	0.0008	0.0002	0.0060	0.0028
Pump - 1500 GPM Fill	32		X	6	8	2265006010	55	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	0.94	0.021	0.002	0.0001	0.0001	0.0000	0.0007	0.0003
Pump - Test	32		X	6	8	2265006010	55	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	0.94	0.021	0.002	0.0001	0.0001	0.0000	0.0007	0.0003
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**
Welding Rig w/ 2 x 300 Amp	45	X		6	9		9,141	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		12.07	0.015	0.036	0.0022	0.0020	0.0001	0.0052	0.0005
Pickup 4 x 4	300		X	6	4		21,240	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		11.03	0.121	0.012	0.0003	0.0003	0.0001	0.0038	0.0020
SUV 4 x 4	250		X	6	4		2,160	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		1.12	0.012	0.001	0.0000	0.0000	0.0000	0.0004	0.0002
Truck, Crewcab, 4x4	400	X		6	4		411	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.54	0.001	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Suburban	300		X	6	4		103	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.05	0.001	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		926	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.22	0.001	0.004	0.0002	0.0002	0.0000	0.0005	0.0001

Table 9D-12
NEXUS Project Construction Equipment Air Emissions - SP 2 Wayne Co. MP 53.5-56.6

AUT Equipment Unit & 4 Wheel Drive Crew Cab Truck	400	X		6	6		617	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.81	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Auto maintenance Truck	300		X	6	4		1,851	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.96	0.011	0.001	0.0000	0.0000	0.0000	0.0003	0.0002
Truck - 1 Ton Flatbed	300	X		6	4		154	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.20	0.000	0.001	0.0000	0.0000	0.0000	0.0001	0.0000
Truck - 3 Ton Flatbed	330	X		6	4		2,674	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.53	0.004	0.011	0.0006	0.0006	0.0000	0.0015	0.0001
Truck - 6 Ton Flatbed	330	X		6	4		720	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.95	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Truck - 6 Ton Winch	330	X		6	4		1,080	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.43	0.002	0.004	0.0003	0.0002	0.0000	0.0006	0.0001
Truck - 5 CY Dump	300	X		6	9		463	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.61	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck - 12 YD Dump	330	X		6	9		2,777	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.67	0.004	0.011	0.0007	0.0006	0.0000	0.0016	0.0002
Truck - Medium Duty Tractor	300	X		6	9		2,430	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.21	0.004	0.010	0.0006	0.0005	0.0000	0.0014	0.0001
Truck - Concrete Mixer	350	X		6	9		579	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.76	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Bus - Minibus	180	X		6	4		411	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.54	0.001	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Bus - 26 Passenger	300	X		6	4		1,080	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.43	0.002	0.004	0.0003	0.0002	0.0000	0.0006	0.0001
Bus - 45 Passenger	300	X		6	4		206	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.27	0.000	0.001	0.0000	0.0000	0.0000	0.0001	0.0000
Truck, End Dump 12cy	350	X		6	9		1,736	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.29	0.003	0.007	0.0004	0.0004	0.0000	0.0010	0.0001
Truck, Skid	300	X		6	9		463	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.61	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck, Stringing Tractor (25 Ton)	300	X		6	9		3,471	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.58	0.006	0.014	0.0008	0.0008	0.0000	0.0020	0.0002
Truck, Tire truck	300	X		6	4		566	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.75	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck, Wrecker truck	300	X		6	4		463	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.61	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000

Construction Workers				**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
				2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Worker Commutes				492,819	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		255.92	2.799	0.272	0.0066	0.0058	0.0017	0.0875	0.0460

Deliveries / Removals	**Empty Vehicle Weight (tons)**	**Full Vehicle Weight (tons)**	**Round Trip Distance (miles)**		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
					2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
On-road delivery vehicles																					
Truck - 4000 Gallon Fuel	13.5	27.5	50.0		885	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		1.10	0.001	0.003	0.0002	0.0002	0.0000	0.0005	0.0001
Truck - Fuel/Lube	5.0	10.0	50.0		885	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		1.10	0.001	0.003	0.0002	0.0002	0.0000	0.0005	0.0001
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		1,013	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		1.26	0.001	0.003	0.0002	0.0002	0.0000	0.0005	0.0001
On-road material removal vehicles																					
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		1,210	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		1.50	0.002	0.004	0.0002	0.0002	0.0000	0.0006	0.0001

Construction Areas		**Disturbed Acreage (acre-months)**	**WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)**								**2017 Emission Totals (Tons)**							
			CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Area under construction (Exposed Soils)		85	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	9.3220	0.9322	NA	NA	NA

Table 9D-13
NEXUS Project Construction Equipment Air Emissions - Mainline -Medina - MP 56.6-80.5

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	x		6	9	2270002069	100	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	10.67	0.016	0.038	0.0024	0.0024	0.0001	0.0031	0.0002
Dozer - D8 w/Winch	305	x		6	9	2270002069	733	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	77.97	0.114	0.281	0.0173	0.0173	0.0004	0.0227	0.0018
Dozer - D7 w/Winch	235	x		6	9	2270002069	825	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	67.66	0.053	0.161	0.0097	0.0097	0.0004	0.0193	0.0016
Dozer - D7	235	x		6	9	2270002069	154	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	12.65	0.010	0.030	0.0018	0.0018	0.0001	0.0036	0.0003
Tac rig (Auto) D6	200	x		6	9	2270002069	386	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	26.91	0.021	0.064	0.0039	0.0039	0.0001	0.0077	0.0006
Sideboom - 583	310	x		6	9	2270002069	2,669	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	288.61	0.422	1.041	0.0641	0.0641	0.0016	0.0840	0.0066
Sideboom - 572	240	x		6	9	2270002069	116	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	9.69	0.008	0.023	0.0014	0.0014	0.0001	0.0028	0.0002
Bend Machine - PB 32-42	173	x		6	9	2270002033	193	530.03	1.10	3.87	0.24	0.24	0.0033	0.32	0.012	0.43	8.38	0.017	0.061	0.0038	0.0038	0.0001	0.0050	0.0002
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	687	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	91.01	0.112	0.277	0.0175	0.0175	0.0005	0.0253	0.0021
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	1,381	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	144.50	0.178	0.440	0.0278	0.0278	0.0008	0.0401	0.0033
Backhoe - 325 (1.38 cy)	180	x		6	9	2270002036	1,373	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	86.22	0.052	0.172	0.0089	0.0089	0.0004	0.0233	0.0020
Backhoe - 325 w/Hoe-Ram	180	x		6	9	2270002036	293	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	18.41	0.011	0.037	0.0019	0.0019	0.0001	0.0050	0.0004
Backhoe, 215 / 320 w/hyd. Saw (feller buncher)	140	x		6	9	2270002036	154	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	7.53	0.007	0.017	0.0016	0.0016	0.0000	0.0022	0.0002
Backhoe, 215 / 320 w/hyd. Thumb	140	x		6	9	2270002036	154	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	7.53	0.007	0.017	0.0016	0.0016	0.0000	0.0022	0.0002
Clearing/brushing, Log Skidder	200	x		6	9	2270007015	154	638.34	0.29	1.10	0.05	0.05	0.0032	0.17	0.012	0.54	11.74	0.005	0.020	0.0008	0.0008	0.0001	0.0031	0.0002
Clearing/Brushing, Loader, Brush Cutter Attachment	80	x		6	9	2270007015	154	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	5.22	0.010	0.011	0.0012	0.0012	0.0000	0.0013	0.0001
Clearing/brushing, Delimber	140	x		6	9	2270007015	154	638.31	0.50	1.26	0.11	0.11	0.0033	0.17	0.012	0.54	8.22	0.006	0.016	0.0014	0.0014	0.0000	0.0023	0.0002
Clearing/brushing, Loader, Brush Rake Attachment	80	x		6	9	2270007015	309	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	10.43	0.020	0.022	0.0024	0.0024	0.0001	0.0026	0.0002
Clearing/brushing, Wood chipper	70	x		6	9	2270007015	154	708.88	1.40	3.64	0.13	0.13	0.0039	0.19	0.012	0.54	4.56	0.009	0.023	0.0009	0.0009	0.0000	0.0012	0.0001
Backhoe/Loader - 430	100	X		6	9	2270002060	1,227	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	42.78	0.059	0.138	0.0141	0.0141	0.0002	0.0142	0.0010
Backhoe/Loader - 420	93	X		6	9	2270002060	100	595.50	2.00	2.08	0.26	0.26	0.0034	0.20	0.012	0.59	3.61	0.012	0.013	0.0016	0.0016	0.0000	0.0012	0.0001
Loader - 980 Wheel	392	X		6	9	2270002060	185	536.28	0.97	2.40	0.14	0.14	0.0031	0.17	0.012	0.59	25.31	0.046	0.113	0.0067	0.0067	0.0001	0.0081	0.0006
Loader - 966 Wheel	262	X		6	9	2270002060	571	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	52.17	0.053	0.156	0.0102	0.0102	0.0003	0.0162	0.0012
Motor Grader - 14M	259	X		6	9	2270002048	278	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	25.09	0.019	0.058	0.0035	0.0035	0.0001	0.0071	0.0006
Trencher - Trencor 1660 HD	800	X		6	9	2270002030	193	535.80	1.69	4.56	0.24	0.24	0.0032	0.32	0.012	0.59	53.76	0.169	0.458	0.0237	0.0237	0.0003	0.0324	0.0012
Crane - 50 Ton Truck	280	X		6	5	2270002045	223	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	15.69	0.011	0.049	0.0022	0.0022	0.0001	0.0049	0.0004
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	171	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	6.90	0.007	0.024	0.0016	0.0016	0.0000	0.0023	0.0002
Ozzie Padder	400	X		6	9	2270002036	370	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	51.67	0.064	0.157	0.0099	0.0099	0.0003	0.0143	0.0012
Drill, Boring mach. 16"-42" (600,000 #)	95	X		7	9	2270002033	576	589.01	2.17	4.03	0.40	0.40	0.0036	0.43	0.012	0.43	15.28	0.056	0.104	0.0103	0.0103	0.0001	0.0110	0.0003
CAT 815 COMPACTOR	200	X		6	9	2270002015	185	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	12.91	0.013	0.039	0.0025	0.0025	0.0001	0.0040	0.0003
Farm Tractor	175	X		6	9	2270002075	177	536.32	0.48	1.42	0.09	0.09	0.0029	0.16	0.012	0.59	10.83	0.010	0.029	0.0018	0.0018	0.0001	0.0032	0.0002
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	0	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Compressor - 1600 CFM	590	X		6	9	2270006015	46	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	6.87	0.011	0.039	0.0017	0.0017	0.0000	0.0026	0.0002
Compressor - 1200 CFM	590	X		6	9	2270006015	46	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	6.87	0.011	0.039	0.0017	0.0017	0.0000	0.0026	0.0002
Compressor - 600 CFM	185	X		6	9	2270006015	401	530.45	0.45	2.05	0.09	0.09	0.0030	0.19	0.012	0.43	18.66	0.016	0.072	0.0033	0.0033	0.0001	0.0065	0.0004
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	401	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	5.05	0.006	0.031	0.0009	0.0009	0.0000	0.0016	0.0001
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	1,029	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	3.45	0.014	0.027	0.0021	0.0021	0.0000	0.0028	0.0001
Welders	46	X		6	9	2270006025	4,073	693.43	3.59	4.72	0.58	0.58	0.0043	0.80	0.012	0.21	30.08	0.156	0.205	0.0253	0.0253	0.0002	0.0348	0.0005
Pressure washers	10		X	6	7	2265006030	312	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	3.06	0.812	0.006	0.0003	0.0003	0.0001	0.0148	0.0007
Generator - 250 KW	433	X		6	9	2270006005	0	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Chain Saw	1		X	6	9	2265004021	926	1,227.52	206.95	2.52	0.31	0.31	0.0224	7.08	0.229	0.40	0.50	0.084	0.001	0.0001	0.0001	0.0000	0.0029	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	3,374	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	57.81	1.293	0.139	0.0057	0.0057	0.0011	0.0407	0.0188
Pump - 1500 GPM Fill	32		X	6	8	2265006010	343	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	5.87	0.131	0.014	0.0006	0.0006	0.0001	0.0041	0.0019
Pump - Test	32		X	6	8	2265006010	343	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	5.87	0.131	0.014	0.0006	0.0006	0.0001	0.0041	0.0019
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**
Welding Rig w/ 2 x 300 Amp	45	X		6	9		61,097	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		80.66	0.098	0.243	0.0145	0.0133	0.0007	0.0346	0.0034
Pickup 4 x 4	300		X	6	4		154,389	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		80.17	0.877	0.085	0.0021	0.0018	0.0005	0.0274	0.0144
SUV 4 x 4	250		X	6	4		15,994	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		8.31	0.091	0.009	0.0002	0.0002	0.0001	0.0028	0.0015
Truck, Crewcab, 4x4	400	X		6	4		2,571	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.39	0.004	0.010	0.0006	0.0006	0.0000	0.0015	0.0001
Suburban	300		X	6	4		720	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.37	0.004	0.000	0.0000	0.0000	0.0000	0.0001	0.0001
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		5,940	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		7.84	0.010	0.024	0.0014	0.0013	0.0001	0.0034	0.0003

Table 9D-13
NEXUS Project Construction Equipment Air Emissions - Mainline -Medina - MP 56.6-80.5

AUT Equipment Unit & 4 Wheel Drive Crew Cab Truck	400	X		6	6		3,857	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		5.09	0.006	0.015	0.0009	0.0008	0.0000	0.0022	0.0002
Auto maintenance Truck	300		X	6	4		13,989	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		7.26	0.079	0.008	0.0002	0.0002	0.0000	0.0025	0.0013
Truck - 1 Ton Flatbed	300	X		6	4		1,234	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.63	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		18,257	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		24.10	0.029	0.073	0.0043	0.0040	0.0002	0.0103	0.0010
Truck - 6 Ton Flatbed	330	X		6	4		5,091	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.72	0.008	0.020	0.0012	0.0011	0.0001	0.0029	0.0003
Truck - 6 Ton Winch	330	X		6	4		7,766	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		10.25	0.012	0.031	0.0018	0.0017	0.0001	0.0044	0.0004
Truck - 5 CY Dump	300	X		6	9		2,893	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.82	0.005	0.012	0.0007	0.0006	0.0000	0.0016	0.0002
Truck - 12 YD Dump	330	X		6	9		17,357	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		22.92	0.028	0.069	0.0041	0.0038	0.0002	0.0098	0.0010
Truck - Medium Duty Tractor	300	X		6	9		17,241	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		22.76	0.028	0.069	0.0041	0.0038	0.0002	0.0098	0.0010
Truck - Concrete Mixer	350	X		6	9		4,281	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		5.65	0.007	0.017	0.0010	0.0009	0.0000	0.0024	0.0002
Bus - Minibus	180	X		6	4		2,829	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.73	0.005	0.011	0.0007	0.0006	0.0000	0.0016	0.0002
Bus - 26 Passenger	300	X		6	4		7,869	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		10.39	0.013	0.031	0.0019	0.0017	0.0001	0.0045	0.0004
Bus - 45 Passenger	300	X		6	4		1,286	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.70	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Truck, End Dump 12cy	350	X		6	9		13,886	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		18.33	0.022	0.055	0.0033	0.0030	0.0002	0.0079	0.0008
Truck, Skid	300	X		6	9		3,471	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.58	0.006	0.014	0.0008	0.0008	0.0000	0.0020	0.0002
Truck, Stringing Tractor (25 Ton)	300	X		6	9		26,036	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		34.37	0.042	0.104	0.0062	0.0057	0.0003	0.0147	0.0015
Truck, Tire truck	300	X		6	4		4,269	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		5.64	0.007	0.017	0.0010	0.0009	0.0000	0.0024	0.0002
Truck, Wrecker truck	300	X		6	4		3,497	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.62	0.006	0.014	0.0008	0.0008	0.0000	0.0020	0.0002

Construction Workers				**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
				2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Worker Commutes				393,112	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		204.14	2.233	0.217	0.0053	0.0047	0.0014	0.0698	0.0367

Deliveries / Removals	**Empty Vehicle Weight (tons)**	**Full Vehicle Weight (tons)**	**Round Trip Distance (miles)**		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
					2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
On-road delivery vehicles																					
Truck - 4000 Gallon Fuel	13.5	27.5	50.0		7,053	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		8.75	0.010	0.023	0.0014	0.0013	0.0001	0.0036	0.0007
Truck - Fuel/Lube	5.0	10.0	50.0		7,053	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		8.75	0.010	0.023	0.0014	0.0013	0.0001	0.0036	0.0007
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		8,216	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		10.19	0.011	0.027	0.0016	0.0015	0.0001	0.0042	0.0008
On-road material removal vehicles																					
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		9,810	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		12.17	0.014	0.033	0.0019	0.0018	0.0001	0.0050	0.0009

Construction Areas		**Disturbed Acreage (acre-months)**	**WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)**									**2017 Emission Totals (Tons)**							
			CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Area under construction (Exposed Soils)		822	NA	NA	NA	0.11	0.01	NA	NA	NA		NA	NA	NA	90.4624	9.0462	NA	NA	NA

Table 9D-14
NEXUS Project Construction Equipment Air Emissions - Mainline -Lorain- MP 80.5-101.3

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	x		6	9	2270002069	85	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	9.03	0.013	0.033	0.0020	0.0020	0.0001	0.0026	0.0002
Dozer - D8 w/Winch	305	x		6	9	2270002069	625	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	66.48	0.097	0.240	0.0148	0.0148	0.0004	0.0193	0.0015
Dozer - D7 w/Winch	235	x		6	9	2270002069	717	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	58.81	0.046	0.140	0.0084	0.0084	0.0003	0.0168	0.0013
Dozer - D7	235	x		6	9	2270002069	131	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	10.75	0.008	0.026	0.0015	0.0015	0.0001	0.0031	0.0002
Tac rig (Auto) D6	200	x		6	9	2270002069	355	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	24.76	0.019	0.059	0.0035	0.0035	0.0001	0.0071	0.0006
Sideboom - 583	310	x		6	9	2270002069	2,330	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	251.91	0.368	0.909	0.0560	0.0560	0.0014	0.0733	0.0058
Sideboom - 572	240	x		6	9	2270002069	108	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	9.04	0.007	0.022	0.0013	0.0013	0.0000	0.0026	0.0002
Bend Machine - PB 32-42	173	x		6	9	2270002033	170	530.03	1.10	3.87	0.24	0.24	0.0033	0.32	0.012	0.43	7.38	0.015	0.054	0.0033	0.0033	0.0000	0.0044	0.0002
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	586	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	77.71	0.096	0.236	0.0149	0.0149	0.0004	0.0216	0.0018
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	1,288	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	134.81	0.166	0.410	0.0259	0.0259	0.0007	0.0374	0.0031
Backhoe - 325 (1.38 cy)	180	x		6	9	2270002036	1,180	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	74.11	0.045	0.148	0.0077	0.0077	0.0004	0.0201	0.0017
Backhoe - 325 w/Hoe-Ram	180	x		6	9	2270002036	255	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	15.98	0.010	0.032	0.0017	0.0017	0.0001	0.0043	0.0004
Backhoe, 215 / 320 w/hyd. Saw (feller buncher)	140	x		6	9	2270002036	131	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	6.40	0.006	0.014	0.0014	0.0014	0.0000	0.0018	0.0001
Backhoe, 215 / 320 w/hyd. Thumb	140	x		6	9	2270002036	131	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	6.40	0.006	0.014	0.0014	0.0014	0.0000	0.0018	0.0001
Clearing/brushing, Log Skidder	200	x		6	9	2270007015	131	638.34	0.29	1.10	0.05	0.05	0.0032	0.17	0.012	0.54	9.98	0.005	0.017	0.0007	0.0007	0.0001	0.0026	0.0002
Clearing/Brushing, Loader, Brush Cutter Attachment	80	x		6	9	2270007015	131	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	4.43	0.009	0.009	0.0010	0.0010	0.0000	0.0011	0.0001
Clearing/brushing, Delimber	140	x		6	9	2270007015	131	638.31	0.50	1.26	0.11	0.11	0.0033	0.17	0.012	0.54	6.99	0.006	0.014	0.0012	0.0012	0.0000	0.0019	0.0001
Clearing/brushing, Loader, Brush Rake Attachment	80	x		6	9	2270007015	262	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	8.87	0.017	0.019	0.0020	0.0020	0.0000	0.0023	0.0002
Clearing/brushing, Wood chipper	70	x		6	9	2270007015	131	708.88	1.40	3.64	0.13	0.13	0.0039	0.19	0.012	0.54	3.88	0.008	0.020	0.0007	0.0007	0.0000	0.0010	0.0001
Backhoe/Loader - 430	100	X		6	9	2270002060	1,057	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	36.86	0.051	0.119	0.0121	0.0121	0.0002	0.0122	0.0008
Backhoe/Loader - 420	93	X		6	9	2270002060	85	595.50	2.00	2.08	0.26	0.26	0.0034	0.20	0.012	0.59	3.06	0.010	0.011	0.0013	0.0013	0.0000	0.0010	0.0001
Loader - 980 Wheel	392	X		6	9	2270002060	162	536.28	0.97	2.40	0.14	0.14	0.0031	0.17	0.012	0.59	22.15	0.040	0.099	0.0059	0.0059	0.0001	0.0071	0.0005
Loader - 966 Wheel	262	X		6	9	2270002060	501	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	45.82	0.046	0.137	0.0090	0.0090	0.0003	0.0142	0.0011
Motor Grader - 14M	259	X		6	9	2270002048	239	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	21.60	0.016	0.050	0.0030	0.0030	0.0001	0.0061	0.0005
Trencher - Trencor 1660 HD	800	X		6	9	2270002030	170	535.80	1.69	4.56	0.24	0.24	0.0032	0.32	0.012	0.59	47.31	0.149	0.403	0.0208	0.0208	0.0003	0.0285	0.0011
Crane - 50 Ton Truck	280	X		6	5	2270002045	201	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	14.18	0.010	0.045	0.0020	0.0020	0.0001	0.0044	0.0003
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	154	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	6.21	0.006	0.021	0.0015	0.0015	0.0000	0.0021	0.0001
Ozzie Padder	400	X		6	9	2270002036	332	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	46.28	0.057	0.141	0.0089	0.0089	0.0003	0.0129	0.0011
Drill, Boring mach. 16"-42" (600,000 #)	95	X		7	9	2270002033	486	589.01	2.17	4.03	0.40	0.40	0.0036	0.43	0.012	0.43	12.89	0.048	0.088	0.0087	0.0087	0.0001	0.0093	0.0003
CAT 815 COMPACTOR	200	X		6	9	2270002015	162	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	11.30	0.011	0.034	0.0022	0.0022	0.0001	0.0035	0.0003
Farm Tractor	175	X		6	9	2270002075	154	536.32	0.48	1.42	0.09	0.09	0.0029	0.16	0.012	0.59	9.42	0.008	0.025	0.0016	0.0016	0.0001	0.0028	0.0002
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	0	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Compressor - 1600 CFM	590	X		6	9	2270006015	46	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	6.87	0.011	0.039	0.0017	0.0017	0.0000	0.0026	0.0002
Compressor - 1200 CFM	590	X		6	9	2270006015	46	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	6.87	0.011	0.039	0.0017	0.0017	0.0000	0.0026	0.0002
Compressor - 600 CFM	185	X		6	9	2270006015	355	530.45	0.45	2.05	0.09	0.09	0.0030	0.19	0.012	0.43	16.51	0.014	0.064	0.0029	0.0029	0.0001	0.0058	0.0004
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	355	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	4.46	0.005	0.027	0.0008	0.0008	0.0000	0.0014	0.0001
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	905	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	3.03	0.012	0.023	0.0018	0.0018	0.0000	0.0024	0.0001
Welders	46	X		6	9	2270006025	3,641	693.43	3.59	4.72	0.58	0.58	0.0043	0.80	0.012	0.21	26.89	0.139	0.183	0.0226	0.0226	0.0002	0.0311	0.0005
Pressure washers	10		X	6	7	2265006030	264	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	2.59	0.687	0.005	0.0003	0.0003	0.0000	0.0125	0.0006
Generator - 250 KW	433	X		6	9	2270006005	0	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Chain Saw	1		X	6	9	2265004021	787	1,227.52	206.95	2.52	0.31	0.31	0.0224	7.08	0.229	0.40	0.43	0.072	0.001	0.0001	0.0001	0.0000	0.0025	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	2,921	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	50.05	1.120	0.120	0.0049	0.0049	0.0009	0.0353	0.0163
Pump - 1500 GPM Fill	32		X	6	8	2265006010	302	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	5.17	0.116	0.012	0.0005	0.0005	0.0001	0.0036	0.0017
Pump - Test	32		X	6	8	2265006010	302	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	5.17	0.116	0.012	0.0005	0.0005	0.0001	0.0036	0.0017
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**
Welding Rig w/ 2 x 300 Amp	45	X		6	9		54,617	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		72.11	0.087	0.217	0.0130	0.0119	0.0006	0.0309	0.0030
Pickup 4 x 4	300		X	6	4		135,360	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		70.29	0.769	0.075	0.0018	0.0016	0.0005	0.0240	0.0126
SUV 4 x 4	250		X	6	4		13,989	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		7.26	0.079	0.008	0.0002	0.0002	0.0000	0.0025	0.0013
Truck, Crewcab, 4x4	400	X		6	4		2,366	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.12	0.004	0.009	0.0006	0.0005	0.0000	0.0013	0.0001
Suburban	300		X	6	4		720	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.37	0.004	0.000	0.0000	0.0000	0.0000	0.0001	0.0001
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		5,323	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		7.03	0.009	0.021	0.0013	0.0012	0.0001	0.0030	0.0003

Table 9D-14
NEXUS Project Construction Equipment Air Emissions - Mainline -Lorain- MP 80.5-101.3

AUT Equipment Unit & 4 Wheel Drive Crew Cab Truck	400	X		6	6		3,549	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.69	0.006	0.014	0.0008	0.0008	0.0000	0.0020	0.0002
Auto maintenance Truck	300		X	6	4		12,137	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		6.30	0.069	0.007	0.0002	0.0001	0.0000	0.0022	0.0011
Truck - 1 Ton Flatbed	300	X		6	4		1,080	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.43	0.002	0.004	0.0003	0.0002	0.0000	0.0006	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		15,994	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		21.12	0.026	0.064	0.0038	0.0035	0.0002	0.0090	0.0009
Truck - 6 Ton Flatbed	330	X		6	4		4,577	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.04	0.007	0.018	0.0011	0.0010	0.0001	0.0026	0.0003
Truck - 6 Ton Winch	330	X		6	4		6,686	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		8.83	0.011	0.027	0.0016	0.0015	0.0001	0.0038	0.0004
Truck - 5 CY Dump	300	X		6	9		2,546	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.36	0.004	0.010	0.0006	0.0006	0.0000	0.0014	0.0001
Truck - 12 YD Dump	330	X		6	9		15,274	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		20.17	0.024	0.061	0.0036	0.0033	0.0002	0.0086	0.0009
Truck - Medium Duty Tractor	300	X		6	9		14,811	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		19.56	0.024	0.059	0.0035	0.0032	0.0002	0.0084	0.0008
Truck - Concrete Mixer	350	X		6	9		3,819	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		5.04	0.006	0.015	0.0009	0.0008	0.0000	0.0022	0.0002
Bus - Minibus	180	X		6	4		2,571	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.39	0.004	0.010	0.0006	0.0006	0.0000	0.0015	0.0001
Bus - 26 Passenger	300	X		6	4		6,789	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		8.96	0.011	0.027	0.0016	0.0015	0.0001	0.0038	0.0004
Bus - 45 Passenger	300	X		6	4		1,183	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.56	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Truck, End Dump 12cy	350	X		6	9		12,150	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		16.04	0.019	0.048	0.0029	0.0027	0.0001	0.0069	0.0007
Truck, Skid	300	X		6	9		3,240	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.28	0.005	0.013	0.0008	0.0007	0.0000	0.0018	0.0002
Truck, Stringing Tractor (25 Ton)	300	X		6	9		24,300	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		32.08	0.039	0.097	0.0058	0.0053	0.0003	0.0137	0.0014
Truck, Tire truck	300	X		6	4		3,754	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.96	0.006	0.015	0.0009	0.0008	0.0000	0.0021	0.0002
Truck, Wrecker truck	300	X		6	4		3,034	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.01	0.005	0.012	0.0007	0.0007	0.0000	0.0017	0.0002

Construction Workers				**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
				2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Worker Commutes				343,621	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		178.44	1.952	0.189	0.0046	0.0041	0.0012	0.0610	0.0321

Deliveries / Removals	**Empty Vehicle Weight (tons)**	**Full Vehicle Weight (tons)**	**Round Trip Distance (miles)**		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
					2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
On-road delivery vehicles																					
Truck - 4000 Gallon Fuel	13.5	27.5	50.0		6,168	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		7.65	0.009	0.020	0.0012	0.0011	0.0001	0.0032	0.0006
Truck - Fuel/Lube	5.0	10.0	50.0		6,168	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		7.65	0.009	0.020	0.0012	0.0011	0.0001	0.0032	0.0006
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		7,219	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		8.95	0.010	0.024	0.0014	0.0013	0.0001	0.0037	0.0007
On-road material removal vehicles																					
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		8,620	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		10.69	0.012	0.029	0.0017	0.0015	0.0001	0.0044	0.0008

Construction Areas		**Disturbed Acreage (acre-months)**	**WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)**								**2017 Emission Totals (Tons)**							
			CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Area under construction (Exposed Soils)		704	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	77.3992	7.7399	NA	NA	NA

Table 9D-15
NEXUS Project Construction Equipment Air Emissions - SP 2 Huron Co. MP 101.3-104.7

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	x		6	9	2270002069	15	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	1.64	0.002	0.006	0.0004	0.0004	0.0000	0.0005	0.0000
Dozer - D8 w/Winch	305	x		6	9	2270002069	116	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	12.31	0.018	0.044	0.0027	0.0027	0.0001	0.0036	0.0003
Dozer - D7 w/Winch	235	x		6	9	2270002069	131	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	10.75	0.008	0.026	0.0015	0.0015	0.0001	0.0031	0.0002
Dozer - D7	235	x		6	9	2270002069	23	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	1.90	0.001	0.005	0.0003	0.0003	0.0000	0.0005	0.0000
Tac rig (Auto) D6	200	x		6	9	2270002069	46	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	3.23	0.003	0.008	0.0005	0.0005	0.0000	0.0009	0.0001
Sideboom - 583	310	x		6	9	2270002069	363	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	39.20	0.057	0.141	0.0087	0.0087	0.0002	0.0114	0.0009
Sideboom - 572	240	x		6	9	2270002069	15	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	1.29	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Bend Machine - PB 32-42	173	x		6	9	2270002033	31	530.03	1.10	3.87	0.24	0.24	0.0033	0.32	0.012	0.43	1.34	0.003	0.010	0.0006	0.0006	0.0000	0.0008	0.0000
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	108	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	14.32	0.018	0.044	0.0028	0.0028	0.0001	0.0040	0.0003
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	123	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	12.92	0.016	0.039	0.0025	0.0025	0.0001	0.0036	0.0003
Backhoe - 325 (1.38 cy)	180	x		6	9	2270002036	748	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	46.98	0.028	0.094	0.0049	0.0049	0.0002	0.0127	0.0011
Backhoe - 325 w/Hoe-Ram	180	x		6	9	2270002036	46	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	2.91	0.002	0.006	0.0003	0.0003	0.0000	0.0008	0.0001
Backhoe, 215 / 320 w/hyd. Saw (feller buncher)	140	x		6	9	2270002036	23	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	1.13	0.001	0.003	0.0002	0.0002	0.0000	0.0003	0.0000
Backhoe, 215 / 320 w/hyd. Thumb	140	x		6	9	2270002036	23	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	1.13	0.001	0.003	0.0002	0.0002	0.0000	0.0003	0.0000
Clearing/brushing, Log Skidder	200	x		6	9	2270007015	23	638.34	0.29	1.10	0.05	0.05	0.0032	0.17	0.012	0.54	1.76	0.001	0.003	0.0001	0.0001	0.0000	0.0005	0.0000
Clearing/Brushing, Loader, Brush Cutter Attachment	80	x		6	9	2270007015	23	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	0.78	0.002	0.002	0.0002	0.0002	0.0000	0.0002	0.0000
Clearing/brushing, Delimber	140	x		6	9	2270007015	23	638.31	0.50	1.26	0.11	0.11	0.0033	0.17	0.012	0.54	1.23	0.001	0.002	0.0002	0.0002	0.0000	0.0003	0.0000
Clearing/brushing, Loader, Brush Rake Attachment	80	x		6	9	2270007015	46	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	1.56	0.003	0.003	0.0004	0.0004	0.0000	0.0004	0.0000
Clearing/brushing, Wood chipper	70	x		6	9	2270007015	23	708.88	1.40	3.64	0.13	0.13	0.0039	0.19	0.012	0.54	0.68	0.001	0.004	0.0001	0.0001	0.0000	0.0002	0.0000
Backhoe/Loader - 430	100	X		6	9	2270002060	193	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	6.73	0.009	0.022	0.0022	0.0022	0.0000	0.0022	0.0002
Backhoe/Loader - 420	93	X		6	9	2270002060	15	595.50	2.00	2.08	0.26	0.26	0.0034	0.20	0.012	0.59	0.56	0.002	0.002	0.0002	0.0002	0.0000	0.0002	0.0000
Loader - 980 Wheel	392	X		6	9	2270002060	31	536.28	0.97	2.40	0.14	0.14	0.0031	0.17	0.012	0.59	4.22	0.008	0.019	0.0011	0.0011	0.0000	0.0014	0.0001
Loader - 966 Wheel	262	X		6	9	2270002060	77	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	7.05	0.007	0.021	0.0014	0.0014	0.0000	0.0022	0.0002
Motor Grader - 14M	259	X		6	9	2270002048	46	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	4.18	0.003	0.010	0.0006	0.0006	0.0000	0.0012	0.0001
Trencher - Trencor 1660 HD	800	X		6	9	2270002030	31	535.80	1.69	4.56	0.24	0.24	0.0032	0.32	0.012	0.59	8.60	0.027	0.073	0.0038	0.0038	0.0001	0.0052	0.0002
Crane - 50 Ton Truck	280	X		6	5	2270002045	30	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	2.11	0.001	0.007	0.0003	0.0003	0.0000	0.0007	0.0000
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	26	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	1.03	0.001	0.004	0.0002	0.0002	0.0000	0.0003	0.0000
Ozzie Padder	400	X		6	9	2270002036	54	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	7.53	0.009	0.023	0.0014	0.0014	0.0000	0.0021	0.0002
Drill, Boring mach. 16"-42" (600,000 #)	95	X		7	9	2270002033	90	589.01	2.17	4.03	0.40	0.40	0.0036	0.43	0.012	0.43	2.39	0.009	0.016	0.0016	0.0016	0.0000	0.0017	0.0000
CAT 815 COMPACTOR	200	X		6	9	2270002015	31	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	2.15	0.002	0.006	0.0004	0.0004	0.0000	0.0007	0.0000
Farm Tractor	175	X		6	9	2270002075	31	536.32	0.48	1.42	0.09	0.09	0.0029	0.16	0.012	0.59	1.88	0.002	0.005	0.0003	0.0003	0.0000	0.0006	0.0000
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	0	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Compressor - 1600 CFM	590	X		6	9	2270006015	15	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	2.29	0.004	0.013	0.0006	0.0006	0.0000	0.0009	0.0001
Compressor - 1200 CFM	590	X		6	9	2270006015	15	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	2.29	0.004	0.013	0.0006	0.0006	0.0000	0.0009	0.0001
Compressor - 600 CFM	185	X		6	9	2270006015	54	530.45	0.45	2.05	0.09	0.09	0.0030	0.19	0.012	0.43	2.51	0.002	0.010	0.0004	0.0004	0.0000	0.0009	0.0001
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	54	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.68	0.001	0.004	0.0001	0.0001	0.0000	0.0002	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	165	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	0.55	0.002	0.004	0.0003	0.0003	0.0000	0.0004	0.0000
Welders	46	X		6	9	2270006025	540	693.43	3.59	4.72	0.58	0.58	0.0043	0.80	0.012	0.21	3.99	0.021	0.027	0.0033	0.0033	0.0000	0.0046	0.0001
Pressure washers	10		X	6	7	2265006030	48	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.47	0.125	0.001	0.0001	0.0001	0.0000	0.0023	0.0001
Generator - 250 KW	433	X		6	9	2270006005	0	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Chain Saw	1		X	6	9	2265004021	139	1,227.52	206.95	2.52	0.31	0.31	0.0224	7.08	0.229	0.40	0.08	0.013	0.000	0.0000	0.0000	0.0000	0.0004	0.0000
Pump - 6-Inch Water	32		X	6	24	2265006010	535	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	9.16	0.205	0.022	0.0009	0.0009	0.0002	0.0065	0.0030
Pump - 1500 GPM Fill	32		X	6	8	2265006010	55	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	0.94	0.021	0.002	0.0001	0.0001	0.0000	0.0007	0.0003
Pump - Test	32		X	6	8	2265006010	55	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	0.94	0.021	0.002	0.0001	0.0001	0.0000	0.0007	0.0003
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**
Welding Rig w/ 2 x 300 Amp	45	X		6	9		8,100	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		10.69	0.013	0.032	0.0019	0.0018	0.0001	0.0046	0.0005
Pickup 4 x 4	300		X	6	4		22,269	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		11.56	0.126	0.012	0.0003	0.0003	0.0001	0.0040	0.0021
SUV 4 x 4	250		X	6	4		2,366	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		1.23	0.013	0.001	0.0000	0.0000	0.0000	0.0004	0.0002
Truck, Crewcab, 4x4	400	X		6	4		309	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.41	0.000	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
Suburban	300		X	6	4		103	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.05	0.001	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		771	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.02	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000

Table 9D-15
NEXUS Project Construction Equipment Air Emissions - SP 2 Huron Co. MP 101.3-104.7

AUT Equipment Unit & 4 Wheel Drive Crew Cab Truck	400	X		6	6		463	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.61	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Auto maintenance Truck	300		X	6	4		2,057	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		1.07	0.012	0.001	0.0000	0.0000	0.0000	0.0004	0.0002
Truck - 1 Ton Flatbed	300	X		6	4		206	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.27	0.000	0.001	0.0000	0.0000	0.0000	0.0001	0.0000
Truck - 3 Ton Flatbed	330	X		6	4		2,674	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.53	0.004	0.011	0.0006	0.0006	0.0000	0.0015	0.0001
Truck - 6 Ton Flatbed	330	X		6	4		669	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.88	0.001	0.003	0.0002	0.0001	0.0000	0.0004	0.0000
Truck - 6 Ton Winch	330	X		6	4		1,131	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.49	0.002	0.004	0.0003	0.0002	0.0000	0.0006	0.0001
Truck - 5 CY Dump	300	X		6	9		347	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.46	0.001	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
Truck - 12 YD Dump	330	X		6	9		2,083	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.75	0.003	0.008	0.0005	0.0005	0.0000	0.0012	0.0001
Truck - Medium Duty Tractor	300	X		6	9		2,546	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.36	0.004	0.010	0.0006	0.0006	0.0000	0.0014	0.0001
Truck - Concrete Mixer	350	X		6	9		579	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.76	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Bus - Minibus	180	X		6	4		360	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.48	0.001	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
Bus - 26 Passenger	300	X		6	4		1,183	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.56	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Bus - 45 Passenger	300	X		6	4		154	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.20	0.000	0.001	0.0000	0.0000	0.0000	0.0001	0.0000
Truck, End Dump 12cy	350	X		6	9		2,314	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.06	0.004	0.009	0.0005	0.0005	0.0000	0.0013	0.0001
Truck, Skid	300	X		6	9		463	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.61	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck, Stringing Tractor (25 Ton)	300	X		6	9		3,471	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.58	0.006	0.014	0.0008	0.0008	0.0000	0.0020	0.0002
Truck, Tire truck	300	X		6	4		617	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.81	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck, Wrecker truck	300	X		6	4		514	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.68	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000

Construction Workers		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
		2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Worker Commutes		55,532	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		28.84	0.315	0.031	0.0007	0.0007	0.0002	0.0099	0.0052

Deliveries / Removals	**Empty Vehicle Weight (tons)**	**Full Vehicle Weight (tons)**	**Round Trip Distance (miles)**	**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**								**2017 Emission Totals (Tons)**							
				2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
On-road delivery vehicles																				
Truck - 4000 Gallon Fuel	13.5	27.5	50.0	997	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	1.24	0.001	0.003	0.0002	0.0002	0.0000	0.0005	0.0001
Truck - Fuel/Lube	5.0	10.0	50.0	997	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	1.24	0.001	0.003	0.0002	0.0002	0.0000	0.0005	0.0001
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0	1,167	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	1.45	0.002	0.004	0.0002	0.0002	0.0000	0.0006	0.0001
On-road material removal vehicles																				
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0	1,393	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	1.73	0.002	0.005	0.0003	0.0002	0.0000	0.0007	0.0001

Construction Areas	**Disturbed Acreage (acre-months)**	**WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)**								**2017 Emission Totals (Tons)**							
		CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Area under construction (Exposed Soils)	104	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	11.4018	1.1402	NA	NA	NA

Table 9D-16
NEXUS Project Construction Equipment Air Emissions - SP2 Erie Co. MP 104.7-131.5

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	x		6	9	2270002069	116	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	12.31	0.018	0.044	0.0027	0.0027	0.0001	0.0036	0.0003
Dozer - D8 w/Winch	305	x		6	9	2270002069	818	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	86.99	0.127	0.314	0.0193	0.0193	0.0005	0.0253	0.0020
Dozer - D7 w/Winch	235	x		6	9	2270002069	918	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	75.25	0.059	0.179	0.0108	0.0108	0.0004	0.0215	0.0017
Dozer - D7	235	x		6	9	2270002069	609	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	49.96	0.039	0.119	0.0072	0.0072	0.0003	0.0143	0.0011
Tac rig (Auto) D6	200	x		6	9	2270002069	447	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	31.21	0.024	0.074	0.0045	0.0045	0.0002	0.0089	0.0007
Sideboom - 583	310	x		6	9	2270002069	2,985	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	322.81	0.472	1.164	0.0717	0.0717	0.0018	0.0939	0.0074
Sideboom - 572	240	x		6	9	2270002069	131	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	10.98	0.009	0.026	0.0016	0.0016	0.0001	0.0031	0.0003
Bend Machine - PB 32-42	173	x		6	9	2270002033	216	530.03	1.10	3.87	0.24	0.24	0.0033	0.32	0.012	0.43	9.39	0.019	0.069	0.0042	0.0042	0.0001	0.0056	0.0002
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	756	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	100.21	0.124	0.305	0.0193	0.0193	0.0006	0.0278	0.0023
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	1,527	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	159.84	0.197	0.486	0.0307	0.0307	0.0009	0.0444	0.0037
Backhoe - 325 (1.38 cy)	180	x		6	9	2270002036	995	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	62.48	0.038	0.125	0.0065	0.0065	0.0003	0.0169	0.0014
Backhoe - 325 w/Hoe-Ram	180	x		6	9	2270002036	332	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	20.83	0.013	0.042	0.0022	0.0022	0.0001	0.0056	0.0005
Backhoe, 215 / 320 w/hyd. Saw (feller buncher)	140	x		6	9	2270002036	177	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	8.66	0.008	0.019	0.0019	0.0019	0.0000	0.0025	0.0002
Backhoe, 215 / 320 w/hyd. Thumb	140	x		6	9	2270002036	177	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	8.66	0.008	0.019	0.0019	0.0019	0.0000	0.0025	0.0002
Clearing/brushing, Log Skidder	200	x		6	9	2270007015	177	638.34	0.29	1.10	0.05	0.05	0.0032	0.17	0.012	0.54	13.50	0.006	0.023	0.0010	0.0010	0.0001	0.0035	0.0003
Clearing/Brushing, Loader, Brush Cutter Attachment	80	x		6	9	2270007015	177	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	6.00	0.012	0.013	0.0014	0.0014	0.0000	0.0015	0.0001
Clearing/brushing, Delimber	140	x		6	9	2270007015	177	638.31	0.50	1.26	0.11	0.11	0.0033	0.17	0.012	0.54	9.45	0.007	0.019	0.0016	0.0016	0.0000	0.0026	0.0002
Clearing/brushing, Loader, Brush Rake Attachment	80	x		6	9	2270007015	355	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	12.00	0.023	0.025	0.0027	0.0027	0.0001	0.0030	0.0002
Clearing/brushing, Wood chipper	70	x		6	9	2270007015	177	708.88	1.40	3.64	0.13	0.13	0.0039	0.19	0.012	0.54	5.25	0.010	0.027	0.0010	0.0010	0.0000	0.0014	0.0001
Backhoe/Loader - 430	100	X		6	9	2270002060	2,214	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	77.22	0.106	0.250	0.0254	0.0254	0.0004	0.0256	0.0018
Backhoe/Loader - 420	93	X		6	9	2270002060	116	595.50	2.00	2.08	0.26	0.26	0.0034	0.20	0.012	0.59	4.17	0.014	0.015	0.0018	0.0018	0.0000	0.0014	0.0001
Loader - 980 Wheel	392	X		6	9	2270002060	201	536.28	0.97	2.40	0.14	0.14	0.0031	0.17	0.012	0.59	27.42	0.050	0.123	0.0072	0.0072	0.0002	0.0088	0.0006
Loader - 966 Wheel	262	X		6	9	2270002060	633	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	57.81	0.058	0.172	0.0113	0.0113	0.0003	0.0179	0.0013
Motor Grader - 14M	259	X		6	9	2270002048	741	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	66.91	0.051	0.155	0.0092	0.0092	0.0004	0.0190	0.0015
Trencher - Trencor 1660 HD	800	X		6	9	2270002030	216	535.80	1.69	4.56	0.24	0.24	0.0032	0.32	0.012	0.59	60.21	0.190	0.513	0.0265	0.0265	0.0004	0.0363	0.0014
Crane - 50 Ton Truck	280	X		6	5	2270002045	249	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	17.50	0.012	0.055	0.0025	0.0025	0.0001	0.0055	0.0004
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	429	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	17.24	0.016	0.059	0.0041	0.0041	0.0001	0.0058	0.0004
Ozzie Padder	400	X		6	9	2270002036	417	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	58.12	0.072	0.177	0.0112	0.0112	0.0003	0.0161	0.0013
Drill, Boring mach. 16"-42" (600,000 #)	95	X		7	9	2270002033	630	589.01	2.17	4.03	0.40	0.40	0.0036	0.43	0.012	0.43	16.71	0.062	0.114	0.0113	0.0113	0.0001	0.0121	0.0003
CAT 815 COMPACTOR	200	X		6	9	2270002015	633	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	44.13	0.045	0.132	0.0086	0.0086	0.0002	0.0137	0.0010
Farm Tractor	175	X		6	9	2270002075	193	536.32	0.48	1.42	0.09	0.09	0.0029	0.16	0.012	0.59	11.77	0.011	0.031	0.0020	0.0020	0.0001	0.0035	0.0003
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	864	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	30.14	0.013	0.036	0.0020	0.0020	0.0001	0.0076	0.0007
Compressor - 1600 CFM	590	X		6	9	2270006015	46	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	6.87	0.011	0.039	0.0017	0.0017	0.0000	0.0026	0.0002
Compressor - 1200 CFM	590	X		6	9	2270006015	46	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	6.87	0.011	0.039	0.0017	0.0017	0.0000	0.0026	0.0002
Compressor - 600 CFM	185	X		6	9	2270006015	455	530.45	0.45	2.05	0.09	0.09	0.0030	0.19	0.012	0.43	21.17	0.018	0.082	0.0037	0.0037	0.0001	0.0074	0.0005
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	455	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	5.73	0.006	0.035	0.0011	0.0011	0.0000	0.0018	0.0001
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	1,152	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	3.86	0.016	0.030	0.0023	0.0023	0.0000	0.0031	0.0001
Welders	46	X		6	9	2270006025	4,629	693.43	3.59	4.72	0.58	0.58	0.0043	0.80	0.012	0.21	34.18	0.177	0.233	0.0287	0.0287	0.0002	0.0396	0.0006
Pressure washers	10		X	6	7	2265006030	240	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	2.35	0.624	0.005	0.0003	0.0003	0.0000	0.0114	0.0005
Generator - 250 KW	433	X		6	9	2270006005	432	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	47.01	0.096	0.323	0.0144	0.0144	0.0003	0.0230	0.0011
Chain Saw	1		X	6	9	2265004021	1,065	1,227.52	206.95	2.52	0.31	0.31	0.0224	7.08	0.229	0.40	0.58	0.097	0.001	0.0001	0.0001	0.0000	0.0033	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	3,744	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	64.15	1.435	0.154	0.0063	0.0063	0.0012	0.0452	0.0209
Pump - 1500 GPM Fill	32		X	6	8	2265006010	384	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	6.58	0.147	0.016	0.0006	0.0006	0.0001	0.0046	0.0021
Pump - Test	32		X	6	8	2265006010	384	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	6.58	0.147	0.016	0.0006	0.0006	0.0001	0.0046	0.0021
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**
Welding Rig w/ 2 x 300 Amp	45	X		6	9		69,429	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		91.66	0.111	0.276	0.0165	0.0152	0.0008	0.0393	0.0039
Pickup 4 x 4	300		X	6	4		174,086	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		90.40	0.989	0.096	0.0023	0.0021	0.0006	0.0309	0.0163
SUV 4 x 4	250		X	6	4		18,103	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		9.40	0.103	0.010	0.0002	0.0002	0.0001	0.0032	0.0017
Truck, Crewcab, 4x4	400	X		6	4		2,983	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.94	0.005	0.012	0.0007	0.0007	0.0000	0.0017	0.0002
Suburban	300		X	6	4		823	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.43	0.005	0.000	0.0000	0.0000	0.0000	0.0001	0.0001
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		6,789	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		8.96	0.011	0.027	0.0016	0.0015	0.0001	0.0038	0.0004

Table 9D-16
NEXUS Project Construction Equipment Air Emissions - SP2 Erie Co. MP 104.7-131.5

AUT Equipment Unit & 4 Wheel Drive Crew Cab Truck	400	X		6	6		4,474	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		5.91	0.007	0.018	0.0011	0.0010	0.0001	0.0025	0.0002
Auto maintenance Truck	300		X	6	4		15,840	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		8.23	0.090	0.009	0.0002	0.0002	0.0001	0.0028	0.0015
Truck - 1 Ton Flatbed	300	X		6	4		1,337	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.77	0.002	0.005	0.0003	0.0003	0.0000	0.0008	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		26,331	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		34.76	0.042	0.105	0.0063	0.0058	0.0003	0.0149	0.0015
Truck - 6 Ton Flatbed	330	X		6	4		5,709	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		7.54	0.009	0.023	0.0014	0.0012	0.0001	0.0032	0.0003
Truck - 6 Ton Winch	330	X		6	4		8,743	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		11.54	0.014	0.035	0.0021	0.0019	0.0001	0.0049	0.0005
Truck - 5 CY Dump	300	X		6	9		3,240	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.28	0.005	0.013	0.0008	0.0007	0.0000	0.0018	0.0002
Truck - 12 YD Dump	330	X		6	9		32,400	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		42.78	0.052	0.129	0.0077	0.0071	0.0004	0.0183	0.0018
Truck - Medium Duty Tractor	300	X		6	9		25,920	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		34.22	0.041	0.103	0.0062	0.0057	0.0003	0.0147	0.0014
Truck - Concrete Mixer	350	X		6	9		4,744	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.26	0.008	0.019	0.0011	0.0010	0.0001	0.0027	0.0003
Bus - Minibus	180	X		6	4		3,240	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.28	0.005	0.013	0.0008	0.0007	0.0000	0.0018	0.0002
Bus - 26 Passenger	300	X		6	4		8,743	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		11.54	0.014	0.035	0.0021	0.0019	0.0001	0.0049	0.0005
Bus - 45 Passenger	300	X		6	4		1,491	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.97	0.002	0.006	0.0004	0.0003	0.0000	0.0008	0.0001
Truck, End Dump 12cy	350	X		6	9		15,043	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		19.86	0.024	0.060	0.0036	0.0033	0.0002	0.0085	0.0008
Truck, Skid	300	X		6	9		3,934	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		5.19	0.006	0.016	0.0009	0.0009	0.0000	0.0022	0.0002
Truck, Stringing Tractor (25 Ton)	300	X		6	9		29,507	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		38.96	0.047	0.117	0.0070	0.0064	0.0003	0.0167	0.0016
Truck, Tire truck	300	X		6	4		4,834	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.38	0.008	0.019	0.0011	0.0011	0.0001	0.0027	0.0003
Truck, Wrecker truck	300	X		6	4		3,960	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		5.23	0.006	0.016	0.0009	0.0009	0.0000	0.0022	0.0002

Construction Workers	Assume 3 ppl per commuter vehicle	**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
		2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Number of Constructruction Workers (Assume 450ppl peak / Spread)		440,607	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		228.81	2.502	0.243	0.0059	0.0052	0.0015	0.0783	0.0412

Deliveries / Removals	**Empty Vehicle Weight (tons)**	**Full Vehicle Weight (tons)**	**Round Trip Distance (miles)**	**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**								**2017 Emission Totals (Tons)**							
				2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
On-road delivery vehicles																				
Truck - 4000 Gallon Fuel	13.5	27.5	50.0																	
Truck - Fuel/Lube	5.0	10.0	50.0	7,909	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	9.81	0.011	0.026	0.0015	0.0014	0.0001	0.0041	0.0007
				0	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0	9,256	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	11.48	0.013	0.031	0.0018	0.0017	0.0001	0.0048	0.0009
On-road material removal vehicles																				
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0	11,053	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	13.71	0.015	0.037	0.0022	0.0020	0.0001	0.0057	0.0010

Construction Areas	**Disturbed Acreage (acre-months)**	**WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)**								**2017 Emission Totals (Tons)**							
		CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Area under construction (Exposed Soils)	1,045	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	114.9139	11.4914	NA	NA	NA

Table 9D-17
NEXUS Project Construction Equipment Air Emissions - SP2 Sandusky Co.MP 131.5-132.8

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	x		6	9	2270002069	8	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	0.82	0.001	0.003	0.0002	0.0002	0.0000	0.0002	0.0000
Dozer - D8 w/Winch	305	x		6	9	2270002069	54	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	5.74	0.008	0.021	0.0013	0.0013	0.0000	0.0017	0.0001
Dozer - D7 w/Winch	235	x		6	9	2270002069	62	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	5.06	0.004	0.012	0.0007	0.0007	0.0000	0.0014	0.0001
Dozer - D7	235	x		6	9	2270002069	15	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	1.26	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Tac rig (Auto) D6	200	x		6	9	2270002069	31	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	2.15	0.002	0.005	0.0003	0.0003	0.0000	0.0006	0.0000
Sideboom - 583	310	x		6	9	2270002069	208	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	22.52	0.033	0.081	0.0050	0.0050	0.0001	0.0066	0.0005
Sideboom - 572	240	x		6	9	2270002069	8	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	0.65	0.001	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Bend Machine - PB 32-42	173	x		6	9	2270002033	15	530.03	1.10	3.87	0.24	0.24	0.0033	0.32	0.012	0.43	0.67	0.001	0.005	0.0003	0.0003	0.0000	0.0004	0.0000
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	46	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	6.14	0.008	0.019	0.0012	0.0012	0.0000	0.0017	0.0001
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	108	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	11.30	0.014	0.034	0.0022	0.0022	0.0001	0.0031	0.0003
Backhoe - 325 (1.38 cy)	180	x		6	9	2270002036	100	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	6.30	0.004	0.013	0.0007	0.0007	0.0000	0.0017	0.0001
Backhoe - 325 w/Hoe-Ram	180	x		6	9	2270002036	23	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	1.45	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Backhoe, 215 / 320 w/hyd. Saw (feller buncher)	140	x		6	9	2270002036	15	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	0.75	0.001	0.002	0.0002	0.0002	0.0000	0.0002	0.0000
Backhoe, 215 / 320 w/hyd. Thumb	140	x		6	9	2270002036	15	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	0.75	0.001	0.002	0.0002	0.0002	0.0000	0.0002	0.0000
Clearing/brushing, Log Skidder	200	x		6	9	2270007015	15	638.34	0.29	1.10	0.05	0.05	0.0032	0.17	0.012	0.54	1.17	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Clearing/Brushing, Loader, Brush Cutter Attachment	80	x		6	9	2270007015	15	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	0.52	0.001	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Clearing/brushing, Delimber	140	x		6	9	2270007015	15	638.31	0.50	1.26	0.11	0.11	0.0033	0.17	0.012	0.54	0.82	0.001	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Clearing/brushing, Loader, Brush Rake Attachment	80	x		6	9	2270007015	31	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	1.04	0.002	0.002	0.0002	0.0002	0.0000	0.0003	0.0000
Clearing/brushing, Wood chipper	70	x		6	9	2270007015	15	708.88	1.40	3.64	0.13	0.13	0.0039	0.19	0.012	0.54	0.46	0.001	0.002	0.0001	0.0001	0.0000	0.0001	0.0000
Backhoe/Loader - 430	100	X		6	9	2270002060	93	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	3.23	0.004	0.010	0.0011	0.0011	0.0000	0.0011	0.0001
Backhoe/Loader - 420	93	X		6	9	2270002060	8	595.50	2.00	2.08	0.26	0.26	0.0034	0.20	0.012	0.59	0.28	0.001	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Loader - 980 Wheel	392	X		6	9	2270002060	15	536.28	0.97	2.40	0.14	0.14	0.0031	0.17	0.012	0.59	2.11	0.004	0.009	0.0006	0.0006	0.0000	0.0007	0.0000
Loader - 966 Wheel	262	X		6	9	2270002060	46	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	4.23	0.004	0.013	0.0008	0.0008	0.0000	0.0013	0.0001
Motor Grader - 14M	259	X		6	9	2270002048	23	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	2.09	0.002	0.005	0.0003	0.0003	0.0000	0.0006	0.0000
Trencher - Trencor 1660 HD	800	X		6	9	2270002030	15	535.80	1.69	4.56	0.24	0.24	0.0032	0.32	0.012	0.59	4.30	0.014	0.037	0.0019	0.0019	0.0000	0.0026	0.0001
Crane - 50 Ton Truck	280	X		6	5	2270002045	17	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	1.21	0.001	0.004	0.0002	0.0002	0.0000	0.0004	0.0000
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	17	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	0.69	0.001	0.002	0.0002	0.0002	0.0000	0.0002	0.0000
Ozzie Padder	400	X		6	9	2270002036	31	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	4.31	0.005	0.013	0.0008	0.0008	0.0000	0.0012	0.0001
Drill, Boring mach. 16"-42" (600,000 #)	95	X		7	9	2270002033	36	589.01	2.17	4.03	0.40	0.40	0.0036	0.43	0.012	0.43	0.95	0.004	0.007	0.0006	0.0006	0.0000	0.0007	0.0000
CAT 815 COMPACTOR	200	X		6	9	2270002015	15	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	1.08	0.001	0.003	0.0002	0.0002	0.0000	0.0003	0.0000
Farm Tractor	175	X		6	9	2270002075	15	536.32	0.48	1.42	0.09	0.09	0.0029	0.16	0.012	0.59	0.94	0.001	0.002	0.0002	0.0002	0.0000	0.0003	0.0000
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	0	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Compressor - 1600 CFM	590	X		6	9	2270006015	15	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	2.29	0.004	0.013	0.0006	0.0006	0.0000	0.0009	0.0001
Compressor - 1200 CFM	590	X		6	9	2270006015	15	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	2.29	0.004	0.013	0.0006	0.0006	0.0000	0.0009	0.0001
Compressor - 600 CFM	185	X		6	9	2270006015	31	530.45	0.45	2.05	0.09	0.09	0.0030	0.19	0.012	0.43	1.44	0.001	0.006	0.0003	0.0003	0.0000	0.0005	0.0000
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	31	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.39	0.000	0.002	0.0001	0.0001	0.0000	0.0001	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	82	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	0.28	0.001	0.002	0.0002	0.0002	0.0000	0.0002	0.0000
Welders	46	X		6	9	2270006025	309	693.43	3.59	4.72	0.58	0.58	0.0043	0.80	0.012	0.21	2.28	0.012	0.016	0.0019	0.0019	0.0000	0.0026	0.0000
Pressure washers	10		X	6	7	2265006030	24	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.24	0.062	0.000	0.0000	0.0000	0.0000	0.0011	0.0001
Generator - 250 KW	433	X		6	9	2270006005	0	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Chain Saw	1		X	6	9	2265004021	93	1,227.52	206.95	2.52	0.31	0.31	0.0224	7.08	0.229	0.40	0.05	0.008	0.000	0.0000	0.0000	0.0000	0.0003	0.0000
Pump - 6-Inch Water	32		X	6	24	2265006010	247	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	4.23	0.095	0.010	0.0004	0.0004	0.0001	0.0030	0.0014
Pump - 1500 GPM Fill	32		X	6	8	2265006010	27	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	0.47	0.011	0.001	0.0000	0.0000	0.0000	0.0003	0.0002
Pump - Test	32		X	6	8	2265006010	27	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	0.47	0.011	0.001	0.0000	0.0000	0.0000	0.0003	0.0002
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**
Welding Rig w/ 2 x 300 Amp	45	X		6	9		4,629	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.11	0.007	0.018	0.0011	0.0010	0.0001	0.0026	0.0003
Pickup 4 x 4	300		X	6	4		10,697	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		5.56	0.061	0.006	0.0001	0.0001	0.0000	0.0019	0.0010
SUV 4 x 4	250		X	6	4		1,029	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.53	0.006	0.001	0.0000	0.0000	0.0000	0.0002	0.0001
Truck, Crewcab, 4x4	400	X		6	4		206	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.27	0.000	0.001	0.0000	0.0000	0.0000	0.0001	0.0000
Suburban	300		X	6	4		103	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.05	0.001	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		463	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.61	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000

Table 9D-17
NEXUS Project Construction Equipment Air Emissions - SP2 Sandusky Co.MP 131.5-132.8

AUT Equipment Unit & 4 Wheel Drive Crew Cab Truck	400	X		6	6		309	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.41	0.000	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
Auto maintenance Truck	300		X	6	4		823	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.43	0.005	0.000	0.0000	0.0000	0.0000	0.0001	0.0001
Truck - 1 Ton Flatbed	300	X		6	4		103	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.14	0.000	0.000	0.0000	0.0000	0.0000	0.0001	0.0000
Truck - 3 Ton Flatbed	330	X		6	4		1,337	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.77	0.002	0.005	0.0003	0.0003	0.0000	0.0008	0.0001
Truck - 6 Ton Flatbed	330	X		6	4		411	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.54	0.001	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Truck - 6 Ton Winch	330	X		6	4		514	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.68	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck - 5 CY Dump	300	X		6	9		231	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.31	0.000	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Truck - 12 YD Dump	330	X		6	9		1,389	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.83	0.002	0.006	0.0003	0.0003	0.0000	0.0008	0.0001
Truck - Medium Duty Tractor	300	X		6	9		1,504	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.99	0.002	0.006	0.0004	0.0003	0.0000	0.0009	0.0001
Truck - Concrete Mixer	350	X		6	9		347	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.46	0.001	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
Bus - Minibus	180	X		6	4		206	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.27	0.000	0.001	0.0000	0.0000	0.0000	0.0001	0.0000
Bus - 26 Passenger	300	X		6	4		617	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.81	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Bus - 45 Passenger	300	X		6	4		103	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.14	0.000	0.000	0.0000	0.0000	0.0000	0.0001	0.0000
Truck, End Dump 12cy	350	X		6	9		1,157	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.53	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Truck, Skid	300	X		6	9		231	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.31	0.000	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Truck, Stringing Tractor (25 Ton)	300	X		6	9		1,736	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.29	0.003	0.007	0.0004	0.0004	0.0000	0.0010	0.0001
Truck, Tire truck	300	X		6	4		257	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.34	0.000	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Truck, Wrecker truck	300	X		6	4		206	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.27	0.000	0.001	0.0000	0.0000	0.0000	0.0001	0.0000

Construction Workers		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**								**2017 Emission Totals (Tons)**							
		2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Worker Commutes		21,379	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085	11.10	0.121	0.012	0.0003	0.0003	0.0001	0.0038	0.0020

Deliveries / Removals	**Empty Vehicle Weight (tons)**	**Full Vehicle Weight (tons)**	**Round Trip Distance (miles)**		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
					2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
On-road delivery vehicles																						
Truck - 4000 Gallon Fuel	13.5	27.5	50.0		384	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		0.48	0.001	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
Truck - Fuel/Lube	5.0	10.0	50.0		384	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		0.48	0.001	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		449	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		0.56	0.001	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
On-road material removal vehicles																						
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		536	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		0.67	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0001

Construction Areas	**Disturbed Acreage (acre-months)**	**WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)**								**2017 Emission Totals (Tons)**							
		CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Area under construction (Exposed Soils)	46	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	5.0968	0.5097	NA	NA	NA

Table 9D-18
NEXUS Project Construction Equipment Air Emissions - SP3 Sandusky Co. MP 132.8-163.7

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	x		6	9	2270002069	139	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	14.77	0.022	0.053	0.0033	0.0033	0.0001	0.0043	0.0003
Dozer - D8 w/Winch	305	x		6	9	2270002069	879	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	93.56	0.137	0.337	0.0208	0.0208	0.0005	0.0272	0.0021
Dozer - D7 w/Winch	235	x		6	9	2270002069	972	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	79.68	0.062	0.190	0.0114	0.0114	0.0004	0.0228	0.0018
Dozer - D7	235	x		6	9	2270002069	216	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	17.71	0.014	0.042	0.0025	0.0025	0.0001	0.0051	0.0004
Tac rig (Auto) D6	200	x		6	9	2270002069	525	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	36.60	0.029	0.087	0.0052	0.0052	0.0002	0.0105	0.0008
Sideboom - 583	310	x		6	9	2270002069	3,579	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	387.04	0.566	1.396	0.0860	0.0860	0.0022	0.1126	0.0089
Sideboom - 572	240	x		6	9	2270002069	162	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	13.56	0.011	0.032	0.0019	0.0019	0.0001	0.0039	0.0003
Bend Machine - PB 32-42	173	x		6	9	2270002033	255	530.03	1.10	3.87	0.24	0.24	0.0033	0.32	0.012	0.43	11.06	0.023	0.081	0.0050	0.0050	0.0001	0.0066	0.0003
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	671	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	88.96	0.110	0.271	0.0171	0.0171	0.0005	0.0247	0.0020
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	1,875	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	196.17	0.242	0.597	0.0377	0.0377	0.0011	0.0545	0.0045
Backhoe - 325 (1.38 cy)	180	x		6	9	2270002036	1,635	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	102.69	0.062	0.205	0.0106	0.0106	0.0005	0.0278	0.0024
Backhoe - 325 w/Hoe-Ram	180	x		6	9	2270002036	393	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	24.70	0.015	0.049	0.0026	0.0026	0.0001	0.0067	0.0006
Backhoe, 215 / 320 w/hyd. Saw (feller buncher)	140	x		6	9	2270002036	216	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	10.55	0.010	0.024	0.0023	0.0023	0.0001	0.0030	0.0002
Backhoe, 215 / 320 w/hyd. Thumb	140	x		6	9	2270002036	216	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	10.55	0.010	0.024	0.0023	0.0023	0.0001	0.0030	0.0002
Clearing/brushing, Log Skidder	200	x		6	9	2270007015	216	638.34	0.29	1.10	0.05	0.05	0.0032	0.17	0.012	0.54	16.44	0.007	0.028	0.0012	0.0012	0.0001	0.0043	0.0003
Clearing/Brushing, Loader, Brush Cutter Attachment	80	x		6	9	2270007015	216	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	7.30	0.014	0.015	0.0017	0.0017	0.0000	0.0019	0.0001
Clearing/brushing, Delimber	140	x		6	9	2270007015	216	638.31	0.50	1.26	0.11	0.11	0.0033	0.17	0.012	0.54	11.51	0.009	0.023	0.0020	0.0020	0.0001	0.0032	0.0002
Clearing/brushing, Loader, Brush Rake Attachment	80	x		6	9	2270007015	432	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	14.61	0.028	0.031	0.0033	0.0033	0.0001	0.0037	0.0003
Clearing/brushing, Wood chipper	70	x		6	9	2270007015	216	708.88	1.40	3.64	0.13	0.13	0.0039	0.19	0.012	0.54	6.39	0.013	0.033	0.0012	0.0012	0.0000	0.0017	0.0001
Backhoe/Loader - 430	100	X		6	9	2270002060	1,682	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	58.65	0.081	0.190	0.0193	0.0193	0.0003	0.0194	0.0013
Backhoe/Loader - 420	93	X		6	9	2270002060	139	595.50	2.00	2.08	0.26	0.26	0.0034	0.20	0.012	0.59	5.00	0.017	0.017	0.0022	0.0022	0.0000	0.0017	0.0001
Loader - 980 Wheel	392	X		6	9	2270002060	270	536.28	0.97	2.40	0.14	0.14	0.0031	0.17	0.012	0.59	36.91	0.067	0.165	0.0098	0.0098	0.0002	0.0119	0.0008
Loader - 966 Wheel	262	X		6	9	2270002060	779	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	71.20	0.072	0.212	0.0139	0.0139	0.0004	0.0221	0.0016
Motor Grader - 14M	259	X		6	9	2270002048	386	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	34.85	0.026	0.081	0.0048	0.0048	0.0002	0.0099	0.0008
Trencher - Trencor 1660 HD	800	X		6	9	2270002030	255	535.80	1.69	4.56	0.24	0.24	0.0032	0.32	0.012	0.59	70.97	0.224	0.604	0.0312	0.0312	0.0004	0.0428	0.0016
Crane - 50 Ton Truck	280	X		6	5	2270002045	274	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	19.31	0.013	0.061	0.0028	0.0028	0.0001	0.0060	0.0004
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	206	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	8.28	0.008	0.028	0.0020	0.0020	0.0000	0.0028	0.0002
Ozzie Padder	400	X		6	9	2270002036	525	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	73.19	0.090	0.223	0.0141	0.0141	0.0004	0.0203	0.0017
Drill, Boring mach. 16"-42" (600,000 #)	95	X		7	9	2270002033	486	589.01	2.17	4.03	0.40	0.40	0.0036	0.43	0.012	0.43	12.89	0.048	0.088	0.0087	0.0087	0.0001	0.0093	0.0003
CAT 815 COMPACTOR	200	X		6	9	2270002015	255	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	17.76	0.018	0.053	0.0035	0.0035	0.0001	0.0055	0.0004
Farm Tractor	175	X		6	9	2270002075	247	536.32	0.48	1.42	0.09	0.09	0.0029	0.16	0.012	0.59	15.07	0.013	0.040	0.0025	0.0025	0.0001	0.0045	0.0003
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	0	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Compressor - 1600 CFM	590	X		6	9	2270006015	77	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	11.44	0.018	0.065	0.0029	0.0029	0.0001	0.0044	0.0003
Compressor - 1200 CFM	590	X		6	9	2270006015	77	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	11.44	0.018	0.065	0.0029	0.0029	0.0001	0.0044	0.0003
Compressor - 600 CFM	185	X		6	9	2270006015	548	530.45	0.45	2.05	0.09	0.09	0.0030	0.19	0.012	0.43	25.48	0.022	0.099	0.0045	0.0045	0.0001	0.0089	0.0006
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	548	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	6.89	0.008	0.042	0.0013	0.0000	0.0021	0.0001	
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	1,070	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	3.58	0.015	0.028	0.0022	0.0022	0.0000	0.0029	0.0001
Welders	46	X		6	9	2270006025	5,253	693.43	3.59	4.72	0.58	0.58	0.0043	0.80	0.012	0.21	38.79	0.201	0.264	0.0326	0.0326	0.0002	0.0449	0.0007
Pressure washers	10		X	6	7	2265006030	228	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	2.24	0.593	0.005	0.0002	0.0002	0.0000	0.0108	0.0005
Generator - 250 KW	433	X		6	9	2270006005	0	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Chain Saw	1		X	6	9	2265004021	1,296	1,227.52	206.95	2.52	0.31	0.31	0.0224	7.08	0.229	0.40	0.70	0.118	0.001	0.0002	0.0002	0.0000	0.0040	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	4,073	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	69.79	1.561	0.167	0.0068	0.0068	0.0013	0.0492	0.0227
Pump - 1500 GPM Fill	32		X	6	8	2265006010	494	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	8.46	0.189	0.020	0.0008	0.0008	0.0002	0.0060	0.0028
Pump - Test	32		X	6	8	2265006010	494	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	8.46	0.189	0.020	0.0008	0.0008	0.0002	0.0060	0.0028
On-road construction vehicles							Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)									2017 Emission Totals (Tons)							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		78,801	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		104.04	0.126	0.313	0.0187	0.0172	0.0009	0.0446	0.0044
Pickup 4 x 4	300		X	6	4		207,566	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		107.79	1.179	0.114	0.0028	0.0025	0.0007	0.0369	0.0194
SUV 4 x 4	250		X	6	4		21,651	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		11.24	0.123	0.012	0.0003	0.0003	0.0001	0.0038	0.0020
Truck, Crewcab, 4x4	400	X		6	4		3,497	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.62	0.006	0.014	0.0008	0.0008	0.0000	0.0020	0.0002
Suburban	300		X	6	4		926	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.48	0.005	0.001	0.0000	0.0000	0.0000	0.0002	0.0001
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		8,100	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		10.69	0.013	0.032	0.0019	0.0018	0.0001	0.0046	0.0005

Table 9D-18
NEXUS Project Construction Equipment Air Emissions - SP3 Sandusky Co. MP 132.8-163.7

AUT Equipment Unit & 4 Wheel Drive Crew Cab Truck	400	X		6	6		5,246	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.93	0.008	0.021	0.0012	0.0011	0.0001	0.0030	0.0003
Auto maintenance Truck	300		X	6	4		19,131	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		9.94	0.109	0.011	0.0003	0.0002	0.0001	0.0034	0.0018
Truck - 1 Ton Flatbed	300	X		6	4		1,697	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.24	0.003	0.007	0.0004	0.0004	0.0000	0.0010	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		24,891	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		32.86	0.040	0.099	0.0059	0.0054	0.0003	0.0141	0.0014
Truck - 6 Ton Flatbed	330	X		6	4		6,171	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		8.15	0.010	0.025	0.0015	0.0013	0.0001	0.0035	0.0003
Truck - 6 Ton Winch	330	X		6	4		9,771	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		12.90	0.016	0.039	0.0023	0.0021	0.0001	0.0055	0.0005
Truck - 5 CY Dump	300	X		6	9		3,819	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		5.04	0.006	0.015	0.0009	0.0008	0.0000	0.0022	0.0002
Truck - 12 YD Dump	330	X		6	9		22,911	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		30.25	0.037	0.091	0.0054	0.0050	0.0003	0.0130	0.0013
Truck - Medium Duty Tractor	300	X		6	9		21,060	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		27.80	0.034	0.084	0.0050	0.0046	0.0002	0.0119	0.0012
Truck - Concrete Mixer	350	X		6	9		4,976	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.57	0.008	0.020	0.0012	0.0011	0.0001	0.0028	0.0003
Bus - Minibus	180	X		6	4		2,829	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.73	0.005	0.011	0.0007	0.0006	0.0000	0.0016	0.0002
Bus - 26 Passenger	300	X		6	4		9,926	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		13.10	0.016	0.039	0.0024	0.0022	0.0001	0.0056	0.0006
Bus - 45 Passenger	300	X		6	4		1,749	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.31	0.003	0.007	0.0004	0.0004	0.0000	0.0010	0.0001
Truck, End Dump 12cy	350	X		6	9		20,250	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		26.74	0.032	0.081	0.0048	0.0044	0.0002	0.0115	0.0011
Truck, Skid	300	X		6	9		4,860	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.42	0.008	0.019	0.0012	0.0011	0.0001	0.0027	0.0003
Truck, Stringing Tractor (25 Ton)	300	X		6	9		36,450	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		48.12	0.058	0.145	0.0087	0.0080	0.0004	0.0206	0.0020
Truck, Tire truck	300	X		6	4		5,863	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		7.74	0.009	0.023	0.0014	0.0013	0.0001	0.0033	0.0003
Truck, Wrecker truck	300	X		6	4		4,783	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.31	0.008	0.019	0.0011	0.0010	0.0001	0.0027	0.0003

Construction Workers		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**								**2017 Emission Totals (Tons)**							
		2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Worker Commutes		535,898	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085	278.29	3.044	0.295	0.0072	0.0063	0.0019	0.0952	0.0501

Deliveries / Removals	**Empty Vehicle Weight (tons)**	**Full Vehicle Weight (tons)**	**Round Trip Distance (miles)**	**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**								**2017 Emission Totals (Tons)**							
				2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
On-road delivery vehicles																				
Truck - 4000 Gallon Fuel	13.5	27.5	50.0	9,620	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	11.93	0.013	0.032	0.0019	0.0017	0.0001	0.0049	0.0009
Truck - Fuel/Lube	5.0	10.0	50.0	9,620	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	11.93	0.013	0.032	0.0019	0.0017	0.0001	0.0049	0.0009
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0	11,258	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	13.96	0.016	0.037	0.0022	0.0020	0.0001	0.0058	0.0011
On-road material removal vehicles																				
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0	1,991	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	2.47	0.003	0.007	0.0004	0.0004	0.0000	0.0010	0.0002

Construction Areas	**Disturbed Acreage (acre-months)**	**WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)**								**2017 Emission Totals (Tons)**							
		CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Area under construction (Exposed Soils)	1,105	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	121.5383	12.1538	NA	NA	NA

Table 9D-19
NEXUS Project Construction Equipment Air Emissions - SP3 Wood Co. MP 163.8-181.4

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	x		6	9	2270002069	77	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	8.21	0.012	0.030	0.0018	0.0018	0.0000	0.0024	0.0002
Dozer - D8 w/Winch	305	x		6	9	2270002069	486	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	51.70	0.076	0.186	0.0115	0.0115	0.0003	0.0150	0.0012
Dozer - D7 w/Winch	235	x		6	9	2270002069	555	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	45.53	0.036	0.109	0.0065	0.0065	0.0002	0.0130	0.0010
Dozer - D7	235	x		6	9	2270002069	509	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	41.73	0.033	0.099	0.0060	0.0060	0.0002	0.0119	0.0010
Tac rig (Auto) D6	200	x		6	9	2270002069	293	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	20.45	0.016	0.049	0.0029	0.0029	0.0001	0.0058	0.0005
Sideboom - 583	310	x		6	9	2270002069	1,936	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	209.37	0.306	0.755	0.0465	0.0465	0.0012	0.0609	0.0048
Sideboom - 572	240	x		6	9	2270002069	85	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	7.10	0.006	0.017	0.0010	0.0010	0.0000	0.0020	0.0002
Bend Machine - PB 32-42	173	x		6	9	2270002033	139	530.03	1.10	3.87	0.24	0.24	0.0033	0.32	0.012	0.43	6.04	0.012	0.044	0.0027	0.0027	0.0000	0.0036	0.0001
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	378	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	50.10	0.062	0.152	0.0096	0.0096	0.0003	0.0139	0.0011
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	1,034	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	108.17	0.133	0.329	0.0208	0.0208	0.0006	0.0300	0.0025
Backhoe - 325 (1.38 cy)	180	x		6	9	2270002036	933	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	58.61	0.035	0.117	0.0061	0.0061	0.0003	0.0159	0.0013
Backhoe - 325 w/Hoe-Ram	180	x		6	9	2270002036	224	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	14.05	0.008	0.028	0.0015	0.0015	0.0001	0.0038	0.0003
Backhoe, 215 / 320 w/hyd. Saw (feller buncher)	140	x		6	9	2270002036	123	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	6.03	0.006	0.014	0.0013	0.0013	0.0000	0.0017	0.0001
Backhoe, 215 / 320 w/hyd. Thumb	140	x		6	9	2270002036	123	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	6.03	0.006	0.014	0.0013	0.0013	0.0000	0.0017	0.0001
Clearing/brushing, Log Skidder	200	x		6	9	2270007015	123	638.34	0.29	1.10	0.05	0.05	0.0032	0.17	0.012	0.54	9.39	0.004	0.016	0.0007	0.0007	0.0000	0.0024	0.0002
Clearing/Brushing, Loader, Brush Cutter Attachment	80	x		6	9	2270007015	123	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	4.17	0.008	0.009	0.0009	0.0009	0.0000	0.0011	0.0001
Clearing/brushing, Delimber	140	x		6	9	2270007015	123	638.31	0.50	1.26	0.11	0.11	0.0033	0.17	0.012	0.54	6.58	0.005	0.013	0.0011	0.0011	0.0000	0.0018	0.0001
Clearing/brushing, Loader, Brush Rake Attachment	80	x		6	9	2270007015	247	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	8.35	0.016	0.017	0.0019	0.0019	0.0000	0.0021	0.0001
Clearing/brushing, Wood chipper	70	x		6	9	2270007015	123	708.88	1.40	3.64	0.13	0.13	0.0039	0.19	0.012	0.54	3.65	0.007	0.019	0.0007	0.0007	0.0000	0.0010	0.0001
Backhoe/Loader - 430	100	X		6	9	2270002060	1,705	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	59.46	0.082	0.192	0.0195	0.0195	0.0003	0.0197	0.0014
Backhoe/Loader - 420	93	X		6	9	2270002060	77	595.50	2.00	2.08	0.26	0.26	0.0034	0.20	0.012	0.59	2.78	0.009	0.010	0.0012	0.0012	0.0000	0.0010	0.0001
Loader - 980 Wheel	392	X		6	9	2270002060	139	536.28	0.97	2.40	0.14	0.14	0.0031	0.17	0.012	0.59	18.98	0.034	0.085	0.0050	0.0050	0.0001	0.0061	0.0004
Loader - 966 Wheel	262	X		6	9	2270002060	424	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	38.77	0.039	0.116	0.0076	0.0076	0.0002	0.0120	0.0009
Motor Grader - 14M	259	X		6	9	2270002048	594	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	53.66	0.041	0.125	0.0074	0.0074	0.0003	0.0152	0.0012
Trencher - Trencor 1660 HD	800	X		6	9	2270002030	147	535.80	1.69	4.56	0.24	0.24	0.0032	0.32	0.012	0.59	40.86	0.129	0.348	0.0180	0.0180	0.0002	0.0247	0.0009
Crane - 50 Ton Truck	280	X		6	5	2270002045	150	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	10.56	0.007	0.033	0.0015	0.0015	0.0001	0.0033	0.0002
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	330	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	13.28	0.013	0.046	0.0032	0.0032	0.0001	0.0045	0.0003
Ozzie Padder	400	X		6	9	2270002036	285	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	39.83	0.049	0.121	0.0077	0.0077	0.0002	0.0111	0.0009
Drill, Boring mach. 16"-42" (600,000 #)	95	X		7	9	2270002033	270	589.01	2.17	4.03	0.40	0.40	0.0036	0.43	0.012	0.43	7.16	0.026	0.049	0.0048	0.0048	0.0000	0.0052	0.0001
CAT 815 COMPACTOR	200	X		6	9	2270002015	525	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	36.59	0.037	0.109	0.0072	0.0072	0.0002	0.0114	0.0008
Farm Tractor	175	X		6	9	2270002075	131	536.32	0.48	1.42	0.09	0.09	0.0029	0.16	0.012	0.59	8.00	0.007	0.021	0.0013	0.0013	0.0000	0.0024	0.0002
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	771	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	26.91	0.011	0.032	0.0018	0.0018	0.0001	0.0068	0.0006
Compressor - 1600 CFM	590	X		6	9	2270006015	46	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	6.87	0.011	0.039	0.0017	0.0017	0.0000	0.0026	0.0002
Compressor - 1200 CFM	590	X		6	9	2270006015	46	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	6.87	0.011	0.039	0.0017	0.0017	0.0000	0.0026	0.0002
Compressor - 600 CFM	185	X		6	9	2270006015	301	530.45	0.45	2.05	0.09	0.09	0.0030	0.19	0.012	0.43	13.99	0.012	0.054	0.0025	0.0025	0.0001	0.0049	0.0003
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	301	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	3.78	0.004	0.023	0.0007	0.0007	0.0000	0.0012	0.0001
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	1,234	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	4.13	0.017	0.032	0.0025	0.0025	0.0000	0.0033	0.0001
Welders	46	X		6	9	2270006025	3,024	693.43	3.59	4.72	0.58	0.58	0.0043	0.80	0.012	0.21	22.33	0.116	0.152	0.0188	0.0188	0.0001	0.0259	0.0004
Pressure washers	10		X	6	7	2265006030	108	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	1.06	0.281	0.002	0.0001	0.0001	0.0000	0.0051	0.0002
Generator - 250 KW	433	X		6	9	2270006005	386	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	41.97	0.086	0.288	0.0129	0.0129	0.0003	0.0205	0.0010
Chain Saw	1		X	6	9	2265004021	741	1,227.52	206.95	2.52	0.31	0.31	0.0224	7.08	0.229	0.40	0.40	0.068	0.001	0.0001	0.0001	0.0000	0.0023	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	2,263	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	38.77	0.867	0.093	0.0038	0.0038	0.0007	0.0273	0.0126
Pump - 1500 GPM Fill	32		X	6	8	2265006010	274	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	4.70	0.105	0.011	0.0005	0.0005	0.0001	0.0033	0.0015
Pump - Test	32		X	6	8	2265006010	274	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	4.70	0.105	0.011	0.0005	0.0005	0.0001	0.0033	0.0015
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**
Welding Rig w/ 2 x 300 Amp	45	X		6	9		45,360	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		59.89	0.073	0.180	0.0108	0.0099	0.0005	0.0257	0.0025
Pickup 4 x 4	300		X	6	4		117,051	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		60.79	0.665	0.064	0.0016	0.0014	0.0004	0.0208	0.0109
SUV 4 x 4	250		X	6	4		12,446	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		6.46	0.071	0.007	0.0002	0.0001	0.0000	0.0022	0.0012
Truck, Crewcab, 4x4	400	X		6	4		1,954	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.58	0.003	0.008	0.0005	0.0004	0.0000	0.0011	0.0001
Suburban	300		X	6	4		514	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.27	0.003	0.000	0.0000	0.0000	0.0000	0.0001	0.0000
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		2,931	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.87	0.005	0.012	0.0007	0.0006	0.0000	0.0017	0.0002

Table 9D-19
NEXUS Project Construction Equipment Air Emissions - SP3 Wood Co. MP 163.8-181.4

AUT Equipment Unit & 4 Wheel Drive Crew Cab Truck	400	X		6	6		2,931	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.87	0.005	0.012	0.0007	0.0006	0.0000	0.0017	0.0002
Auto maintenance Truck	300		X	6	4		10,903	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		5.66	0.062	0.006	0.0001	0.0001	0.0000	0.0019	0.0010
Truck - 1 Ton Flatbed	300	X		6	4		926	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.22	0.001	0.004	0.0002	0.0002	0.0000	0.0005	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		16,611	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		21.93	0.027	0.066	0.0039	0.0036	0.0002	0.0094	0.0009
Truck - 6 Ton Flatbed	330	X		6	4		3,446	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.55	0.006	0.014	0.0008	0.0008	0.0000	0.0019	0.0002
Truck - 6 Ton Winch	330	X		6	4		5,503	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		7.27	0.009	0.022	0.0013	0.0012	0.0001	0.0031	0.0003
Truck - 5 CY Dump	300	X		6	9		2,199	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.90	0.004	0.009	0.0005	0.0005	0.0000	0.0012	0.0001
Truck - 12 YD Dump	330	X		6	9		24,763	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		32.69	0.040	0.098	0.0059	0.0054	0.0003	0.0140	0.0014
Truck - Medium Duty Tractor	300	X		6	9		17,589	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		23.22	0.028	0.070	0.0042	0.0038	0.0002	0.0100	0.0010
Truck - Concrete Mixer	350	X		6	9		2,777	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.67	0.004	0.011	0.0007	0.0006	0.0000	0.0016	0.0002
Bus - Minibus	180	X		6	4		1,543	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.04	0.002	0.006	0.0004	0.0003	0.0000	0.0009	0.0001
Bus - 26 Passenger	300	X		6	4		4,577	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.04	0.007	0.018	0.0011	0.0010	0.0001	0.0026	0.0003
Bus - 45 Passenger	300	X		6	4		977	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.29	0.002	0.004	0.0002	0.0002	0.0000	0.0006	0.0001
Truck, End Dump 12cy	350	X		6	9		10,414	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		13.75	0.017	0.041	0.0025	0.0023	0.0001	0.0059	0.0006
Truck, Skid	300	X		6	9		2,546	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.36	0.004	0.010	0.0006	0.0006	0.0000	0.0014	0.0001
Truck, Stringing Tractor (25 Ton)	300	X		6	9		19,093	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		25.21	0.031	0.076	0.0045	0.0042	0.0002	0.0108	0.0011
Truck, Tire truck	300	X		6	4		3,291	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.35	0.005	0.013	0.0008	0.0007	0.0000	0.0019	0.0002
Truck, Wrecker truck	300	X		6	4		2,726	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.60	0.004	0.011	0.0006	0.0006	0.0000	0.0015	0.0002

Construction Workers				**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
				2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Worker Commutes				302,559	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		157.12	1.718	0.167	0.0040	0.0036	0.0010	0.0537	0.0283

Deliveries / Removals	**Empty Vehicle Weight (tons)**	**Full Vehicle Weight (tons)**	**Round Trip Distance (miles)**		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**								**2017 Emission Totals (Tons)**							
					2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
On-road delivery vehicles																					
Truck - 4000 Gallon Fuel	13.5	27.5	50.0		5,431	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		6.74	0.007	0.018	0.0011	0.0010	0.0001	0.0028	0.0005
Truck - Fuel/Lube	5.0	10.0	50.0		5,431	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		6.74	0.007	0.018	0.0011	0.0010	0.0001	0.0028	0.0005
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		6,356	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		7.88	0.009	0.021	0.0012	0.0011	0.0001	0.0033	0.0006
On-road material removal vehicles																					
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		7,590	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		9.41	0.010	0.025	0.0015	0.0014	0.0001	0.0039	0.0007

Construction Areas		**Disturbed Acreage (acre-months)**	**WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)**								**2017 Emission Totals (Tons)**							
			CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Area under construction (Exposed Soils)		732	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	80.5445	8.0544	NA	NA	NA

Table 9D-20
NEXUS Project Construction Equipment Air Emissions - SP3 Lucas Co. MP 181.4-189.3

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	x		6	9	2270002069	31	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	3.28	0.005	0.012	0.0007	0.0007	0.0000	0.0010	0.0001
Dozer - D8 w/Winch	305	x		6	9	2270002069	208	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	22.16	0.032	0.080	0.0049	0.0049	0.0001	0.0064	0.0005
Dozer - D7 w/Winch	235	x		6	9	2270002069	231	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	18.97	0.015	0.045	0.0027	0.0027	0.0001	0.0054	0.0004
Dozer - D7	235	x		6	9	2270002069	54	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	4.43	0.003	0.011	0.0006	0.0006	0.0000	0.0013	0.0001
Tac rig (Auto) D6	200	x		6	9	2270002069	123	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	8.61	0.007	0.021	0.0012	0.0012	0.0000	0.0025	0.0002
Sideboom - 583	310	x		6	9	2270002069	856	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	92.59	0.135	0.334	0.0206	0.0206	0.0005	0.0269	0.0021
Sideboom - 572	240	x		6	9	2270002069	39	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	3.23	0.003	0.008	0.0005	0.0005	0.0000	0.0009	0.0001
Bend Machine - PB 32-42	173	x		6	9	2270002033	62	530.03	1.10	3.87	0.24	0.24	0.0033	0.32	0.012	0.43	2.68	0.006	0.020	0.0012	0.0012	0.0000	0.0016	0.0001
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	154	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	20.45	0.025	0.062	0.0039	0.0039	0.0001	0.0057	0.0005
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	471	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	49.24	0.061	0.150	0.0095	0.0095	0.0003	0.0137	0.0011
Backhoe - 325 (1.38 cy)	180	x		6	9	2270002036	370	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	23.25	0.014	0.046	0.0024	0.0024	0.0001	0.0063	0.0005
Backhoe - 325 w/Hoe-Ram	180	x		6	9	2270002036	93	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	5.81	0.004	0.012	0.0006	0.0006	0.0000	0.0016	0.0001
Backhoe, 215 / 320 w/hyd. Saw (feller buncher)	140	x		6	9	2270002036	54	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	2.64	0.003	0.006	0.0006	0.0006	0.0000	0.0008	0.0001
Backhoe, 215 / 320 w/hyd. Thumb	140	x		6	9	2270002036	54	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	2.64	0.003	0.006	0.0006	0.0006	0.0000	0.0008	0.0001
Clearing/brushing, Log Skidder	200	x		6	9	2270007015	54	638.34	0.29	1.10	0.05	0.05	0.0032	0.17	0.012	0.54	4.11	0.002	0.007	0.0003	0.0003	0.0000	0.0011	0.0001
Clearing/Brushing, Loader, Brush Cutter Attachment	80	x		6	9	2270007015	54	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	1.83	0.004	0.004	0.0004	0.0004	0.0000	0.0005	0.0000
Clearing/brushing, Delimber	140	x		6	9	2270007015	54	638.31	0.50	1.26	0.11	0.11	0.0033	0.17	0.012	0.54	2.88	0.002	0.006	0.0005	0.0005	0.0000	0.0008	0.0001
Clearing/brushing, Loader, Brush Rake Attachment	80	x		6	9	2270007015	108	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	3.65	0.007	0.008	0.0008	0.0008	0.0000	0.0009	0.0001
Clearing/brushing, Wood chipper	70	x		6	9	2270007015	54	708.88	1.40	3.64	0.13	0.13	0.0039	0.19	0.012	0.54	1.60	0.003	0.008	0.0003	0.0003	0.0000	0.0004	0.0000
Backhoe/Loader - 430	100	X		6	9	2270002060	424	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	14.80	0.020	0.048	0.0049	0.0049	0.0001	0.0049	0.0003
Backhoe/Loader - 420	93	X		6	9	2270002060	31	595.50	2.00	2.08	0.26	0.26	0.0034	0.20	0.012	0.59	1.11	0.004	0.004	0.0005	0.0005	0.0000	0.0004	0.0000
Loader - 980 Wheel	392	X		6	9	2270002060	69	536.28	0.97	2.40	0.14	0.14	0.0031	0.17	0.012	0.59	9.49	0.017	0.042	0.0025	0.0025	0.0001	0.0031	0.0002
Loader - 966 Wheel	262	X		6	9	2270002060	201	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	18.33	0.019	0.055	0.0036	0.0036	0.0001	0.0057	0.0004
Motor Grader - 14M	259	X		6	9	2270002048	93	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	8.36	0.006	0.019	0.0012	0.0012	0.0000	0.0024	0.0002
Trencher - Trencor 1660 HD	800	X		6	9	2270002030	62	535.80	1.69	4.56	0.24	0.24	0.0032	0.32	0.012	0.59	17.20	0.054	0.147	0.0076	0.0076	0.0001	0.0104	0.0004
Crane - 50 Ton Truck	280	X		6	5	2270002045	69	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	4.83	0.003	0.015	0.0007	0.0007	0.0000	0.0015	0.0001
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	51	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	2.07	0.002	0.007	0.0005	0.0005	0.0000	0.0007	0.0000
Ozzie Padder	400	X		6	9	2270002036	131	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	18.30	0.023	0.056	0.0035	0.0035	0.0001	0.0051	0.0004
Drill, Boring mach. 16"-42" (600,000 #)	95	X		7	9	2270002033	108	589.01	2.17	4.03	0.40	0.40	0.0036	0.43	0.012	0.43	2.86	0.011	0.020	0.0019	0.0019	0.0000	0.0021	0.0001
CAT 815 COMPACTOR	200	X		6	9	2270002015	69	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	4.84	0.005	0.014	0.0009	0.0009	0.0000	0.0015	0.0001
Farm Tractor	175	X		6	9	2270002075	62	536.32	0.48	1.42	0.09	0.09	0.0029	0.16	0.012	0.59	3.77	0.003	0.010	0.0006	0.0006	0.0000	0.0011	0.0001
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	0	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Compressor - 1600 CFM	590	X		6	9	2270006015	15	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	2.29	0.004	0.013	0.0006	0.0006	0.0000	0.0009	0.0001
Compressor - 1200 CFM	590	X		6	9	2270006015	15	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	2.29	0.004	0.013	0.0006	0.0006	0.0000	0.0009	0.0001
Compressor - 600 CFM	185	X		6	9	2270006015	131	530.45	0.45	2.05	0.09	0.09	0.0030	0.19	0.012	0.43	6.10	0.005	0.024	0.0011	0.0011	0.0000	0.0021	0.0001
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	131	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	1.65	0.002	0.010	0.0003	0.0003	0.0000	0.0005	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	370	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	1.24	0.005	0.010	0.0007	0.0007	0.0000	0.0010	0.0000
Welders	46	X		6	9	2270006025	1,281	693.43	3.59	4.72	0.58	0.58	0.0043	0.80	0.012	0.21	9.46	0.049	0.064	0.0079	0.0079	0.0001	0.0110	0.0002
Pressure washers	10		X	6	7	2265006030	48	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.47	0.125	0.001	0.0001	0.0001	0.0000	0.0023	0.0001
Generator - 250 KW	433	X		6	9	2270006005	0	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Chain Saw	1		X	6	9	2265004021	324	1,227.52	206.95	2.52	0.31	0.31	0.0224	7.08	0.229	0.40	0.18	0.030	0.000	0.0000	0.0000	0.0000	0.0010	0.0000
Pump - 6-Inch Water	32		X	6	24	2265006010	987	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	16.92	0.378	0.041	0.0017	0.0017	0.0003	0.0119	0.0055
Pump - 1500 GPM Fill	32		X	6	8	2265006010	123	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	2.11	0.047	0.005	0.0002	0.0002	0.0000	0.0015	0.0007
Pump - Test	32		X	6	8	2265006010	123	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	2.11	0.047	0.005	0.0002	0.0002	0.0000	0.0015	0.0007
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**
Welding Rig w/ 2 x 300 Amp	45	X		6	9		19,209	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		25.36	0.031	0.076	0.0046	0.0042	0.0002	0.0109	0.0011
Pickup 4 x 4	300		X	6	4		51,274	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		26.63	0.291	0.028	0.0007	0.0006	0.0002	0.0091	0.0048
SUV 4 x 4	250		X	6	4		5,451	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.83	0.031	0.003	0.0001	0.0001	0.0000	0.0010	0.0005
Truck, Crewcab, 4x4	400	X		6	4		823	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.09	0.001	0.003	0.0002	0.0002	0.0000	0.0005	0.0000
Suburban	300		X	6	4		309	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.16	0.002	0.000	0.0000	0.0000	0.0000	0.0001	0.0000
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		2,777	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.67	0.004	0.011	0.0007	0.0006	0.0000	0.0016	0.0002

Table 9D-20
NEXUS Project Construction Equipment Air Emissions - SP3 Lucas Co. MP 181.4-189.3

AUT Equipment Unit & 4 Wheel Drive Crew Cab Truck	400	X		6	6		1,234	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.63	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Auto maintenance Truck	300		X	6	4		4,731	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.46	0.027	0.003	0.0001	0.0001	0.0000	0.0008	0.0004
Truck - 1 Ton Flatbed	300	X		6	4		463	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.61	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck - 3 Ton Flatbed	330	X		6	4		6,069	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		8.01	0.010	0.024	0.0014	0.0013	0.0001	0.0034	0.0003
Truck - 6 Ton Flatbed	330	X		6	4		1,543	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.04	0.002	0.006	0.0004	0.0003	0.0000	0.0009	0.0001
Truck - 6 Ton Winch	330	X		6	4		2,366	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.12	0.004	0.009	0.0006	0.0005	0.0000	0.0013	0.0001
Truck - 5 CY Dump	300	X		6	9		926	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.22	0.001	0.004	0.0002	0.0002	0.0000	0.0005	0.0001
Truck - 12 YD Dump	330	X		6	9		5,554	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		7.33	0.009	0.022	0.0013	0.0012	0.0001	0.0031	0.0003
Truck - Medium Duty Tractor	300	X		6	9		5,207	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.87	0.008	0.021	0.0012	0.0011	0.0001	0.0029	0.0003
Truck - Concrete Mixer	350	X		6	9		1,273	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.68	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Bus - Minibus	180	X		6	4		669	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.88	0.001	0.003	0.0002	0.0001	0.0000	0.0004	0.0000
Bus - 26 Passenger	300	X		6	4		3,343	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.41	0.005	0.013	0.0008	0.0007	0.0000	0.0019	0.0002
Bus - 45 Passenger	300	X		6	4		411	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.54	0.001	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Truck, End Dump 12cy	350	X		6	9		5,207	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.87	0.008	0.021	0.0012	0.0011	0.0001	0.0029	0.0003
Truck, Skid	300	X		6	9		1,157	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.53	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Truck, Stringing Tractor (25 Ton)	300	X		6	9		8,679	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		11.46	0.014	0.035	0.0021	0.0019	0.0001	0.0049	0.0005
Truck, Tire truck	300	X		6	4		1,440	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.90	0.002	0.006	0.0003	0.0003	0.0000	0.0008	0.0001
Truck, Wrecker truck	300	X		6	4		1,183	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.56	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001

Construction Workers				**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
				2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Worker Commutes				136,614	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		70.94	0.776	0.075	0.0018	0.0016	0.0005	0.0243	0.0128

Deliveries / Removals	**Empty Vehicle Weight (tons)**	**Full Vehicle Weight (tons)**	**Round Trip Distance (miles)**		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**								**2017 Emission Totals (Tons)**							
					2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
On-road delivery vehicles																					
Truck - 4000 Gallon Fuel	13.5	27.5	50.0		2,452	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	3.04	0.003	0.008	0.0005	0.0004	0.0000	0.0013	0.0002
Truck - Fuel/Lube	5.0	10.0	50.0		2,452	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	3.04	0.003	0.008	0.0005	0.0004	0.0000	0.0013	0.0002
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		2,870	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	3.56	0.004	0.010	0.0006	0.0005	0.0000	0.0015	0.0003
On-road material removal vehicles																					
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		3,427	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	4.25	0.005	0.011	0.0007	0.0006	0.0000	0.0018	0.0003

Construction Areas		**Disturbed Acreage (acre-months)**	**WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)**								**2017 Emission Totals (Tons)**							
			CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Area under construction (Exposed Soils)		419	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	46.0594	4.6059	NA	NA	NA

Table 9D-21
NEXUS Project Construction Equipment Air Emissions - SP3 Henry Co. MP 189.3-190.2

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	x		6	9	2270002069	8	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	0.82	0.001	0.003	0.0002	0.0002	0.0000	0.0002	0.0000
Dozer - D8 w/Winch	305	x		6	9	2270002069	39	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	4.10	0.006	0.015	0.0009	0.0009	0.0000	0.0012	0.0001
Dozer - D7 w/Winch	235	x		6	9	2270002069	31	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	2.53	0.002	0.006	0.0004	0.0004	0.0000	0.0007	0.0001
Dozer - D7	235	x		6	9	2270002069	8	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	0.63	0.000	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Tac rig (Auto) D6	200	x		6	9	2270002069	15	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	1.08	0.001	0.003	0.0002	0.0002	0.0000	0.0003	0.0000
Sideboom - 583	310	x		6	9	2270002069	108	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	11.68	0.017	0.042	0.0026	0.0026	0.0001	0.0034	0.0003
Sideboom - 572	240	x		6	9	2270002069	8	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	0.65	0.001	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Bend Machine - PB 32-42	173	x		6	9	2270002033	8	530.03	1.10	3.87	0.24	0.24	0.0033	0.32	0.012	0.43	0.34	0.001	0.002	0.0002	0.0002	0.0000	0.0002	0.0000
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	23	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	3.07	0.004	0.009	0.0006	0.0006	0.0000	0.0009	0.0001
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	54	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	5.65	0.007	0.017	0.0011	0.0011	0.0000	0.0016	0.0001
Backhoe - 325 (1.38 cy)	180	x		6	9	2270002036	62	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	3.87	0.002	0.008	0.0004	0.0004	0.0000	0.0010	0.0001
Backhoe - 325 w/Hoe-Ram	180	x		6	9	2270002036	15	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	0.97	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Backhoe, 215 / 320 w/hyd. Saw (feller buncher)	140	x		6	9	2270002036	8	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	0.38	0.000	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Backhoe, 215 / 320 w/hyd. Thumb	140	x		6	9	2270002036	8	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	0.38	0.000	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Clearing/brushing, Log Skidder	200	x		6	9	2270007015	8	638.34	0.29	1.10	0.05	0.05	0.0032	0.17	0.012	0.54	0.59	0.000	0.001	0.0000	0.0000	0.0000	0.0002	0.0000
Clearing/Brushing, Loader, Brush Cutter Attachment	80	x		6	9	2270007015	8	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	0.26	0.001	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Clearing/brushing, Delimber	140	x		6	9	2270007015	8	638.31	0.50	1.26	0.11	0.11	0.0033	0.17	0.012	0.54	0.41	0.000	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Clearing/brushing, Loader, Brush Rake Attachment	80	x		6	9	2270007015	15	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	0.52	0.001	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Clearing/brushing, Wood chipper	70	x		6	9	2270007015	8	708.88	1.40	3.64	0.13	0.13	0.0039	0.19	0.012	0.54	0.23	0.000	0.001	0.0000	0.0000	0.0000	0.0001	0.0000
Backhoe/Loader - 430	100	X		6	9	2270002060	54	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	1.88	0.003	0.006	0.0006	0.0006	0.0000	0.0006	0.0000
Backhoe/Loader - 420	93	X		6	9	2270002060	8	595.50	2.00	2.08	0.26	0.26	0.0034	0.20	0.012	0.59	0.28	0.001	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Loader - 980 Wheel	392	X		6	9	2270002060	8	536.28	0.97	2.40	0.14	0.14	0.0031	0.17	0.012	0.59	1.05	0.002	0.005	0.0003	0.0003	0.0000	0.0003	0.0000
Loader - 966 Wheel	262	X		6	9	2270002060	23	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	2.11	0.002	0.006	0.0004	0.0004	0.0000	0.0007	0.0000
Motor Grader - 14M	259	X		6	9	2270002048	15	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	1.39	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Trencher - Trencor 1660 HD	800	X		6	9	2270002030	8	535.80	1.69	4.56	0.24	0.24	0.0032	0.32	0.012	0.59	2.15	0.007	0.018	0.0009	0.0009	0.0000	0.0013	0.0000
Crane - 50 Ton Truck	280	X		6	5	2270002045	13	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	0.91	0.001	0.003	0.0001	0.0001	0.0000	0.0003	0.0000
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	13	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	0.52	0.000	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Ozzie Padder	400	X		6	9	2270002036	15	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	2.15	0.003	0.007	0.0004	0.0004	0.0000	0.0006	0.0000
Drill, Boring mach. 16"-42" (600,000 #)	95	X		7	9	2270002033	18	589.01	2.17	4.03	0.40	0.40	0.0036	0.43	0.012	0.43	0.48	0.002	0.003	0.0003	0.0003	0.0000	0.0003	0.0000
CAT 815 COMPACTOR	200	X		6	9	2270002015	8	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	0.54	0.001	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Farm Tractor	175	X		6	9	2270002075	8	536.32	0.48	1.42	0.09	0.09	0.0029	0.16	0.012	0.59	0.47	0.000	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	0	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Compressor - 1600 CFM	590	X		6	9	2270006015	15	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	2.29	0.004	0.013	0.0006	0.0006	0.0000	0.0009	0.0001
Compressor - 1200 CFM	590	X		6	9	2270006015	15	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	2.29	0.004	0.013	0.0006	0.0006	0.0000	0.0009	0.0001
Compressor - 600 CFM	185	X		6	9	2270006015	15	530.45	0.45	2.05	0.09	0.09	0.0030	0.19	0.012	0.43	0.72	0.001	0.003	0.0001	0.0001	0.0000	0.0003	0.0000
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	15	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.19	0.000	0.001	0.0000	0.0000	0.0000	0.0001	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	41	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	0.14	0.001	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Welders	46	X		6	9	2270006025	170	693.43	3.59	4.72	0.58	0.58	0.0043	0.80	0.012	0.21	1.25	0.006	0.009	0.0011	0.0011	0.0000	0.0015	0.0000
Pressure washers	10		X	6	7	2265006030	12	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.12	0.031	0.000	0.0000	0.0000	0.0000	0.0006	0.0000
Generator - 250 KW	433	X		6	9	2270006005	0	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Chain Saw	1		X	6	9	2265004021	46	1,227.52	206.95	2.52	0.31	0.31	0.0224	7.08	0.229	0.40	0.03	0.004	0.000	0.0000	0.0000	0.0000	0.0001	0.0000
Pump - 6-Inch Water	32		X	6	24	2265006010	123	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	2.11	0.047	0.005	0.0002	0.0002	0.0000	0.0015	0.0007
Pump - 1500 GPM Fill	32		X	6	8	2265006010	14	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	0.23	0.005	0.001	0.0000	0.0000	0.0000	0.0002	0.0001
Pump - Test	32		X	6	8	2265006010	14	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	0.23	0.005	0.001	0.0000	0.0000	0.0000	0.0002	0.0001
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**
Welding Rig w/ 2 x 300 Amp	45	X		6	9		2,546	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.36	0.004	0.010	0.0006	0.0006	0.0000	0.0014	0.0001
Pickup 4 x 4	300		X	6	4		6,840	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		3.55	0.039	0.004	0.0001	0.0001	0.0000	0.0012	0.0006
SUV 4 x 4	250		X	6	4		771	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.40	0.004	0.000	0.0000	0.0000	0.0000	0.0001	0.0001
Truck, Crewcab, 4x4	400	X		6	4		103	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.14	0.000	0.000	0.0000	0.0000	0.0000	0.0001	0.0000
Suburban	300		X	6	4		103	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.05	0.001	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		231	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.31	0.000	0.001	0.0001	0.0001	0.0000	0.0001	0.0000

Table 9D-21
NEXUS Project Construction Equipment Air Emissions - SP3 Henry Co. MP 189.3-190.2

AUT Equipment Unit & 4 Wheel Drive Crew Cab Truck	400	X		6	6		154	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.20	0.000	0.001	0.0000	0.0000	0.0000	0.0001	0.0000
Auto maintenance Truck	300		X	6	4		617	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.32	0.004	0.000	0.0000	0.0000	0.0000	0.0001	0.0001
Truck - 1 Ton Flatbed	300	X		6	4		51	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.07	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Truck - 3 Ton Flatbed	330	X		6	4		823	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.09	0.001	0.003	0.0002	0.0002	0.0000	0.0005	0.0000
Truck - 6 Ton Flatbed	330	X		6	4		257	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.34	0.000	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Truck - 6 Ton Winch	330	X		6	4		309	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.41	0.000	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
Truck - 5 CY Dump	300	X		6	9		116	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.15	0.000	0.000	0.0000	0.0000	0.0000	0.0001	0.0000
Truck - 12 YD Dump	330	X		6	9		694	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.92	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Truck - Medium Duty Tractor	300	X		6	9		810	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.07	0.001	0.003	0.0002	0.0002	0.0000	0.0005	0.0000
Truck - Concrete Mixer	350	X		6	9		231	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.31	0.000	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Bus - Minibus	180	X		6	4		103	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.14	0.000	0.000	0.0000	0.0000	0.0000	0.0001	0.0000
Bus - 26 Passenger	300	X		6	4		309	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.41	0.000	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
Bus - 45 Passenger	300	X		6	4		51	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.07	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Truck, End Dump 12cy	350	X		6	9		579	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.76	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck, Skid	300	X		6	9		231	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.31	0.000	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Truck, Stringing Tractor (25 Ton)	300	X		6	9		1,736	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.29	0.003	0.007	0.0004	0.0004	0.0000	0.0010	0.0001
Truck, Tire truck	300	X		6	4		206	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.27	0.000	0.001	0.0000	0.0000	0.0000	0.0001	0.0000
Truck, Wrecker truck	300	X		6	4		154	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.20	0.000	0.001	0.0000	0.0000	0.0000	0.0001	0.0000

Construction Workers				**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
				2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Worker Commutes				17,338	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		9.00	0.098	0.010	0.0002	0.0002	0.0001	0.0031	0.0016

Deliveries / Removals	**Empty Vehicle Weight (tons)**	**Full Vehicle Weight (tons)**	**Round Trip Distance (miles)**		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**								**2017 Emission Totals (Tons)**							
					2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
On-road delivery vehicles																					
Truck - 4000 Gallon Fuel	13.5	27.5	50.0		311	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	0.39	0.000	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
Truck - Fuel/Lube	5.0	10.0	50.0		311	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	0.39	0.000	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		364	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	0.45	0.001	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
On-road material removal vehicles																					
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		435	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	0.54	0.001	0.001	0.0001	0.0001	0.0000	0.0002	0.0000

Construction Areas		**Disturbed Acreage (acre-months)**	**WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)**								**2017 Emission Totals (Tons)**							
			CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Area under construction (Exposed Soils)		32	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	3.4771	0.3477	NA	NA	NA

Table 9D-22
NEXUS Project Construction Equipment Air Emissions - SP3 Fulton Co. MP 190.2-208.3

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	x		6	9	2270002069	77	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	8.21	0.012	0.030	0.0018	0.0018	0.0000	0.0024	0.0002
Dozer - D8 w/Winch	305	x		6	9	2270002069	501	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	53.34	0.078	0.192	0.0118	0.0118	0.0003	0.0155	0.0012
Dozer - D7 w/Winch	235	x		6	9	2270002069	586	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	48.06	0.038	0.115	0.0069	0.0069	0.0003	0.0137	0.0011
Dozer - D7	235	x		6	9	2270002069	131	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	10.75	0.008	0.026	0.0015	0.0015	0.0001	0.0031	0.0002
Tac rig (Auto) D6	200	x		6	9	2270002069	309	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	21.53	0.017	0.051	0.0031	0.0031	0.0001	0.0062	0.0005
Sideboom - 583	310	x		6	9	2270002069	2,114	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	228.55	0.334	0.824	0.0508	0.0508	0.0013	0.0665	0.0052
Sideboom - 572	240	x		6	9	2270002069	93	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	7.75	0.006	0.018	0.0011	0.0011	0.0000	0.0022	0.0002
Bend Machine - PB 32-42	173	x		6	9	2270002033	147	530.03	1.10	3.87	0.24	0.24	0.0033	0.32	0.012	0.43	6.37	0.013	0.047	0.0029	0.0029	0.0000	0.0038	0.0001
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	401	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	53.17	0.066	0.162	0.0102	0.0102	0.0003	0.0148	0.0012
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	1,111	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	116.25	0.143	0.354	0.0224	0.0224	0.0006	0.0323	0.0027
Backhoe - 325 (1.38 cy)	180	x		6	9	2270002036	957	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	60.06	0.036	0.120	0.0062	0.0062	0.0003	0.0163	0.0014
Backhoe - 325 w/Hoe-Ram	180	x		6	9	2270002036	231	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	14.53	0.009	0.029	0.0015	0.0015	0.0001	0.0039	0.0003
Backhoe, 215 / 320 w/hyd. Saw (feller buncher)	140	x		6	9	2270002036	131	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	6.40	0.006	0.014	0.0014	0.0014	0.0000	0.0018	0.0001
Backhoe, 215 / 320 w/hyd. Thumb	140	x		6	9	2270002036	131	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	6.40	0.006	0.014	0.0014	0.0014	0.0000	0.0018	0.0001
Clearing/brushing, Log Skidder	200	x		6	9	2270007015	131	638.34	0.29	1.10	0.05	0.05	0.0032	0.17	0.012	0.54	9.98	0.005	0.017	0.0007	0.0007	0.0001	0.0026	0.0002
Clearing/Brushing, Loader, Brush Cutter Attachment	80	x		6	9	2270007015	131	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	4.43	0.009	0.009	0.0010	0.0010	0.0000	0.0011	0.0001
Clearing/brushing, Delimber	140	x		6	9	2270007015	131	638.31	0.50	1.26	0.11	0.11	0.0033	0.17	0.012	0.54	6.99	0.006	0.014	0.0012	0.0012	0.0000	0.0019	0.0001
Clearing/brushing, Loader, Brush Rake Attachment	80	x		6	9	2270007015	262	708.90	1.38	1.48	0.16	0.16	0.0037	0.18	0.012	0.54	8.87	0.017	0.019	0.0020	0.0020	0.0000	0.0023	0.0002
Clearing/brushing, Wood chipper	70	x		6	9	2270007015	131	708.88	1.40	3.64	0.13	0.13	0.0039	0.19	0.012	0.54	3.88	0.008	0.020	0.0007	0.0007	0.0000	0.0010	0.0001
Backhoe/Loader - 430	100	X		6	9	2270002060	987	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	34.44	0.047	0.111	0.0113	0.0113	0.0002	0.0114	0.0008
Backhoe/Loader - 420	93	X		6	9	2270002060	77	595.50	2.00	2.08	0.26	0.26	0.0034	0.20	0.012	0.59	2.78	0.009	0.010	0.0012	0.0012	0.0000	0.0010	0.0001
Loader - 980 Wheel	392	X		6	9	2270002060	147	536.28	0.97	2.40	0.14	0.14	0.0031	0.17	0.012	0.59	20.04	0.036	0.090	0.0053	0.0053	0.0001	0.0064	0.0005
Loader - 966 Wheel	262	X		6	9	2270002060	455	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	41.59	0.042	0.124	0.0081	0.0081	0.0002	0.0129	0.0010
Motor Grader - 14M	259	X		6	9	2270002048	224	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	20.21	0.015	0.047	0.0028	0.0028	0.0001	0.0057	0.0005
Trencher - Trencor 1660 HD	800	X		6	9	2270002030	154	535.80	1.69	4.56	0.24	0.24	0.0032	0.32	0.012	0.59	43.01	0.136	0.366	0.0189	0.0189	0.0003	0.0260	0.0010
Crane - 50 Ton Truck	280	X		6	5	2270002045	159	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	11.16	0.008	0.035	0.0016	0.0016	0.0001	0.0035	0.0003
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	116	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	4.66	0.004	0.016	0.0011	0.0011	0.0000	0.0016	0.0001
Ozzie Padder	400	X		6	9	2270002036	301	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	41.98	0.052	0.128	0.0081	0.0081	0.0002	0.0117	0.0010
Drill, Boring mach. 16"-42" (600,000 #)	95	X		7	9	2270002033	288	589.01	2.17	4.03	0.40	0.40	0.0036	0.43	0.012	0.43	7.64	0.028	0.052	0.0052	0.0052	0.0000	0.0055	0.0002
CAT 815 COMPACTOR	200	X		6	9	2270002015	147	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	10.22	0.010	0.031	0.0020	0.0020	0.0001	0.0032	0.0002
Farm Tractor	175	X		6	9	2270002075	147	536.32	0.48	1.42	0.09	0.09	0.0029	0.16	0.012	0.59	8.95	0.008	0.024	0.0015	0.0015	0.0000	0.0027	0.0002
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	0	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Compressor - 1600 CFM	590	X		6	9	2270006015	31	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	4.58	0.007	0.026	0.0012	0.0012	0.0000	0.0017	0.0001
Compressor - 1200 CFM	590	X		6	9	2270006015	31	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	4.58	0.007	0.026	0.0012	0.0012	0.0000	0.0017	0.0001
Compressor - 600 CFM	185	X		6	9	2270006015	324	530.45	0.45	2.05	0.09	0.09	0.0030	0.19	0.012	0.43	15.07	0.013	0.058	0.0026	0.0026	0.0001	0.0053	0.0003
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	324	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	4.08	0.005	0.025	0.0008	0.0008	0.0000	0.0013	0.0001
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	864	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	2.89	0.012	0.022	0.0017	0.0017	0.0000	0.0023	0.0001
Welders	46	X		6	9	2270006025	3,132	693.43	3.59	4.72	0.58	0.58	0.0043	0.80	0.012	0.21	23.13	0.120	0.157	0.0194	0.0194	0.0001	0.0268	0.0004
Pressure washers	10		X	6	7	2265006030	120	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	1.18	0.312	0.002	0.0001	0.0001	0.0000	0.0057	0.0003
Generator - 250 KW	433	X		6	9	2270006005	0	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Chain Saw	1		X	6	9	2265004021	787	1,227.52	206.95	2.52	0.31	0.31	0.0224	7.08	0.229	0.40	0.43	0.072	0.001	0.0001	0.0001	0.0000	0.0025	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	2,386	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	40.89	0.915	0.098	0.0040	0.0040	0.0007	0.0288	0.0133
Pump - 1500 GPM Fill	32		X	6	8	2265006010	288	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	4.93	0.110	0.012	0.0005	0.0005	0.0001	0.0035	0.0016
Pump - Test	32		X	6	8	2265006010	288	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	4.93	0.110	0.012	0.0005	0.0005	0.0001	0.0035	0.0016
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**
Welding Rig w/ 2 x 300 Amp	45	X		6	9		46,980	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		62.03	0.075	0.187	0.0112	0.0103	0.0005	0.0266	0.0026
Pickup 4 x 4	300		X	6	4		121,629	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		63.16	0.691	0.067	0.0016	0.0014	0.0004	0.0216	0.0114
SUV 4 x 4	250		X	6	4		12,806	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		6.65	0.073	0.007	0.0002	0.0002	0.0000	0.0023	0.0012
Truck, Crewcab, 4x4	400	X		6	4		2,057	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.72	0.003	0.008	0.0005	0.0004	0.0000	0.0012	0.0001
Suburban	300		X	6	4		514	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.27	0.003	0.000	0.0000	0.0000	0.0000	0.0001	0.0000
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		5,477	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		7.23	0.009	0.022	0.0013	0.0012	0.0001	0.0031	0.0003

Table 9D-22
NEXUS Project Construction Equipment Air Emissions - SP3 Fulton Co. MP 190.2-208.3

AUT Equipment Unit & 4 Wheel Drive Crew Cab Truck	400	X		6	6		3,086	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.07	0.005	0.012	0.0007	0.0007	0.0000	0.0017	0.0002
Auto maintenance Truck	300		X	6	4		11,314	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		5.88	0.064	0.006	0.0002	0.0001	0.0000	0.0020	0.0011
Truck - 1 Ton Flatbed	300	X		6	4		977	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.29	0.002	0.004	0.0002	0.0002	0.0000	0.0006	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		14,657	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		19.35	0.023	0.058	0.0035	0.0032	0.0002	0.0083	0.0008
Truck - 6 Ton Flatbed	330	X		6	4		4,629	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.11	0.007	0.018	0.0011	0.0010	0.0001	0.0026	0.0003
Truck - 6 Ton Winch	330	X		6	4		5,811	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		7.67	0.009	0.023	0.0014	0.0013	0.0001	0.0033	0.0003
Truck - 5 CY Dump	300	X		6	9		2,314	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.06	0.004	0.009	0.0005	0.0005	0.0000	0.0013	0.0001
Truck - 12 YD Dump	330	X		6	9		13,886	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		18.33	0.022	0.055	0.0033	0.0030	0.0002	0.0079	0.0008
Truck - Medium Duty Tractor	300	X		6	9		12,613	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		16.65	0.020	0.050	0.0030	0.0028	0.0001	0.0071	0.0007
Truck - Concrete Mixer	350	X		6	9		2,893	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.82	0.005	0.012	0.0007	0.0006	0.0000	0.0016	0.0002
Bus - Minibus	180	X		6	4		1,646	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.17	0.003	0.007	0.0004	0.0004	0.0000	0.0009	0.0001
Bus - 26 Passenger	300	X		6	4		6,017	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		7.94	0.010	0.024	0.0014	0.0013	0.0001	0.0034	0.0003
Bus - 45 Passenger	300	X		6	4		1,029	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.36	0.002	0.004	0.0002	0.0002	0.0000	0.0006	0.0001
Truck, End Dump 12cy	350	X		6	9		10,993	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		14.51	0.018	0.044	0.0026	0.0024	0.0001	0.0062	0.0006
Truck, Skid	300	X		6	9		2,777	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.67	0.004	0.011	0.0007	0.0006	0.0000	0.0016	0.0002
Truck, Stringing Tractor (25 Ton)	300	X		6	9		20,829	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		27.50	0.033	0.083	0.0049	0.0045	0.0002	0.0118	0.0012
Truck, Tire truck	300	X		6	4		3,446	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.55	0.006	0.014	0.0008	0.0008	0.0000	0.0019	0.0002
Truck, Wrecker truck	300	X		6	4		2,829	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.73	0.005	0.011	0.0007	0.0006	0.0000	0.0016	0.0002

Construction Workers		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
		2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Worker Commutes		311,163	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		161.59	1.767	0.171	0.0042	0.0037	0.0011	0.0553	0.0291

Deliveries / Removals	**Empty Vehicle Weight (tons)**	**Full Vehicle Weight (tons)**	**Round Trip Distance (miles)**		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
					2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
On-road delivery vehicles																						
Truck - 4000 Gallon Fuel	13.5	27.5	50.0		5,586	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		6.93	0.008	0.019	0.0011	0.0010	0.0001	0.0029	0.0005
Truck - Fuel/Lube	5.0	10.0	50.0		5,586	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		6.93	0.008	0.019	0.0011	0.0010	0.0001	0.0029	0.0005
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		6,537	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		8.11	0.009	0.022	0.0013	0.0012	0.0001	0.0034	0.0006
On-road material removal vehicles																						
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		7,805	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		9.68	0.011	0.026	0.0015	0.0014	0.0001	0.0040	0.0007

Construction Areas		**Disturbed Acreage (acre-months)**	**WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)**									**2017 Emission Totals (Tons)**							
			CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Area under construction (Exposed Soils)		624	NA	NA	NA	0.11	0.01	NA	NA	NA		NA	NA	NA	68.6516	6.8652	NA	NA	NA

Table 9D-23
NEXUS Project Construction Equipment Air Emissions - SP4 Lanawee Co. MP 208.3-230.4

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	x		6	9	2270002069	154	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	16.41	0.024	0.059	0.0036	0.0036	0.0001	0.0048	0.0004
Dozer - D8 w/Winch	305	x		6	9	2270002069	972	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	103.41	0.151	0.373	0.0230	0.0230	0.0006	0.0301	0.0024
Dozer - D7 w/Winch	235	x		6	9	2270002069	903	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	73.98	0.058	0.176	0.0106	0.0106	0.0004	0.0211	0.0017
Dozer - D7	235	x		6	9	2270002069	663	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	54.38	0.043	0.130	0.0078	0.0078	0.0003	0.0155	0.0012
Tac rig (Auto) D6	200	x		6	9	2270002069	401	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	27.98	0.022	0.067	0.0040	0.0040	0.0001	0.0080	0.0006
Sideboom - 583	310	x		6	9	2270002069	2,816	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	304.46	0.445	1.098	0.0676	0.0676	0.0017	0.0886	0.0070
Sideboom - 572	240	x		6	9	2270002069	93	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	7.75	0.006	0.018	0.0011	0.0011	0.0000	0.0022	0.0002
Bend Machine - PB 32-42	173	x		6	9	2270002033	185	530.03	1.10	3.87	0.24	0.24	0.0033	0.32	0.012	0.43	8.05	0.017	0.059	0.0036	0.0036	0.0000	0.0048	0.0002
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	841	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	111.46	0.137	0.339	0.0214	0.0214	0.0006	0.0309	0.0026
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	1,335	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	139.66	0.172	0.425	0.0269	0.0269	0.0008	0.0388	0.0032
Backhoe - 325 (1.38 cy)	180	x		6	9	2270002036	1,905	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	119.64	0.072	0.239	0.0124	0.0124	0.0006	0.0324	0.0027
Backhoe - 325 w/Hoe-Ram	180	x		6	9	2270002036	347	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	21.80	0.013	0.043	0.0023	0.0023	0.0001	0.0059	0.0005
Backhoe, 215 / 320 w/hyd. Saw (feller buncher)	140	x		6	9	2270002036	231	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	11.30	0.011	0.025	0.0025	0.0025	0.0001	0.0032	0.0003
Backhoe, 215 / 320 w/hyd. Thumb	140	x		6	9	2270002036	231	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	11.30	0.011	0.025	0.0025	0.0025	0.0001	0.0032	0.0003
Clearing/brushing, Log Skidder	200	x		6	9	2270007015	231	536.38	0.24	0.93	0.04	0.04	0.0027	0.14	0.012	0.59	16.15	0.007	0.028	0.0011	0.0011	0.0001	0.0042	0.0004
Clearing/Brushing, Loader, Brush Cutter Attachment	80	x		6	9	2270007015	231	595.67	1.16	1.25	0.13	0.13	0.0031	0.15	0.012	0.59	7.17	0.014	0.015	0.0016	0.0016	0.0000	0.0018	0.0001
Clearing/brushing, Delimber	140	x		6	9	2270007015	231	536.36	0.42	1.06	0.09	0.09	0.0028	0.15	0.012	0.59	11.30	0.009	0.022	0.0020	0.0020	0.0001	0.0031	0.0003
Clearing/brushing, Loader, Brush Rake Attachment	80	x		6	9	2270007015	463	595.67	1.16	1.25	0.13	0.13	0.0031	0.15	0.012	0.59	14.34	0.028	0.030	0.0032	0.0032	0.0001	0.0036	0.0003
Clearing/brushing, Wood chipper	70	x		6	9	2270007015	231	595.66	1.17	3.06	0.11	0.11	0.0032	0.16	0.012	0.59	6.28	0.012	0.032	0.0012	0.0012	0.0000	0.0016	0.0001
Backhoe/Loader - 430	100	X		6	9	2270002060	2,654	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	92.55	0.127	0.299	0.0304	0.0304	0.0005	0.0307	0.0021
Backhoe/Loader - 420	93	X		6	9	2270002060	154	595.50	2.00	2.08	0.26	0.26	0.0034	0.20	0.012	0.59	5.56	0.019	0.019	0.0025	0.0025	0.0000	0.0019	0.0001
Loader - 980 Wheel	392	X		6	9	2270002060	185	536.28	0.97	2.40	0.14	0.14	0.0031	0.17	0.012	0.59	25.31	0.046	0.113	0.0067	0.0067	0.0001	0.0081	0.0006
Loader - 966 Wheel	262	X		6	9	2270002060	571	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	52.17	0.053	0.156	0.0102	0.0102	0.0003	0.0162	0.0012
Motor Grader - 14M	259	X		6	9	2270002048	864	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	78.06	0.059	0.181	0.0108	0.0108	0.0004	0.0221	0.0018
Trencher - Trencor 1660 HD	800	X		6	9	2270002030	193	535.80	1.69	4.56	0.24	0.24	0.0032	0.32	0.012	0.59	53.76	0.169	0.458	0.0237	0.0237	0.0003	0.0324	0.0012
Crane - 50 Ton Truck	280	X		6	5	2270002045	240	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	16.90	0.012	0.053	0.0024	0.0024	0.0001	0.0053	0.0004
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	214	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	8.62	0.008	0.030	0.0021	0.0021	0.0000	0.0029	0.0002
Ozzie Padder	400	X		6	9	2270002036	378	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	52.74	0.065	0.160	0.0101	0.0101	0.0003	0.0146	0.0012
Drill, Boring mach. 16"-42" (600,000 #)	95	X		7	9	2270002033	756	589.01	2.17	4.03	0.40	0.40	0.0036	0.43	0.012	0.43	20.05	0.074	0.137	0.0135	0.0135	0.0001	0.0145	0.0004
CAT 815 COMPACTOR	200	X		6	9	2270002015	602	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	41.97	0.042	0.125	0.0082	0.0082	0.0002	0.0130	0.0010
Farm Tractor	175	X		6	9	2270002075	278	536.32	0.48	1.42	0.09	0.09	0.0029	0.16	0.012	0.59	16.95	0.015	0.045	0.0029	0.0029	0.0001	0.0050	0.0004
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	864	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	30.14	0.013	0.036	0.0020	0.0020	0.0001	0.0076	0.0007
Compressor - 1600 CFM	590	X		6	9	2270006015	93	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	13.73	0.022	0.078	0.0035	0.0035	0.0001	0.0052	0.0003
Compressor - 1200 CFM	590	X		6	9	2270006015	93	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	13.73	0.022	0.078	0.0035	0.0035	0.0001	0.0052	0.0003
Compressor - 600 CFM	185	X		6	9	2270006015	393	530.45	0.45	2.05	0.09	0.09	0.0030	0.19	0.012	0.43	18.30	0.015	0.071	0.0032	0.0032	0.0001	0.0064	0.0004
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	393	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	4.95	0.006	0.030	0.0009	0.0009	0.0000	0.0015	0.0001
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	1,605	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	5.37	0.022	0.042	0.0032	0.0032	0.0000	0.0043	0.0001
Welders	46	X		6	9	2270006025	4,706	693.43	3.59	4.72	0.58	0.58	0.0043	0.80	0.012	0.21	34.75	0.180	0.237	0.0292	0.0292	0.0002	0.0402	0.0006
Pressure washers	10		X	6	7	2265006030	240	1,046.57	276.86	2.18	0.11	0.11	0.0191	5.09	0.229	0.85	2.35	0.623	0.005	0.0003	0.0003	0.0000	0.0114	0.0005
Generator - 250 KW	433	X		6	9	2270006005	432	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	47.01	0.096	0.323	0.0144	0.0144	0.0003	0.0230	0.0011
Chain Saw	1		X	6	9	2265004021	1,389	1,227.52	206.40	2.55	0.31	0.31	0.0224	7.11	0.229	0.40	0.75	0.126	0.002	0.0002	0.0002	0.0000	0.0044	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	4,937	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	84.59	1.887	0.206	0.0083	0.0083	0.0015	0.0599	0.0275
Pump - 1500 GPM Fill	32		X	6	8	2265006010	535	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	9.16	0.204	0.022	0.0009	0.0009	0.0002	0.0065	0.0030
Pump - Test	32		X	6	8	2265006010	535	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	9.16	0.204	0.022	0.0009	0.0009	0.0002	0.0065	0.0030
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**
Welding Rig w/ 2 x 300 Amp	45	X		6	9		70,586	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		93.19	0.113	0.281	0.0168	0.0154	0.0008	0.0399	0.0039
Pickup 4 x 4	300		X	6	4		218,211	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		113.32	1.239	0.120	0.0029	0.0026	0.0008	0.0388	0.0204
SUV 4 x 4	250		X	6	4		23,657	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		12.29	0.134	0.013	0.0003	0.0003	0.0001	0.0042	0.0022
Truck, Crewcab, 4x4	400	X		6	4		2,674	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.53	0.004	0.011	0.0006	0.0006	0.0000	0.0015	0.0001
Suburban	300		X	6	4		617	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.32	0.004	0.000	0.0000	0.0000	0.0000	0.0001	0.0001
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		5,940	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		7.84	0.010	0.024	0.0014	0.0013	0.0001	0.0034	0.0003

Table 9D-23
NEXUS Project Construction Equipment Air Emissions - SP4 Lanawee Co. MP 208.3-230.4

AUT Equipment Unit & 4 Wheel Drive Crew Cab Truck	400	X		6	6		4,011	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		5.30	0.006	0.016	0.0010	0.0009	0.0000	0.0023	0.0002
Auto maintenance Truck	300		X	6	4		21,806	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		11.32	0.124	0.012	0.0003	0.0003	0.0001	0.0039	0.0020
Truck - 1 Ton Flatbed	300	X		6	4		1,234	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.63	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		28,851	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		38.09	0.046	0.115	0.0068	0.0063	0.0003	0.0163	0.0016
Truck - 6 Ton Flatbed	330	X		6	4		5,863	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		7.74	0.009	0.023	0.0014	0.0013	0.0001	0.0033	0.0003
Truck - 6 Ton Winch	330	X		6	4		10,131	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		13.38	0.016	0.040	0.0024	0.0022	0.0001	0.0057	0.0006
Truck - 5 CY Dump	300	X		6	9		2,893	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.82	0.005	0.012	0.0007	0.0006	0.0000	0.0016	0.0002
Truck - 12 YD Dump	330	X		6	9		30,317	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		40.03	0.049	0.121	0.0072	0.0066	0.0004	0.0172	0.0017
Truck - Medium Duty Tractor	300	X		6	9		30,317	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		40.03	0.049	0.121	0.0072	0.0066	0.0004	0.0172	0.0017
Truck - Concrete Mixer	350	X		6	9		5,091	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.72	0.008	0.020	0.0012	0.0011	0.0001	0.0029	0.0003
Bus - Minibus	180	X		6	4		1,954	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.58	0.003	0.008	0.0005	0.0004	0.0000	0.0011	0.0001
Bus - 26 Passenger	300	X		6	4		8,743	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		11.54	0.014	0.035	0.0021	0.0019	0.0001	0.0049	0.0005
Bus - 45 Passenger	300	X		6	4		1,337	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.77	0.002	0.005	0.0003	0.0003	0.0000	0.0008	0.0001
Truck, End Dump 12cy	350	X		6	9		13,886	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		18.33	0.022	0.055	0.0033	0.0030	0.0002	0.0079	0.0008
Truck, Skid	300	X		6	9		2,777	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.67	0.004	0.011	0.0007	0.0006	0.0000	0.0016	0.0002
Truck, Stringing Tractor (25 Ton)	300	X		6	9		20,829	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		27.50	0.033	0.083	0.0049	0.0045	0.0002	0.0118	0.0012
Truck, Tire truck	300	X		6	4		6,069	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		8.01	0.010	0.024	0.0014	0.0013	0.0001	0.0034	0.0003
Truck, Wrecker truck	300	X		6	4		5,451	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		7.20	0.009	0.022	0.0013	0.0012	0.0001	0.0031	0.0003

Construction Workers		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**								**2017 Emission Totals (Tons)**							
		2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Worker Commutes		614,243	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085	318.98	3.489	0.338	0.0082	0.0073	0.0021	0.1091	0.0574

Deliveries / Removals	**Empty Vehicle Weight (tons)**	**Full Vehicle Weight (tons)**	**Round Trip Distance (miles)**	**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**								**2017 Emission Totals (Tons)**							
				2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
On-road delivery vehicles																				
Truck - 4000 Gallon Fuel	13.5	27.5	50.0	11,026	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	13.68	0.015	0.037	0.0021	0.0020	0.0001	0.0057	0.0010
Truck - Fuel/Lube	5.0	10.0	50.0	11,026	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	13.68	0.015	0.037	0.0021	0.0020	0.0001	0.0057	0.0010
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0	12,904	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	16.01	0.018	0.043	0.0025	0.0023	0.0001	0.0066	0.0012
On-road material removal vehicles																				
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0	15,408	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	19.11	0.021	0.051	0.0030	0.0028	0.0002	0.0079	0.0014

Construction Areas	**Disturbed Acreage (acre-months)**	**WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)**								**2017 Emission Totals (Tons)**							
		CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Area under construction (Exposed Soils)	850	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	93.4666	9.3467	NA	NA	NA

Table 9D-24
NEXUS Project Construction Equipment Air Emissions - Mainline-Monroe- MP 230.4-236.9

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	x		6	9	2270002069	46	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	4.92	0.007	0.018	0.0011	0.0011	0.0000	0.0014	0.0001
Dozer - D8 w/Winch	305	x		6	9	2270002069	285	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	30.37	0.044	0.110	0.0067	0.0067	0.0002	0.0088	0.0007
Dozer - D7 w/Winch	235	x		6	9	2270002069	285	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	23.40	0.018	0.056	0.0034	0.0034	0.0001	0.0067	0.0005
Dozer - D7	235	x		6	9	2270002069	69	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	5.69	0.004	0.014	0.0008	0.0008	0.0000	0.0016	0.0001
Tac rig (Auto) D6	200	x		6	9	2270002069	123	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	8.61	0.007	0.021	0.0012	0.0012	0.0000	0.0025	0.0002
Sideboom - 583	310	x		6	9	2270002069	802	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	86.75	0.127	0.313	0.0193	0.0193	0.0005	0.0252	0.0020
Sideboom - 572	240	x		6	9	2270002069	23	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	1.94	0.002	0.005	0.0003	0.0003	0.0000	0.0006	0.0000
Bend Machine - PB 32-42	173	x		6	9	2270002033	46	530.03	1.10	3.87	0.24	0.24	0.0033	0.32	0.012	0.43	2.01	0.004	0.015	0.0009	0.0009	0.0000	0.0012	0.0000
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	262	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	34.77	0.043	0.106	0.0067	0.0067	0.0002	0.0097	0.0008
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	378	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	39.56	0.049	0.120	0.0076	0.0076	0.0002	0.0110	0.0009
Backhoe - 325 (1.38 cy)	180	x		6	9	2270002036	579	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	36.33	0.022	0.072	0.0038	0.0038	0.0002	0.0098	0.0008
Backhoe - 325 w/Hoe-Ram	180	x		6	9	2270002036	108	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	6.78	0.004	0.014	0.0007	0.0007	0.0000	0.0018	0.0002
Backhoe, 215 / 320 w/hyd. Saw (feller buncher)	140	x		6	9	2270002036	69	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	3.39	0.003	0.008	0.0007	0.0007	0.0000	0.0010	0.0001
Backhoe, 215 / 320 w/hyd. Thumb	140	x		6	9	2270002036	69	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	3.39	0.003	0.008	0.0007	0.0007	0.0000	0.0010	0.0001
Clearing/brushing, Log Skidder	200	x		6	9	2270007015	69	536.38	0.24	0.93	0.04	0.04	0.0027	0.14	0.012	0.59	4.84	0.002	0.008	0.0003	0.0003	0.0000	0.0013	0.0001
Clearing/Brushing, Loader, Brush Cutter Attachment	80	x		6	9	2270007015	69	595.67	1.16	1.25	0.13	0.13	0.0031	0.15	0.012	0.59	2.15	0.004	0.004	0.0005	0.0005	0.0000	0.0005	0.0000
Clearing/brushing, Delimber	140	x		6	9	2270007015	69	536.36	0.42	1.06	0.09	0.09	0.0028	0.15	0.012	0.59	3.39	0.003	0.007	0.0006	0.0006	0.0000	0.0009	0.0001
Clearing/brushing, Loader, Brush Rake Attachment	80	x		6	9	2270007015	139	595.67	1.16	1.25	0.13	0.13	0.0031	0.15	0.012	0.59	4.30	0.008	0.009	0.0010	0.0010	0.0000	0.0011	0.0001
Clearing/brushing, Wood chipper	70	x		6	9	2270007015	69	595.66	1.17	3.06	0.11	0.11	0.0032	0.16	0.012	0.59	1.88	0.004	0.010	0.0004	0.0004	0.0000	0.0005	0.0000
Backhoe/Loader - 430	100	X		6	9	2270002060	555	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	19.37	0.027	0.063	0.0064	0.0064	0.0001	0.0064	0.0004
Backhoe/Loader - 420	93	X		6	9	2270002060	46	595.50	2.00	2.08	0.26	0.26	0.0034	0.20	0.012	0.59	1.67	0.006	0.006	0.0007	0.0007	0.0000	0.0006	0.0000
Loader - 980 Wheel	392	X		6	9	2270002060	46	536.28	0.97	2.40	0.14	0.14	0.0031	0.17	0.012	0.59	6.33	0.011	0.028	0.0017	0.0017	0.0000	0.0020	0.0001
Loader - 966 Wheel	262	X		6	9	2270002060	154	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	14.10	0.014	0.042	0.0028	0.0028	0.0001	0.0044	0.0003
Motor Grader - 14M	259	X		6	9	2270002048	131	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	11.85	0.009	0.028	0.0016	0.0016	0.0001	0.0034	0.0003
Trencher - Trencor 1660 HD	800	X		6	9	2270002030	62	535.80	1.69	4.56	0.24	0.24	0.0032	0.32	0.012	0.59	17.20	0.054	0.147	0.0076	0.0076	0.0001	0.0104	0.0004
Crane - 50 Ton Truck	280	X		6	5	2270002045	69	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	4.83	0.003	0.015	0.0007	0.0007	0.0000	0.0015	0.0001
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	60	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	2.41	0.002	0.008	0.0006	0.0006	0.0000	0.0008	0.0001
Ozzie Padder	400	X		6	9	2270002036	100	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	13.99	0.017	0.043	0.0027	0.0027	0.0001	0.0039	0.0003
Drill, Boring mach. 16"-42" (600,000 #)	95	X		7	9	2270002033	234	589.01	2.17	4.03	0.40	0.40	0.0036	0.43	0.012	0.43	6.21	0.023	0.042	0.0042	0.0042	0.0000	0.0045	0.0001
CAT 815 COMPACTOR	200	X		6	9	2270002015	62	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	4.30	0.004	0.013	0.0008	0.0008	0.0000	0.0013	0.0001
Farm Tractor	175	X		6	9	2270002075	85	536.32	0.48	1.42	0.09	0.09	0.0029	0.16	0.012	0.59	5.18	0.005	0.014	0.0009	0.0009	0.0000	0.0015	0.0001
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	0	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Compressor - 1600 CFM	590	X		6	9	2270006015	15	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	2.29	0.004	0.013	0.0006	0.0006	0.0000	0.0009	0.0001
Compressor - 1200 CFM	590	X		6	9	2270006015	15	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	2.29	0.004	0.013	0.0006	0.0006	0.0000	0.0009	0.0001
Compressor - 600 CFM	185	X		6	9	2270006015	116	530.45	0.45	2.05	0.09	0.09	0.0030	0.19	0.012	0.43	5.38	0.005	0.021	0.0009	0.0009	0.0000	0.0019	0.0001
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	116	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	1.46	0.002	0.009	0.0003	0.0003	0.0000	0.0004	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	494	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	1.65	0.007	0.013	0.0010	0.0010	0.0000	0.0013	0.0000
Welders	46	X		6	9	2270006025	1,419	693.43	3.59	4.72	0.58	0.58	0.0043	0.80	0.012	0.21	10.48	0.054	0.071	0.0088	0.0088	0.0001	0.0121	0.0002
Pressure washers	10		X	6	7	2265006030	72	1,046.57	276.86	2.18	0.11	0.11	0.0191	5.09	0.229	0.85	0.71	0.187	0.001	0.0001	0.0001	0.0000	0.0034	0.0002
Generator - 250 KW	433	X		6	9	2270006005	0	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Chain Saw	1		X	6	9	2265004021	417	1,227.52	206.40	2.55	0.31	0.31	0.0224	7.11	0.229	0.40	0.23	0.038	0.000	0.0001	0.0001	0.0000	0.0013	0.0000
Pump - 6-Inch Water	32		X	6	24	2265006010	1,522	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	26.08	0.582	0.063	0.0026	0.0026	0.0005	0.0185	0.0085
Pump - 1500 GPM Fill	32		X	6	8	2265006010	165	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	2.82	0.063	0.007	0.0003	0.0003	0.0001	0.0020	0.0009
Pump - Test	32		X	6	8	2265006010	165	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	2.82	0.063	0.007	0.0003	0.0003	0.0001	0.0020	0.0009
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**
Welding Rig w/ 2 x 300 Amp	45	X		6	9		21,291	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		28.11	0.034	0.085	0.0051	0.0046	0.0002	0.0120	0.0012
Pickup 4 x 4	300		X	6	4		65,983	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		34.27	0.375	0.036	0.0009	0.0008	0.0002	0.0117	0.0062
SUV 4 x 4	250		X	6	4		6,891	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		3.58	0.039	0.004	0.0001	0.0001	0.0000	0.0012	0.0006
Truck, Crewcab, 4x4	400	X		6	4		823	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.09	0.001	0.003	0.0002	0.0002	0.0000	0.0005	0.0000
Suburban	300		X	6	4		103	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.05	0.001	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		1,774	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.34	0.003	0.007	0.0004	0.0004	0.0000	0.0010	0.0001

Table 9D-24
NEXUS Project Construction Equipment Air Emissions - Mainline-Monroe- MP 230.4-236.9

AUT Equipment Unit & 4 Wheel Drive Crew Cab Truck	400	X		6	6		1,234	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.63	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Auto maintenance Truck	300		X	6	4		6,583	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		3.42	0.037	0.004	0.0001	0.0001	0.0000	0.0012	0.0006
Truck - 1 Ton Flatbed	300	X		6	4		309	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.41	0.000	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
Truck - 3 Ton Flatbed	330	X		6	4		7,354	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		9.71	0.012	0.029	0.0017	0.0016	0.0001	0.0042	0.0004
Truck - 6 Ton Flatbed	330	X		6	4		1,749	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.31	0.003	0.007	0.0004	0.0004	0.0000	0.0010	0.0001
Truck - 6 Ton Winch	330	X		6	4		3,034	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.01	0.005	0.012	0.0007	0.0007	0.0000	0.0017	0.0002
Truck - 5 CY Dump	300	X		6	9		810	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.07	0.001	0.003	0.0002	0.0002	0.0000	0.0005	0.0000
Truck - 12 YD Dump	330	X		6	9		4,860	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.42	0.008	0.019	0.0012	0.0011	0.0001	0.0027	0.0003
Truck - Medium Duty Tractor	300	X		6	9		7,174	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		9.47	0.011	0.029	0.0017	0.0016	0.0001	0.0041	0.0004
Truck - Concrete Mixer	350	X		6	9		1,504	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.99	0.002	0.006	0.0004	0.0003	0.0000	0.0009	0.0001
Bus - Minibus	180	X		6	4		566	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.75	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Bus - 26 Passenger	300	X		6	4		2,623	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.46	0.004	0.010	0.0006	0.0006	0.0000	0.0015	0.0001
Bus - 45 Passenger	300	X		6	4		411	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.54	0.001	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Truck, End Dump 12cy	350	X		6	9		3,471	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.58	0.006	0.014	0.0008	0.0008	0.0000	0.0020	0.0002
Truck, Skid	300	X		6	9		694	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.92	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Truck, Stringing Tractor (25 Ton)	300	X		6	9		5,207	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.87	0.008	0.021	0.0012	0.0011	0.0001	0.0029	0.0003
Truck, Tire truck	300	X		6	4		1,800	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.38	0.003	0.007	0.0004	0.0004	0.0000	0.0010	0.0001
Truck, Wrecker truck	300	X		6	4		1,646	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.17	0.003	0.007	0.0004	0.0004	0.0000	0.0009	0.0001

Construction Workers				**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
				2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Worker Commutes				183,413	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		95.25	1.042	0.101	0.0025	0.0022	0.0006	0.0326	0.0171

Deliveries / Removals	**Empty Vehicle Weight (tons)**	**Full Vehicle Weight (tons)**	**Round Trip Distance (miles)**	**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
				2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
On-road delivery vehicles																					
Truck - 4000 Gallon Fuel	13.5	27.5	50.0	3,292	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		4.08	0.005	0.011	0.0006	0.0006	0.0000	0.0017	0.0003
Truck - Fuel/Lube	5.0	10.0	50.0	3,292	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		4.08	0.005	0.011	0.0006	0.0006	0.0000	0.0017	0.0003
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0	3,853	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		4.78	0.005	0.013	0.0008	0.0007	0.0000	0.0020	0.0004
On-road material removal vehicles																					
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0	4,601	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		5.71	0.006	0.015	0.0009	0.0008	0.0000	0.0024	0.0004

Construction Areas		**Disturbed Acreage (acre-months)**	**WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)**								**2017 Emission Totals (Tons)**							
			CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Area under construction (Exposed Soils)		227	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	24.9551	2.4955	NA	NA	NA

Table 9D-25
NEXUS Project Construction Equipment Air Emissions - Mainline-Washtenaw MP237-254.5

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	x		6	9	2270002069	123	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	13.13	0.019	0.047	0.0029	0.0029	0.0001	0.0038	0.0003
Dozer - D8 w/Winch	305	x		6	9	2270002069	771	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	82.07	0.120	0.296	0.0182	0.0182	0.0005	0.0239	0.0019
Dozer - D7 w/Winch	235	x		6	9	2270002069	717	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	58.81	0.046	0.140	0.0084	0.0084	0.0003	0.0168	0.0013
Dozer - D7	235	x		6	9	2270002069	193	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	15.81	0.012	0.038	0.0023	0.0023	0.0001	0.0045	0.0004
Tac rig (Auto) D6	200	x		6	9	2270002069	309	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	21.53	0.017	0.051	0.0031	0.0031	0.0001	0.0062	0.0005
Sideboom - 583	310	x		6	9	2270002069	2,160	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	233.56	0.341	0.842	0.0519	0.0519	0.0013	0.0680	0.0054
Sideboom - 572	240	x		6	9	2270002069	69	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	5.81	0.005	0.014	0.0008	0.0008	0.0000	0.0017	0.0001
Bend Machine - PB 32-42	173	x		6	9	2270002033	147	530.03	1.10	3.87	0.24	0.24	0.0033	0.32	0.012	0.43	6.37	0.013	0.047	0.0029	0.0029	0.0000	0.0038	0.0001
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	663	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	87.94	0.108	0.268	0.0169	0.0169	0.0005	0.0244	0.0020
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	1,041	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	108.98	0.134	0.332	0.0210	0.0210	0.0006	0.0303	0.0025
Backhoe - 325 (1.38 cy)	180	x		6	9	2270002036	1,489	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	93.48	0.056	0.186	0.0097	0.0097	0.0005	0.0253	0.0021
Backhoe - 325 w/Hoe-Ram	180	x		6	9	2270002036	278	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	17.44	0.011	0.035	0.0018	0.0018	0.0001	0.0047	0.0004
Backhoe, 215 / 320 w/hyd. Saw (feller buncher)	140	x		6	9	2270002036	193	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	9.42	0.009	0.021	0.0021	0.0021	0.0001	0.0027	0.0002
Backhoe, 215 / 320 w/hyd. Thumb	140	x		6	9	2270002036	193	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	9.42	0.009	0.021	0.0021	0.0021	0.0001	0.0027	0.0002
Clearing/brushing, Log Skidder	200	x		6	9	2270007015	193	536.38	0.24	0.93	0.04	0.04	0.0027	0.14	0.012	0.59	13.46	0.006	0.023	0.0010	0.0010	0.0001	0.0035	0.0003
Clearing/Brushing, Loader, Brush Cutter Attachment	80	x		6	9	2270007015	193	595.67	1.16	1.25	0.13	0.13	0.0031	0.15	0.012	0.59	5.98	0.012	0.012	0.0014	0.0014	0.0000	0.0015	0.0001
Clearing/brushing, Delimber	140	x		6	9	2270007015	193	536.36	0.42	1.06	0.09	0.09	0.0028	0.15	0.012	0.59	9.42	0.007	0.019	0.0016	0.0016	0.0000	0.0026	0.0002
Clearing/brushing, Loader, Brush Rake Attachment	80	x		6	9	2270007015	386	595.67	1.16	1.25	0.13	0.13	0.0031	0.15	0.012	0.59	11.95	0.023	0.025	0.0027	0.0027	0.0001	0.0030	0.0002
Clearing/brushing, Wood chipper	70	x		6	9	2270007015	193	595.66	1.17	3.06	0.11	0.11	0.0032	0.16	0.012	0.59	5.23	0.010	0.027	0.0010	0.0010	0.0000	0.0014	0.0001
Backhoe/Loader - 430	100	X		6	9	2270002060	1,450	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	50.58	0.070	0.164	0.0166	0.0166	0.0003	0.0168	0.0012
Backhoe/Loader - 420	93	X		6	9	2270002060	123	595.50	2.00	2.08	0.26	0.26	0.0034	0.20	0.012	0.59	4.45	0.015	0.016	0.0020	0.0020	0.0000	0.0015	0.0001
Loader - 980 Wheel	392	X		6	9	2270002060	147	536.28	0.97	2.40	0.14	0.14	0.0031	0.17	0.012	0.59	20.04	0.036	0.090	0.0053	0.0053	0.0001	0.0064	0.0005
Loader - 966 Wheel	262	X		6	9	2270002060	440	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	40.18	0.041	0.120	0.0079	0.0079	0.0002	0.0125	0.0009
Motor Grader - 14M	259	X		6	9	2270002048	347	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	31.36	0.024	0.073	0.0043	0.0043	0.0002	0.0089	0.0007
Trencher - Trencor 1660 HD	800	X		6	9	2270002030	154	535.80	1.69	4.56	0.24	0.24	0.0032	0.32	0.012	0.59	43.01	0.136	0.366	0.0189	0.0189	0.0003	0.0260	0.0010
Crane - 50 Ton Truck	280	X		6	5	2270002045	184	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	12.98	0.009	0.041	0.0018	0.0018	0.0001	0.0041	0.0003
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	163	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	6.55	0.006	0.022	0.0016	0.0016	0.0000	0.0022	0.0002
Ozzie Padder	400	X		6	9	2270002036	293	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	40.90	0.050	0.124	0.0079	0.0079	0.0002	0.0114	0.0009
Drill, Boring mach. 16"-42" (600,000 #)	95	X		7	9	2270002033	594	589.01	2.17	4.03	0.40	0.40	0.0036	0.43	0.012	0.43	15.75	0.058	0.108	0.0106	0.0106	0.0001	0.0114	0.0003
CAT 815 COMPACTOR	200	X		6	9	2270002015	147	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	10.22	0.010	0.031	0.0020	0.0020	0.0001	0.0032	0.0002
Farm Tractor	175	X		6	9	2270002075	224	536.32	0.48	1.42	0.09	0.09	0.0029	0.16	0.012	0.59	13.66	0.012	0.036	0.0023	0.0023	0.0001	0.0040	0.0003
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	0	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Compressor - 1600 CFM	590	X		6	9	2270006015	62	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	9.15	0.014	0.052	0.0023	0.0023	0.0001	0.0035	0.0002
Compressor - 1200 CFM	590	X		6	9	2270006015	62	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	9.15	0.014	0.052	0.0023	0.0023	0.0001	0.0035	0.0002
Compressor - 600 CFM	185	X		6	9	2270006015	301	530.45	0.45	2.05	0.09	0.09	0.0030	0.19	0.012	0.43	13.99	0.012	0.054	0.0025	0.0025	0.0001	0.0049	0.0003
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	301	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	3.78	0.004	0.023	0.0007	0.0007	0.0000	0.0012	0.0001
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	1,234	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	4.13	0.017	0.032	0.0025	0.0025	0.0000	0.0033	0.0001
Welders	46	X		6	9	2270006025	3,657	693.43	3.59	4.72	0.58	0.58	0.0043	0.80	0.012	0.21	27.00	0.140	0.184	0.0227	0.0227	0.0002	0.0313	0.0005
Pressure washers	10		X	6	7	2265006030	192	1,046.57	276.86	2.18	0.11	0.11	0.0191	5.09	0.229	0.85	1.88	0.498	0.004	0.0002	0.0002	0.0000	0.0092	0.0004
Generator - 250 KW	433	X		6	9	2270006005	0	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Chain Saw	1		X	6	9	2265004021	1,157	1,227.52	206.40	2.55	0.31	0.31	0.0224	7.11	0.229	0.40	0.63	0.105	0.001	0.0002	0.0002	0.0000	0.0036	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	3,826	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	65.56	1.463	0.159	0.0064	0.0064	0.0012	0.0464	0.0213
Pump - 1500 GPM Fill	32		X	6	8	2265006010	411	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	7.05	0.157	0.017	0.0007	0.0007	0.0001	0.0050	0.0023
Pump - Test	32		X	6	8	2265006010	411	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	7.05	0.157	0.017	0.0007	0.0007	0.0001	0.0050	0.0023
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**
Welding Rig w/ 2 x 300 Amp	45	X		6	9		54,849	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		72.41	0.088	0.218	0.0130	0.0120	0.0006	0.0310	0.0031
Pickup 4 x 4	300		X	6	4		175,320	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		91.04	0.996	0.097	0.0023	0.0021	0.0006	0.0311	0.0164
SUV 4 x 4	250		X	6	4		18,977	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		9.85	0.108	0.010	0.0003	0.0002	0.0001	0.0034	0.0018
Truck, Crewcab, 4x4	400	X		6	4		2,057	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.72	0.003	0.008	0.0005	0.0004	0.0000	0.0012	0.0001
Suburban	300		X	6	4		309	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.16	0.002	0.000	0.0000	0.0000	0.0000	0.0001	0.0000
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		4,551	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.01	0.007	0.018	0.0011	0.0010	0.0001	0.0026	0.0003

Table 9D-25
NEXUS Project Construction Equipment Air Emissions - Mainline-Washtenaw MP237-254.5

AUT Equipment Unit & 4 Wheel Drive Crew Cab Truck	400	X		6	6		3,086	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.07	0.005	0.012	0.0007	0.0007	0.0000	0.0017	0.0002
Auto maintenance Truck	300		X	6	4		17,691	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		9.19	0.100	0.010	0.0002	0.0002	0.0001	0.0031	0.0017
Truck - 1 Ton Flatbed	300	X		6	4		977	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.29	0.002	0.004	0.0002	0.0002	0.0000	0.0006	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		18,977	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		25.05	0.030	0.075	0.0045	0.0041	0.0002	0.0107	0.0011
Truck - 6 Ton Flatbed	330	X		6	4		4,526	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		5.98	0.007	0.018	0.0011	0.0010	0.0001	0.0026	0.0003
Truck - 6 Ton Winch	330	X		6	4		8,074	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		10.66	0.013	0.032	0.0019	0.0018	0.0001	0.0046	0.0005
Truck - 5 CY Dump	300	X		6	9		2,199	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.90	0.004	0.009	0.0005	0.0005	0.0000	0.0012	0.0001
Truck - 12 YD Dump	330	X		6	9		13,191	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		17.42	0.021	0.052	0.0031	0.0029	0.0002	0.0075	0.0007
Truck - Medium Duty Tractor	300	X		6	9		19,324	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		25.51	0.031	0.077	0.0046	0.0042	0.0002	0.0109	0.0011
Truck - Concrete Mixer	350	X		6	9		3,934	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		5.19	0.006	0.016	0.0009	0.0009	0.0000	0.0022	0.0002
Bus - Minibus	180	X		6	4		1,491	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.97	0.002	0.006	0.0004	0.0003	0.0000	0.0008	0.0001
Bus - 26 Passenger	300	X		6	4		6,943	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		9.17	0.011	0.028	0.0016	0.0015	0.0001	0.0039	0.0004
Bus - 45 Passenger	300	X		6	4		1,029	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.36	0.002	0.004	0.0002	0.0002	0.0000	0.0006	0.0001
Truck, End Dump 12cy	350	X		6	9		10,993	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		14.51	0.018	0.044	0.0026	0.0024	0.0001	0.0062	0.0006
Truck, Skid	300	X		6	9		2,083	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.75	0.003	0.008	0.0005	0.0005	0.0000	0.0012	0.0001
Truck, Stringing Tractor (25 Ton)	300	X		6	9		15,621	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		20.62	0.025	0.062	0.0037	0.0034	0.0002	0.0088	0.0009
Truck, Tire truck	300	X		6	4		4,886	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.45	0.008	0.019	0.0012	0.0011	0.0001	0.0028	0.0003
Truck, Wrecker truck	300	X		6	4		4,423	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		5.84	0.007	0.018	0.0010	0.0010	0.0001	0.0025	0.0002

Construction Workers		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
		2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Worker Commutes		489,230	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		254.06	2.779	0.270	0.0065	0.0058	0.0017	0.0869	0.0457

Deliveries / Removals	**Empty Vehicle Weight (tons)**	**Full Vehicle Weight (tons)**	**Round Trip Distance (miles)**		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
					2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
On-road delivery vehicles																					
Truck - 4000 Gallon Fuel	13.5	27.5	50.0		8,782	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		10.89	0.012	0.029	0.0017	0.0016	0.0001	0.0045	0.0008
Truck - Fuel/Lube	5.0	10.0	50.0		8,782	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		10.89	0.012	0.029	0.0017	0.0016	0.0001	0.0045	0.0008
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		10,278	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		12.75	0.014	0.034	0.0020	0.0018	0.0001	0.0053	0.0010
On-road material removal vehicles																					
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		12,272	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		15.22	0.017	0.041	0.0024	0.0022	0.0001	0.0063	0.0011

Construction Areas	**Disturbed Acreage (acre-months)**	**WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)**									**2017 Emission Totals (Tons)**							
		CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Area under construction (Exposed Soils)	698	NA	NA	NA	0.11	0.01	NA	NA	NA		NA	NA	NA	76.7267	7.6727	NA	NA	NA

Table 9D-26
NEXUS Project Construction Equipment Air Emissions - Maineline-Wayne MP 254.5-255.1

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	x		6	9	2270002069	8	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	0.82	0.001	0.003	0.0002	0.0002	0.0000	0.0002	0.0000
Dozer - D8 w/Winch	305	x		6	9	2270002069	46	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	4.92	0.007	0.018	0.0011	0.0011	0.0000	0.0014	0.0001
Dozer - D7 w/Winch	235	x		6	9	2270002069	15	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	1.26	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Dozer - D7	235	x		6	9	2270002069	8	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	0.63	0.000	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Tac rig (Auto) D6	200	x		6	9	2270002069	15	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	1.08	0.001	0.003	0.0002	0.0002	0.0000	0.0003	0.0000
Sideboom - 583	310	x		6	9	2270002069	123	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	13.35	0.020	0.048	0.0030	0.0030	0.0001	0.0039	0.0003
Sideboom - 572	240	x		6	9	2270002069	8	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	0.65	0.001	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Bend Machine - PB 32-42	173	x		6	9	2270002033	8	530.03	1.10	3.87	0.24	0.24	0.0033	0.32	0.012	0.43	0.34	0.001	0.002	0.0002	0.0002	0.0000	0.0002	0.0000
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	39	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	5.11	0.006	0.016	0.0010	0.0010	0.0000	0.0014	0.0001
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	1,188	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	124.32	0.153	0.378	0.0239	0.0239	0.0007	0.0345	0.0029
Backhoe - 325 (1.38 cy)	180	x		6	9	2270002036	1,227	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	77.01	0.046	0.154	0.0080	0.0080	0.0004	0.0209	0.0018
Backhoe - 325 w/Hoe-Ram	180	x		6	9	2270002036	1,149	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	72.17	0.044	0.144	0.0075	0.0075	0.0004	0.0195	0.0017
Backhoe, 215 / 320 w/hyd. Saw (feller buncher)	140	x		6	9	2270002036	8	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	0.38	0.000	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Backhoe, 215 / 320 w/hyd. Thumb	140	x		6	9	2270002036	8	536.34	0.51	1.20	0.12	0.12	0.0029	0.15	0.012	0.59	0.38	0.000	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Clearing/brushing, Log Skidder	200	x		6	9	2270007015	8	536.38	0.24	0.93	0.04	0.04	0.0027	0.14	0.012	0.59	0.54	0.000	0.001	0.0000	0.0000	0.0000	0.0001	0.0000
Clearing/Brushing, Loader, Brush Cutter Attachment	80	x		6	9	2270007015	8	595.67	1.16	1.25	0.13	0.13	0.0031	0.15	0.012	0.59	0.24	0.000	0.000	0.0001	0.0001	0.0000	0.0001	0.0000
Clearing/brushing, Delimber	140	x		6	9	2270007015	8	536.36	0.42	1.06	0.09	0.09	0.0028	0.15	0.012	0.59	0.38	0.000	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Clearing/brushing, Loader, Brush Rake Attachment	80	x		6	9	2270007015	15	595.67	1.16	1.25	0.13	0.13	0.0031	0.15	0.012	0.59	0.48	0.001	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Clearing/brushing, Wood chipper	70	x		6	9	2270007015	8	595.66	1.17	3.06	0.11	0.11	0.0032	0.16	0.012	0.59	0.21	0.000	0.001	0.0000	0.0000	0.0000	0.0001	0.0000
Backhoe/Loader - 430	100	X		6	9	2270002060	1,157	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	40.36	0.055	0.131	0.0133	0.0133	0.0002	0.0134	0.0009
Backhoe/Loader - 420	93	X		6	9	2270002060	8	595.50	2.00	2.08	0.26	0.26	0.0034	0.20	0.012	0.59	0.28	0.001	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Loader - 980 Wheel	392	X		6	9	2270002060	8	536.28	0.97	2.40	0.14	0.14	0.0031	0.17	0.012	0.59	1.05	0.002	0.005	0.0003	0.0003	0.0000	0.0003	0.0000
Loader - 966 Wheel	262	X		6	9	2270002060	23	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	2.11	0.002	0.006	0.0004	0.0004	0.0000	0.0007	0.0000
Motor Grader - 14M	259	X		6	9	2270002048	15	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	1.39	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Trencher - Trencor 1660 HD	800	X		6	9	2270002030	8	535.80	1.69	4.56	0.24	0.24	0.0032	0.32	0.012	0.59	2.15	0.007	0.018	0.0009	0.0009	0.0000	0.0013	0.0000
Crane - 50 Ton Truck	280	X		6	5	2270002045	13	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	0.91	0.001	0.003	0.0001	0.0001	0.0000	0.0003	0.0000
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	639	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	25.69	0.024	0.088	0.0061	0.0061	0.0001	0.0086	0.0006
Ozzie Padder	400	X		6	9	2270002036	15	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	2.15	0.003	0.007	0.0004	0.0004	0.0000	0.0006	0.0000
Drill, Boring mach. 16"-42" (600,000 #)	95	X		7	9	2270002033	1,368	589.01	2.17	4.03	0.40	0.40	0.0036	0.43	0.012	0.43	36.28	0.134	0.248	0.0245	0.0245	0.0002	0.0262	0.0008
CAT 815 COMPACTOR	200	X		6	9	2270002015	8	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	0.54	0.001	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Farm Tractor	175	X		6	9	2270002075	8	536.32	0.48	1.42	0.09	0.09	0.0029	0.16	0.012	0.59	0.47	0.000	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	0	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Compressor - 1600 CFM	590	X		6	9	2270006015	15	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	2.29	0.004	0.013	0.0006	0.0006	0.0000	0.0009	0.0001
Compressor - 1200 CFM	590	X		6	9	2270006015	15	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	2.29	0.004	0.013	0.0006	0.0006	0.0000	0.0009	0.0001
Compressor - 600 CFM	185	X		6	9	2270006015	15	530.45	0.45	2.05	0.09	0.09	0.0030	0.19	0.012	0.43	0.72	0.001	0.003	0.0001	0.0001	0.0000	0.0003	0.0000
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	1,149	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	14.46	0.016	0.088	0.0027	0.0027	0.0001	0.0044	0.0003
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	82	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	0.28	0.001	0.002	0.0002	0.0002	0.0000	0.0002	0.0000
Welders	46	X		6	9	2270006025	2,469	693.43	3.59	4.72	0.58	0.58	0.0043	0.80	0.012	0.21	18.23	0.094	0.124	0.0153	0.0153	0.0001	0.0211	0.0003
Pressure washers	10		X	6	7	2265006030	12	1,046.57	276.86	2.18	0.11	0.11	0.0191	5.09	0.229	0.85	0.12	0.031	0.000	0.0000	0.0000	0.0000	0.0006	0.0000
Generator - 250 KW	433	X		6	9	2270006005	0	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	0.00	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Chain Saw	1		X	6	9	2265004021	46	1,227.52	206.40	2.55	0.31	0.31	0.0224	7.11	0.229	0.40	0.03	0.004	0.000	0.0000	0.0000	0.0000	0.0001	0.0000
Pump - 6-Inch Water	32		X	6	24	2265006010	247	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	4.23	0.094	0.010	0.0004	0.0004	0.0001	0.0030	0.0014
Pump - 1500 GPM Fill	32		X	6	8	2265006010	1,035	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	17.74	0.396	0.043	0.0017	0.0017	0.0003	0.0126	0.0058
Pump - Test	32		X	6	8	2265006010	1,035	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	17.74	0.396	0.043	0.0017	0.0017	0.0003	0.0126	0.0058
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAPs**
Welding Rig w/ 2 x 300 Amp	45	X		6	9		37,029	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		48.89	0.059	0.147	0.0088	0.0081	0.0004	0.0209	0.0021
Pickup 4 x 4	300		X	6	4		36,771	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		19.10	0.209	0.020	0.0005	0.0004	0.0001	0.0065	0.0034
SUV 4 x 4	250		X	6	4		874	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.45	0.005	0.000	0.0000	0.0000	0.0000	0.0002	0.0001
Truck, Crewcab, 4x4	400	X		6	4		103	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.14	0.000	0.000	0.0000	0.0000	0.0000	0.0001	0.0000
Suburban	300		X	6	4		103	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.05	0.001	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		11,494	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		15.18	0.018	0.046	0.0027	0.0025	0.0001	0.0065	0.0006

Table 9D-26
NEXUS Project Construction Equipment Air Emissions - Maineline-Wayne MP 254.5-255.1

AUT Equipment Unit & 4 Wheel Drive Crew Cab Truck	400	X		6	6		11,340	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		14.97	0.018	0.045	0.0027	0.0025	0.0001	0.0064	0.0006
Auto maintenance Truck	300		X	6	4		617	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.32	0.004	0.000	0.0000	0.0000	0.0000	0.0001	0.0001
Truck - 1 Ton Flatbed	300	X		6	4		51	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.07	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Truck - 3 Ton Flatbed	330	X		6	4		823	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.09	0.001	0.003	0.0002	0.0002	0.0000	0.0005	0.0000
Truck - 6 Ton Flatbed	330	X		6	4		257	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.34	0.000	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Truck - 6 Ton Winch	330	X		6	4		360	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.48	0.001	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
Truck - 5 CY Dump	300	X		6	9		116	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.15	0.000	0.000	0.0000	0.0000	0.0000	0.0001	0.0000
Truck - 12 YD Dump	330	X		6	9		17,704	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		23.37	0.028	0.070	0.0042	0.0039	0.0002	0.0100	0.0010
Truck - Medium Duty Tractor	300	X		6	9		34,946	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		46.14	0.056	0.139	0.0083	0.0076	0.0004	0.0198	0.0019
Truck - Concrete Mixer	350	X		6	9		17,241	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		22.76	0.028	0.069	0.0041	0.0038	0.0002	0.0098	0.0010
Bus - Minibus	180	X		6	4		103	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.14	0.000	0.000	0.0000	0.0000	0.0000	0.0001	0.0000
Bus - 26 Passenger	300	X		6	4		360	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.48	0.001	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
Bus - 45 Passenger	300	X		6	4		51	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.07	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Truck, End Dump 12cy	350	X		6	9		579	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.76	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck, Skid	300	X		6	9		231	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.31	0.000	0.001	0.0001	0.0001	0.0000	0.0001	0.0000
Truck, Stringing Tractor (25 Ton)	300	X		6	9		18,630	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		24.60	0.030	0.074	0.0044	0.0041	0.0002	0.0105	0.0010
Truck, Tire truck	300	X		6	4		206	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.27	0.000	0.001	0.0000	0.0000	0.0000	0.0001	0.0000
Truck, Wrecker truck	300	X		6	4		154	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.20	0.000	0.001	0.0000	0.0000	0.0000	0.0001	0.0000

Construction Workers				**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
				2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Worker Commutes				16,686	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		8.66	0.095	0.009	0.0002	0.0002	0.0001	0.0030	0.0016

Deliveries / Removals	**Empty Vehicle Weight (tons)**	**Full Vehicle Weight (tons)**	**Round Trip Distance (miles)**		**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**								**2017 Emission Totals (Tons)**							
					2017	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**		**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
On-road delivery vehicles																					
Truck - 4000 Gallon Fuel	13.5	27.5	50.0		300	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		0.37	0.000	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
Truck - Fuel/Lube	5.0	10.0	50.0		300	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		0.37	0.000	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
Heavy duty diesel vehicles (>6,000 lb GVW)	12	30	50		351	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		0.43	0.000	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
On-road material removal vehicles																					
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0		419	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		0.52	0.001	0.001	0.0001	0.0001	0.0000	0.0002	0.0000

Construction Areas		**Disturbed Acreage (acre-months)**	**WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)**								**2017 Emission Totals (Tons)**							
			CO2	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**	**CO2**	**CO**	**NOx**	**PM10**	**PM25**	**SO2**	**VOC**	**HAP**
Area under construction (Exposed Soils)		32	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	3.5508	0.3551	NA	NA	NA

Table 9D-27
NEXUS Project Construction Equipment Air Emissions - Columbiana Co. MP 7.7 HDD

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	x		6	9	2270002069	108	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	8.85	0.007	0.021	0.0013	0.0013	0.0000	0.0025	0.0002
Sideboom - 583	310	x		6	9	2270002069	154	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	16.68	0.024	0.060	0.0037	0.0037	0.0001	0.0049	0.0004
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	108	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	14.32	0.018	0.044	0.0028	0.0028	0.0001	0.0040	0.0003
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	154	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	16.15	0.020	0.049	0.0031	0.0031	0.0001	0.0045	0.0004
Crane - 50 Ton Truck	280	X		6	5	2270002045	90	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	6.34	0.004	0.020	0.0009	0.0009	0.0000	0.0020	0.0001
HDD Machine	1200	X		7	24	2270002033	264	529.85	1.39	5.36	0.23	0.23	0.0032	0.37	0.012	0.43	79.56	0.209	0.804	0.0339	0.0339	0.0005	0.0560	0.0018
Nonroad Industrial Equipment																								
Compressor - 365 CFM	105	X		6	9	2270006015	77	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	2.04	0.002	0.009	0.0006	0.0006	0.0000	0.0008	0.0000
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	77	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.97	0.001	0.006	0.0002	0.0002	0.0000	0.0003	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	1,029	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	3.45	0.014	0.027	0.0021	0.0021	0.0000	0.0028	0.0001
Pressure washers	10		X	6	7	2265006030	48	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.47	0.125	0.001	0.0001	0.0001	0.0000	0.0023	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	453	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	7.75	0.173	0.019	0.0008	0.0008	0.0001	0.0055	0.0025
Pump - 2-Inch Water	10		X	6	24	2265006010	823	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	6.55	1.739	0.013	0.0007	0.0007	0.0001	0.0318	0.0014
Pump - 1500 GPM Fill	32		X	6	24	2265006010	370	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	6.34	0.142	0.015	0.0006	0.0006	0.0001	0.0045	0.0021
Pump - Test	32		X	6	6	2265006010	93	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	1.59	0.035	0.004	0.0002	0.0002	0.0000	0.0011	0.0005
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		2,314	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.06	0.004	0.009	0.0005	0.0005	0.0000	0.0013	0.0001
Pickup 4 x 4	300		X	6	4		4,526	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.35	0.026	0.002	0.0001	0.0001	0.0000	0.0008	0.0004
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		771	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.02	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Auto maintenance Truck	300		X	6	4		1,286	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.67	0.007	0.001	0.0000	0.0000	0.0000	0.0002	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		977	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.29	0.002	0.004	0.0002	0.0002	0.0000	0.0006	0.0001
Truck - Mechanic Rig H.D.	300	X		6	4		566	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.75	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck - 12 YD Dump	330	X		6	9		2,083	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.75	0.003	0.008	0.0005	0.0005	0.0000	0.0012	0.0001
Truck - Medium Duty Tractor	300	X		6	9		2,430	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.21	0.004	0.010	0.0006	0.0005	0.0000	0.0014	0.0001
Hydro vac truck	350	X		6	4		1,029	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.36	0.002	0.004	0.0002	0.0002	0.0000	0.0006	0.0001

Table 9D-28
NEXUS Project Construction Equipment Air Emissions - Summit Co. Nimisila HDD

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	x		6	9	2270002069	108	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	8.85	0.007	0.021	0.0013	0.0013	0.0000	0.0025	0.0002
Sideboom - 583	310	x		6	9	2270002069	154	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	16.68	0.024	0.060	0.0037	0.0037	0.0001	0.0049	0.0004
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	100	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	13.29	0.016	0.040	0.0026	0.0026	0.0001	0.0037	0.0003
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	177	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	18.57	0.023	0.056	0.0036	0.0036	0.0001	0.0052	0.0004
Crane - 50 Ton Truck	280	X		6	5	2270002045	90	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	6.34	0.004	0.020	0.0009	0.0009	0.0000	0.0020	0.0001
HDD Machine	1200	X		7	24	2270002033	336	529.85	1.39	5.36	0.23	0.23	0.0032	0.37	0.012	0.43	101.26	0.266	1.024	0.0432	0.0432	0.0006	0.0713	0.0024
Nonroad Industrial Equipment																								
Compressor - 365 CFM	105	X		6	9	2270006015	77	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	2.04	0.002	0.009	0.0006	0.0006	0.0000	0.0008	0.0000
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	77	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.97	0.001	0.006	0.0002	0.0002	0.0000	0.0003	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	1,111	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	3.72	0.015	0.029	0.0022	0.0022	0.0000	0.0030	0.0001
Pressure washers	10		X	6	7	2265006030	48	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.47	0.125	0.001	0.0001	0.0001	0.0000	0.0023	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	741	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	12.69	0.284	0.030	0.0012	0.0012	0.0002	0.0089	0.0041
Pump - 2-Inch Water	10		X	6	24	2265006010	946	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	7.53	1.999	0.015	0.0008	0.0008	0.0001	0.0366	0.0016
Pump - 1500 GPM Fill	32		X	6	24	2265006010	309	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	5.29	0.118	0.013	0.0005	0.0005	0.0001	0.0037	0.0017
Pump - Test	32		X	6	6	2265006010	77	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	1.32	0.030	0.003	0.0001	0.0001	0.0000	0.0009	0.0004
On-road construction vehicles							Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)									2017 Emission Totals (Tons)							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		2,314	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.06	0.004	0.009	0.0005	0.0005	0.0000	0.0013	0.0001
Pickup 4 x 4	300		X	6	4		5,349	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.78	0.030	0.003	0.0001	0.0001	0.0000	0.0009	0.0005
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		771	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.02	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Auto maintenance Truck	300		X	6	4		926	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.48	0.005	0.001	0.0000	0.0000	0.0000	0.0002	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		977	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.29	0.002	0.004	0.0002	0.0002	0.0000	0.0006	0.0001
Truck - Mechanic Rig H.D.	300	X		6	4		720	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.95	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Truck - 12 YD Dump	330	X		6	9		2,083	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.75	0.003	0.008	0.0005	0.0005	0.0000	0.0012	0.0001
Truck - Medium Duty Tractor	300	X		6	9		2,661	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.51	0.004	0.011	0.0006	0.0006	0.0000	0.0015	0.0001
Hydro vac truck	350	X		6	4		1,183	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.56	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001

Table 9D-29
NEXUS Project Construction Equipment Air Emissions - Summit Co. Tuscarawas HDD

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	x		6	9	2270002069	100	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	8.22	0.006	0.020	0.0012	0.0012	0.0000	0.0023	0.0002
Sideboom - 583	310	x		6	9	2270002069	154	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	16.68	0.024	0.060	0.0037	0.0037	0.0001	0.0049	0.0004
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	100	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	13.29	0.016	0.040	0.0026	0.0026	0.0001	0.0037	0.0003
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	170	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	17.76	0.022	0.054	0.0034	0.0034	0.0001	0.0049	0.0004
Crane - 50 Ton Truck	280	X		6	5	2270002045	90	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	6.34	0.004	0.020	0.0009	0.0009	0.0000	0.0020	0.0001
HDD Machine	1200	X		7	24	2270002033	336	529.85	1.39	5.36	0.23	0.23	0.0032	0.37	0.012	0.43	101.26	0.266	1.024	0.0432	0.0432	0.0006	0.0713	0.0024
Nonroad Industrial Equipment																								
Compressor - 365 CFM	105	X		6	9	2270006015	77	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	2.04	0.002	0.009	0.0006	0.0006	0.0000	0.0008	0.0000
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	77	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.97	0.001	0.006	0.0002	0.0002	0.0000	0.0003	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	1,152	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	3.86	0.016	0.030	0.0023	0.0023	0.0000	0.0031	0.0001
Pressure washers	10		X	6	7	2265006030	48	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.47	0.125	0.001	0.0001	0.0001	0.0000	0.0023	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	699	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	11.98	0.268	0.029	0.0012	0.0012	0.0002	0.0084	0.0039
Pump - 2-Inch Water	10		X	6	24	2265006010	823	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	6.55	1.739	0.013	0.0007	0.0007	0.0001	0.0318	0.0014
Pump - 1500 GPM Fill	32		X	6	24	2265006010	267	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	4.58	0.102	0.011	0.0004	0.0004	0.0001	0.0032	0.0015
Pump - Test	32		X	6	6	2265006010	67	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	1.15	0.026	0.003	0.0001	0.0001	0.0000	0.0008	0.0004
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		2,314	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.06	0.004	0.009	0.0005	0.0005	0.0000	0.0013	0.0001
Pickup 4 x 4	300		X	6	4		4,937	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.56	0.028	0.003	0.0001	0.0001	0.0000	0.0009	0.0005
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		771	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.02	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Auto maintenance Truck	300		X	6	4		1,234	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.64	0.007	0.001	0.0000	0.0000	0.0000	0.0002	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		977	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.29	0.002	0.004	0.0002	0.0002	0.0000	0.0006	0.0001
Truck - Mechanic Rig H.D.	300	X		6	4		720	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.95	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Truck - 12 YD Dump	330	X		6	9		2,083	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.75	0.003	0.008	0.0005	0.0005	0.0000	0.0012	0.0001
Truck - Medium Duty Tractor	300	X		6	9		2,661	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.51	0.004	0.011	0.0006	0.0006	0.0000	0.0015	0.0001
Hydro vac truck	350	X		6	4		1,029	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.36	0.002	0.004	0.0002	0.0002	0.0000	0.0006	0.0001

Table 9D-30
NEXUS Project Construction Equipment Air Emissions - Medina Co. MP70.4 HDD

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	x		6	9	2270002069	116	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	9.49	0.007	0.023	0.0014	0.0014	0.0001	0.0027	0.0002
Sideboom - 583	310	x		6	9	2270002069	154	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	16.68	0.024	0.060	0.0037	0.0037	0.0001	0.0049	0.0004
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	116	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	15.34	0.019	0.047	0.0030	0.0030	0.0001	0.0043	0.0004
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	108	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	11.30	0.014	0.034	0.0022	0.0022	0.0001	0.0031	0.0003
Crane - 50 Ton Truck	280	X		6	5	2270002045	81	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	5.73	0.004	0.018	0.0008	0.0008	0.0000	0.0018	0.0001
HDD Machine	1200	X		7	24	2270002033	192	529.85	1.39	5.36	0.23	0.23	0.0032	0.37	0.012	0.43	57.86	0.152	0.585	0.0247	0.0247	0.0004	0.0407	0.0013
Nonroad Industrial Equipment																								
Compressor - 365 CFM	105	X		6	9	2270006015	39	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	1.02	0.001	0.004	0.0003	0.0003	0.0000	0.0004	0.0000
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	39	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.49	0.001	0.003	0.0001	0.0001	0.0000	0.0001	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	658	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	2.20	0.009	0.017	0.0013	0.0013	0.0000	0.0018	0.0000
Pressure washers	10		X	6	7	2265006030	72	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.71	0.187	0.001	0.0001	0.0001	0.0000	0.0034	0.0002
Pump - 6-Inch Water	32		X	6	24	2265006010	514	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	8.81	0.197	0.021	0.0009	0.0009	0.0002	0.0062	0.0029
Pump - 2-Inch Water	10		X	6	24	2265006010	576	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	4.58	1.217	0.009	0.0005	0.0005	0.0001	0.0223	0.0010
Pump - 1500 GPM Fill	32		X	6	24	2265006010	206	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	3.52	0.079	0.008	0.0003	0.0003	0.0001	0.0025	0.0011
Pump - Test	32		X	6	6	2265006010	51	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	0.88	0.020	0.002	0.0001	0.0001	0.0000	0.0006	0.0003
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		1,157	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.53	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Pickup 4 x 4	300		X	6	4		3,189	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		1.66	0.018	0.002	0.0000	0.0000	0.0000	0.0006	0.0003
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		386	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.51	0.001	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Auto maintenance Truck	300		X	6	4		1,029	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.53	0.006	0.001	0.0000	0.0000	0.0000	0.0002	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		926	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.22	0.001	0.004	0.0002	0.0002	0.0000	0.0005	0.0001
Truck - Mechanic Rig H.D.	300	X		6	4		411	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.54	0.001	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Truck - 12 YD Dump	330	X		6	9		2,083	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.75	0.003	0.008	0.0005	0.0005	0.0000	0.0012	0.0001
Truck - Medium Duty Tractor	300	X		6	9		1,967	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.60	0.003	0.008	0.0005	0.0004	0.0000	0.0011	0.0001
Hydro vac truck	350	X		6	4		720	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.95	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000

Table 9D-31
NEXUS Project Construction Equipment Air Emissions - Lorain Co. East Branch HDD

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	x		6	9	2270002069	93	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	7.59	0.006	0.018	0.0011	0.0011	0.0000	0.0022	0.0002
Sideboom - 583	310	x		6	9	2270002069	93	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	10.01	0.015	0.036	0.0022	0.0022	0.0001	0.0029	0.0002
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	93	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	12.27	0.015	0.037	0.0024	0.0024	0.0001	0.0034	0.0003
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	170	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	17.76	0.022	0.054	0.0034	0.0034	0.0001	0.0049	0.0004
Crane - 50 Ton Truck	280	X		6	5	2270002045	90	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	6.34	0.004	0.020	0.0009	0.0009	0.0000	0.0020	0.0001
HDD Machine	1200	X		7	24	2270002033	312	529.85	1.39	5.36	0.23	0.23	0.0032	0.37	0.012	0.43	94.03	0.247	0.951	0.0401	0.0401	0.0006	0.0662	0.0022
Nonroad Industrial Equipment																								
Compressor - 365 CFM	105	X		6	9	2270006015	39	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	1.02	0.001	0.004	0.0003	0.0003	0.0000	0.0004	0.0000
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	39	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.49	0.001	0.003	0.0001	0.0001	0.0000	0.0001	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	1,029	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	3.45	0.014	0.027	0.0021	0.0021	0.0000	0.0028	0.0001
Pressure washers	10		X	6	7	2265006030	36	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.35	0.094	0.001	0.0000	0.0000	0.0000	0.0017	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	699	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	11.98	0.268	0.029	0.0012	0.0012	0.0002	0.0084	0.0039
Pump - 2-Inch Water	10		X	6	24	2265006010	905	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	7.20	1.912	0.014	0.0008	0.0008	0.0001	0.0350	0.0016
Pump - 1500 GPM Fill	32		X	6	24	2265006010	309	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	5.29	0.118	0.013	0.0005	0.0005	0.0001	0.0037	0.0017
Pump - Test	32		X	6	6	2265006010	77	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	1.32	0.030	0.003	0.0001	0.0001	0.0000	0.0009	0.0004
On-road construction vehicles							Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)									2017 Emission Totals (Tons)							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		1,157	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.53	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Pickup 4 x 4	300		X	6	4		4,320	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.24	0.025	0.002	0.0001	0.0001	0.0000	0.0008	0.0004
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		386	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.51	0.001	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Auto maintenance Truck	300		X	6	4		1,286	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.67	0.007	0.001	0.0000	0.0000	0.0000	0.0002	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		771	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.02	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Truck - Mechanic Rig H.D.	300	X		6	4		669	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.88	0.001	0.003	0.0002	0.0001	0.0000	0.0004	0.0000
Truck - 12 YD Dump	330	X		6	9		2,083	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.75	0.003	0.008	0.0005	0.0005	0.0000	0.0012	0.0001
Truck - Medium Duty Tractor	300	X		6	9		1,967	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.60	0.003	0.008	0.0005	0.0004	0.0000	0.0011	0.0001
Hydro vac truck	350	X		6	4		1,131	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.49	0.002	0.004	0.0003	0.0002	0.0000	0.0006	0.0001

Table 9D-32
NEXUS Project Construction Equipment Air Emissions - Lorain Co. West Branch HDD

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	x		6	9	2270002069	93	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	7.59	0.006	0.018	0.0011	0.0011	0.0000	0.0022	0.0002
Sideboom - 583	310	x		6	9	2270002069	77	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	8.34	0.012	0.030	0.0019	0.0019	0.0000	0.0024	0.0002
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	93	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	12.27	0.015	0.037	0.0024	0.0024	0.0001	0.0034	0.0003
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	170	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	17.76	0.022	0.054	0.0034	0.0034	0.0001	0.0049	0.0004
Crane - 50 Ton Truck	280	X		6	5	2270002045	86	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	6.03	0.004	0.019	0.0009	0.0009	0.0000	0.0019	0.0001
HDD Machine	1200	X		7	24	2270002033	312	529.85	1.39	5.36	0.23	0.23	0.0032	0.37	0.012	0.43	94.03	0.247	0.951	0.0401	0.0401	0.0006	0.0662	0.0022
Nonroad Industrial Equipment																								
Compressor - 365 CFM	105	X		6	9	2270006015	39	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	1.02	0.001	0.004	0.0003	0.0003	0.0000	0.0004	0.0000
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	39	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.49	0.001	0.003	0.0001	0.0001	0.0000	0.0001	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	1,029	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	3.45	0.014	0.027	0.0021	0.0021	0.0000	0.0028	0.0001
Pressure washers	10		X	6	7	2265006030	36	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.35	0.094	0.001	0.0000	0.0000	0.0000	0.0017	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	699	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	11.98	0.268	0.029	0.0012	0.0012	0.0002	0.0084	0.0039
Pump - 2-Inch Water	10		X	6	24	2265006010	864	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	6.88	1.825	0.014	0.0008	0.0008	0.0001	0.0334	0.0015
Pump - 1500 GPM Fill	32		X	6	24	2265006010	309	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	5.29	0.118	0.013	0.0005	0.0005	0.0001	0.0037	0.0017
Pump - Test	32		X	6	6	2265006010	77	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	1.32	0.030	0.003	0.0001	0.0001	0.0000	0.0009	0.0004
On-road construction vehicles							Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)									2017 Emission Totals (Tons)							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		926	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.22	0.001	0.004	0.0002	0.0002	0.0000	0.0005	0.0001
Pickup 4 x 4	300		X	6	4		4,217	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.19	0.024	0.002	0.0001	0.0000	0.0000	0.0007	0.0004
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		309	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.41	0.000	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
Auto maintenance Truck	300		X	6	4		1,286	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.67	0.007	0.001	0.0000	0.0000	0.0000	0.0002	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		771	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.02	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Truck - Mechanic Rig H.D.	300	X		6	4		669	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.88	0.001	0.003	0.0002	0.0001	0.0000	0.0004	0.0000
Truck - 12 YD Dump	330	X		6	9		2,083	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.75	0.003	0.008	0.0005	0.0005	0.0000	0.0012	0.0001
Truck - Medium Duty Tractor	300	X		6	9		1,967	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.60	0.003	0.008	0.0005	0.0004	0.0000	0.0011	0.0001
Hydro vac truck	350	X		6	4		1,131	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.49	0.002	0.004	0.0003	0.0002	0.0000	0.0006	0.0001

Table 9D-33
NEXUS Project Construction Equipment Air Emissions - Huron Co. Vermillion HDD

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	x		6	9	2270002069	93	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	7.59	0.006	0.018	0.0011	0.0011	0.0000	0.0022	0.0002
Sideboom - 583	310	x		6	9	2270002069	62	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	6.67	0.010	0.024	0.0015	0.0015	0.0000	0.0019	0.0002
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	93	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	12.27	0.015	0.037	0.0024	0.0024	0.0001	0.0034	0.0003
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	147	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	15.34	0.019	0.047	0.0030	0.0030	0.0001	0.0043	0.0004
Crane - 50 Ton Truck	280	X		6	5	2270002045	77	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	5.43	0.004	0.017	0.0008	0.0008	0.0000	0.0017	0.0001
HDD Machine	1200	X		7	24	2270002033	216	529.85	1.39	5.36	0.23	0.23	0.0032	0.37	0.012	0.43	65.10	0.171	0.658	0.0278	0.0278	0.0004	0.0458	0.0015
Nonroad Industrial Equipment																								
Compressor - 365 CFM	105	X		6	9	2270006015	31	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	0.81	0.001	0.003	0.0002	0.0002	0.0000	0.0003	0.0000
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	31	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.39	0.000	0.002	0.0001	0.0001	0.0000	0.0001	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	741	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	2.48	0.010	0.019	0.0015	0.0015	0.0000	0.0020	0.0001
Pressure washers	10		X	6	7	2265006030	36	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.35	0.094	0.001	0.0000	0.0000	0.0000	0.0017	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	555	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	9.52	0.213	0.023	0.0009	0.0009	0.0002	0.0067	0.0031
Pump - 2-Inch Water	10		X	6	24	2265006010	741	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	5.89	1.565	0.012	0.0007	0.0007	0.0001	0.0287	0.0013
Pump - 1500 GPM Fill	32		X	6	24	2265006010	226	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	3.88	0.087	0.009	0.0004	0.0004	0.0001	0.0027	0.0013
Pump - Test	32		X	6	6	2265006010	57	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	0.97	0.022	0.002	0.0001	0.0001	0.0000	0.0007	0.0003
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		926	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.22	0.001	0.004	0.0002	0.0002	0.0000	0.0005	0.0001
Pickup 4 x 4	300		X	6	4		3,291	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		1.71	0.019	0.002	0.0000	0.0000	0.0000	0.0006	0.0003
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		309	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.41	0.000	0.001	0.0001	0.0001	0.0000	0.0002	0.0000
Auto maintenance Truck	300		X	6	4		1,080	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.56	0.006	0.001	0.0000	0.0000	0.0000	0.0002	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		771	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.02	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Truck - Mechanic Rig H.D.	300	X		6	4		463	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.61	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck - 12 YD Dump	330	X		6	9		2,083	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.75	0.003	0.008	0.0005	0.0005	0.0000	0.0012	0.0001
Truck - Medium Duty Tractor	300	X		6	9		1,851	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.44	0.003	0.007	0.0004	0.0004	0.0000	0.0010	0.0001
Hydro vac truck	350	X		6	4		926	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.22	0.001	0.004	0.0002	0.0002	0.0000	0.0005	0.0001

Table 9D-34
NEXUS Project Construction Equipment Air Emissions - Erie Co. I80 HDD

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	x		6	9	2270002069	100	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	8.22	0.006	0.020	0.0012	0.0012	0.0000	0.0023	0.0002
Sideboom - 583	310	x		6	9	2270002069	170	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	18.35	0.027	0.066	0.0041	0.0041	0.0001	0.0053	0.0004
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	100	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	13.29	0.016	0.040	0.0026	0.0026	0.0001	0.0037	0.0003
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	162	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	16.95	0.021	0.052	0.0033	0.0033	0.0001	0.0047	0.0004
Crane - 50 Ton Truck	280	X		6	5	2270002045	90	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	6.34	0.004	0.020	0.0009	0.0009	0.0000	0.0020	0.0001
HDD Machine	1200	X		7	24	2270002033	288	529.85	1.39	5.36	0.23	0.23	0.0032	0.37	0.012	0.43	86.79	0.228	0.878	0.0370	0.0370	0.0005	0.0611	0.0020
Nonroad Industrial Equipment																								
Compressor - 365 CFM	105	X		6	9	2270006015	85	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	2.24	0.002	0.009	0.0006	0.0006	0.0000	0.0009	0.0001
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	85	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	1.07	0.001	0.006	0.0002	0.0002	0.0000	0.0003	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	987	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	3.31	0.013	0.026	0.0020	0.0020	0.0000	0.0027	0.0001
Pressure washers	10		X	6	7	2265006030	48	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.47	0.125	0.001	0.0001	0.0001	0.0000	0.0023	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	679	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	11.63	0.260	0.028	0.0011	0.0011	0.0002	0.0082	0.0038
Pump - 2-Inch Water	10		X	6	24	2265006010	864	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	6.88	1.825	0.014	0.0008	0.0008	0.0001	0.0334	0.0015
Pump - 1500 GPM Fill	32		X	6	24	2265006010	288	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	4.93	0.110	0.012	0.0005	0.0005	0.0001	0.0035	0.0016
Pump - Test	32		X	6	6	2265006010	72	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	1.23	0.028	0.003	0.0001	0.0001	0.0000	0.0009	0.0004
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		2,546	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.36	0.004	0.010	0.0006	0.0006	0.0000	0.0014	0.0001
Pickup 4 x 4	300		X	6	4		4,629	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.40	0.026	0.003	0.0001	0.0001	0.0000	0.0008	0.0004
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		849	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.12	0.001	0.003	0.0002	0.0002	0.0000	0.0005	0.0000
Auto maintenance Truck	300		X	6	4		1,286	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.67	0.007	0.001	0.0000	0.0000	0.0000	0.0002	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		771	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.02	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Truck - Mechanic Rig H.D.	300	X		6	4		617	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.81	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck - 12 YD Dump	330	X		6	9		2,083	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.75	0.003	0.008	0.0005	0.0005	0.0000	0.0012	0.0001
Truck - Medium Duty Tractor	300	X		6	9		2,777	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.67	0.004	0.011	0.0007	0.0006	0.0000	0.0016	0.0002
Hydro vac truck	350	X		6	4		1,080	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.43	0.002	0.004	0.0003	0.0002	0.0000	0.0006	0.0001

Table 9D-35
NEXUS Project Construction Equipment Air Emissions - Erie Co. Huron Rv. HDD

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	x		6	9	2270002069	100	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	8.22	0.006	0.020	0.0012	0.0012	0.0000	0.0023	0.0002
Sideboom - 583	310	x		6	9	2270002069	93	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	10.01	0.015	0.036	0.0022	0.0022	0.0001	0.0029	0.0002
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	100	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	13.29	0.016	0.040	0.0026	0.0026	0.0001	0.0037	0.0003
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	162	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	16.95	0.021	0.052	0.0033	0.0033	0.0001	0.0047	0.0004
Crane - 50 Ton Truck	280	X		6	5	2270002045	90	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	6.34	0.004	0.020	0.0009	0.0009	0.0000	0.0020	0.0001
HDD Machine	1200	X		7	24	2270002033	288	529.85	1.39	5.36	0.23	0.23	0.0032	0.37	0.012	0.43	86.79	0.228	0.878	0.0370	0.0370	0.0005	0.0611	0.0020
Nonroad Industrial Equipment																								
Compressor - 365 CFM	105	X		6	9	2270006015	46	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	1.22	0.001	0.005	0.0003	0.0003	0.0000	0.0005	0.0000
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	46	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.58	0.001	0.004	0.0001	0.0001	0.0000	0.0002	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	987	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	3.31	0.013	0.026	0.0020	0.0020	0.0000	0.0027	0.0001
Pressure washers	10		X	6	7	2265006030	48	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.47	0.125	0.001	0.0001	0.0001	0.0000	0.0023	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	679	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	11.63	0.260	0.028	0.0011	0.0011	0.0002	0.0082	0.0038
Pump - 2-Inch Water	10		X	6	24	2265006010	905	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	7.20	1.912	0.014	0.0008	0.0008	0.0001	0.0350	0.0016
Pump - 1500 GPM Fill	32		X	6	24	2265006010	288	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	4.93	0.110	0.012	0.0005	0.0005	0.0001	0.0035	0.0016
Pump - Test	32		X	6	6	2265006010	72	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	1.23	0.028	0.003	0.0001	0.0001	0.0000	0.0009	0.0004
On-road construction vehicles							Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)									2017 Emission Totals (Tons)							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		1,389	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.83	0.002	0.006	0.0003	0.0003	0.0000	0.0008	0.0001
Pickup 4 x 4	300		X	6	4		4,114	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.14	0.023	0.002	0.0001	0.0000	0.0000	0.0007	0.0004
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		463	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.61	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Auto maintenance Truck	300		X	6	4		1,286	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.67	0.007	0.001	0.0000	0.0000	0.0000	0.0002	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		771	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.02	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Truck - Mechanic Rig H.D.	300	X		6	4		617	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.81	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck - 12 YD Dump	330	X		6	9		2,083	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.75	0.003	0.008	0.0005	0.0005	0.0000	0.0012	0.0001
Truck - Medium Duty Tractor	300	X		6	9		2,199	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.90	0.004	0.009	0.0005	0.0005	0.0000	0.0012	0.0001
Hydro vac truck	350	X		6	4		1,080	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.43	0.002	0.004	0.0003	0.0002	0.0000	0.0006	0.0001

Table 9D-36
NEXUS Project Construction Equipment Air Emissions - Sandusky Co. Sandusky Rv. HDD

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	x		6	9	2270002069	100	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	8.22	0.006	0.020	0.0012	0.0012	0.0000	0.0023	0.0002
Sideboom - 583	310	x		6	9	2270002069	93	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	10.01	0.015	0.036	0.0022	0.0022	0.0001	0.0029	0.0002
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	100	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	13.29	0.016	0.040	0.0026	0.0026	0.0001	0.0037	0.0003
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	162	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	16.95	0.021	0.052	0.0033	0.0033	0.0001	0.0047	0.0004
Crane - 50 Ton Truck	280	X		6	5	2270002045	90	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	6.34	0.004	0.020	0.0009	0.0009	0.0000	0.0020	0.0001
HDD Machine	1200	X		7	24	2270002033	288	529.85	1.39	5.36	0.23	0.23	0.0032	0.37	0.012	0.43	86.79	0.228	0.878	0.0370	0.0370	0.0005	0.0611	0.0020
Nonroad Industrial Equipment																								
Compressor - 365 CFM	105	X		6	9	2270006015	46	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	1.22	0.001	0.005	0.0003	0.0003	0.0000	0.0005	0.0000
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	39	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.49	0.001	0.003	0.0001	0.0001	0.0000	0.0001	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	1,111	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	3.72	0.015	0.029	0.0022	0.0022	0.0000	0.0030	0.0001
Pressure washers	10		X	6	7	2265006030	48	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.47	0.125	0.001	0.0001	0.0001	0.0000	0.0023	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	679	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	11.63	0.260	0.028	0.0011	0.0011	0.0002	0.0082	0.0038
Pump - 2-Inch Water	10		X	6	24	2265006010	864	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	6.88	1.825	0.014	0.0008	0.0008	0.0001	0.0334	0.0015
Pump - 1500 GPM Fill	32		X	6	24	2265006010	288	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	4.93	0.110	0.012	0.0005	0.0005	0.0001	0.0035	0.0016
Pump - Test	32		X	6	6	2265006010	72	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	1.23	0.028	0.003	0.0001	0.0001	0.0000	0.0009	0.0004
On-road construction vehicles							Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)									2017 Emission Totals (Tons)							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		1,157	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.53	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Pickup 4 x 4	300		X	6	4		4,114	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.14	0.023	0.002	0.0001	0.0000	0.0000	0.0007	0.0004
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		386	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.51	0.001	0.002	0.0001	0.0001	0.0000	0.0002	0.0000
Auto maintenance Truck	300		X	6	4		1,234	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.64	0.007	0.001	0.0000	0.0000	0.0000	0.0002	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		771	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.02	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Truck - Mechanic Rig H.D.	300	X		6	4		617	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.81	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck - 12 YD Dump	330	X		6	9		2,661	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.51	0.004	0.011	0.0006	0.0006	0.0000	0.0015	0.0001
Truck - Medium Duty Tractor	300	X		6	9		1,504	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.99	0.002	0.006	0.0004	0.0003	0.0000	0.0009	0.0001
Hydro vac truck	350	X		6	4		1,080	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.43	0.002	0.004	0.0003	0.0002	0.0000	0.0006	0.0001

Table 9D-37
NEXUS Project Construction Equipment Air Emissions - Sandusky Co. Portage Rv. HDD

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	x		6	9	2270002069	100	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	8.22	0.006	0.020	0.0012	0.0012	0.0000	0.0023	0.0002
Sideboom - 583	310	x		6	9	2270002069	93	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	10.01	0.015	0.036	0.0022	0.0022	0.0001	0.0029	0.0002
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	100	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	13.29	0.016	0.040	0.0026	0.0026	0.0001	0.0037	0.0003
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	162	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	16.95	0.021	0.052	0.0033	0.0033	0.0001	0.0047	0.0004
Crane - 50 Ton Truck	280	X		6	5	2270002045	86	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	6.03	0.004	0.019	0.0009	0.0009	0.0000	0.0019	0.0001
HDD Machine	1200	X		7	24	2270002033	288	529.85	1.39	5.36	0.23	0.23	0.0032	0.37	0.012	0.43	86.79	0.228	0.878	0.0370	0.0370	0.0005	0.0611	0.0020
Nonroad Industrial Equipment																								
Compressor - 365 CFM	105	X		6	9	2270006015	46	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	1.22	0.001	0.005	0.0003	0.0003	0.0000	0.0005	0.0000
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	46	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.58	0.001	0.004	0.0001	0.0001	0.0000	0.0002	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	987	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	3.31	0.013	0.026	0.0020	0.0020	0.0000	0.0027	0.0001
Pressure washers	10		X	6	7	2265006030	48	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.47	0.125	0.001	0.0001	0.0001	0.0000	0.0023	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	679	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	11.63	0.260	0.028	0.0011	0.0011	0.0002	0.0082	0.0038
Pump - 2-Inch Water	10		X	6	24	2265006010	864	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	6.88	1.825	0.014	0.0008	0.0008	0.0001	0.0334	0.0015
Pump - 1500 GPM Fill	32		X	6	24	2265006010	288	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	4.93	0.110	0.012	0.0005	0.0005	0.0001	0.0035	0.0016
Pump - Test	32		X	6	6	2265006010	72	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	1.23	0.028	0.003	0.0001	0.0001	0.0000	0.0009	0.0004
On-road construction vehicles							Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)									2017 Emission Totals (Tons)							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		1,389	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.83	0.002	0.006	0.0003	0.0003	0.0000	0.0008	0.0001
Pickup 4 x 4	300		X	6	4		4,217	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.19	0.024	0.002	0.0001	0.0000	0.0000	0.0007	0.0004
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		463	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.61	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Auto maintenance Truck	300		X	6	4		1,029	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.53	0.006	0.001	0.0000	0.0000	0.0000	0.0002	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		771	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.02	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Truck - Mechanic Rig H.D.	300	X		6	4		617	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.81	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck - 12 YD Dump	330	X		6	9		2,083	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.75	0.003	0.008	0.0005	0.0005	0.0000	0.0012	0.0001
Truck - Medium Duty Tractor	300	X		6	9		2,314	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.06	0.004	0.009	0.0005	0.0005	0.0000	0.0013	0.0001
Hydro vac truck	350	X		6	4		1,080	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.43	0.002	0.004	0.0003	0.0002	0.0000	0.0006	0.0001

Table 9D-38
NEXUS Project Construction Equipment Air Emissions - Wood Co. Findlay Rd. HDD

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	x		6	9	2270002069	100	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	8.22	0.006	0.020	0.0012	0.0012	0.0000	0.0023	0.0002
Sideboom - 583	310	x		6	9	2270002069	93	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	10.01	0.015	0.036	0.0022	0.0022	0.0001	0.0029	0.0002
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	100	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	13.29	0.016	0.040	0.0026	0.0026	0.0001	0.0037	0.0003
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	162	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	16.95	0.021	0.052	0.0033	0.0033	0.0001	0.0047	0.0004
Crane - 50 Ton Truck	280	X		6	5	2270002045	90	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	6.34	0.004	0.020	0.0009	0.0009	0.0000	0.0020	0.0001
HDD Machine	1200	X		7	24	2270002033	288	529.85	1.39	5.36	0.23	0.23	0.0032	0.37	0.012	0.43	86.79	0.228	0.878	0.0370	0.0370	0.0005	0.0611	0.0020
Nonroad Industrial Equipment																								
Compressor - 365 CFM	105	X		6	9	2270006015	46	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	1.22	0.001	0.005	0.0003	0.0003	0.0000	0.0005	0.0000
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	46	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.58	0.001	0.004	0.0001	0.0001	0.0000	0.0002	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	987	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	3.31	0.013	0.026	0.0020	0.0020	0.0000	0.0027	0.0001
Pressure washers	10		X	6	7	2265006030	48	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.47	0.125	0.001	0.0001	0.0001	0.0000	0.0023	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	679	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	11.63	0.260	0.028	0.0011	0.0011	0.0002	0.0082	0.0038
Pump - 2-Inch Water	10		X	6	24	2265006010	823	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	6.55	1.739	0.013	0.0007	0.0007	0.0001	0.0318	0.0014
Pump - 1500 GPM Fill	32		X	6	24	2265006010	288	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	4.93	0.110	0.012	0.0005	0.0005	0.0001	0.0035	0.0016
Pump - Test	32		X	6	6	2265006010	72	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	1.23	0.028	0.003	0.0001	0.0001	0.0000	0.0009	0.0004
On-road construction vehicles							Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)									2017 Emission Totals (Tons)							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		1,389	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.83	0.002	0.006	0.0003	0.0003	0.0000	0.0008	0.0001
Pickup 4 x 4	300		X	6	4		4,217	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.19	0.024	0.002	0.0001	0.0000	0.0000	0.0007	0.0004
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		463	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.61	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Auto maintenance Truck	300		X	6	4		1,234	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.64	0.007	0.001	0.0000	0.0000	0.0000	0.0002	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		771	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.02	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Truck - Mechanic Rig H.D.	300	X		6	4		617	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.81	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck - 12 YD Dump	330	X		6	9		2,083	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.75	0.003	0.008	0.0005	0.0005	0.0000	0.0012	0.0001
Truck - Medium Duty Tractor	300	X		6	9		2,199	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.90	0.004	0.009	0.0005	0.0005	0.0000	0.0012	0.0001
Hydro vac truck	350	X		6	4		1,029	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.36	0.002	0.004	0.0002	0.0002	0.0000	0.0006	0.0001

Table 9D-39
NEXUS Project Construction Equipment Air Emissions - Wood Co. Maumee Rv. HDD

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	x		6	9	2270002069	100	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	8.22	0.006	0.020	0.0012	0.0012	0.0000	0.0023	0.0002
Sideboom - 583	310	x		6	9	2270002069	93	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	10.01	0.015	0.036	0.0022	0.0022	0.0001	0.0029	0.0002
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	108	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	14.32	0.018	0.044	0.0028	0.0028	0.0001	0.0040	0.0003
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	154	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	16.15	0.020	0.049	0.0031	0.0031	0.0001	0.0045	0.0004
Crane - 50 Ton Truck	280	X		6	5	2270002045	90	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	6.34	0.004	0.020	0.0009	0.0009	0.0000	0.0020	0.0001
HDD Machine	1200	X		7	24	2270002033	288	529.85	1.39	5.36	0.23	0.23	0.0032	0.37	0.012	0.43	86.79	0.228	0.878	0.0370	0.0370	0.0005	0.0611	0.0020
Nonroad Industrial Equipment																								
Compressor - 365 CFM	105	X		6	9	2270006015	46	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	1.22	0.001	0.005	0.0003	0.0003	0.0000	0.0005	0.0000
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	46	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.58	0.001	0.004	0.0001	0.0001	0.0000	0.0002	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	987	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	3.31	0.013	0.026	0.0020	0.0020	0.0000	0.0027	0.0001
Pressure washers	10		X	6	7	2265006030	48	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	0.47	0.125	0.001	0.0001	0.0001	0.0000	0.0023	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	679	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	11.63	0.260	0.028	0.0011	0.0011	0.0002	0.0082	0.0038
Pump - 2-Inch Water	10		X	6	24	2265006010	864	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	6.88	1.825	0.014	0.0008	0.0008	0.0001	0.0334	0.0015
Pump - 1500 GPM Fill	32		X	6	24	2265006010	267	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	4.58	0.102	0.011	0.0004	0.0004	0.0001	0.0032	0.0015
Pump - Test	32		X	6	6	2265006010	72	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	1.23	0.028	0.003	0.0001	0.0001	0.0000	0.0009	0.0004
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		1,620	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.14	0.003	0.006	0.0004	0.0004	0.0000	0.0009	0.0001
Pickup 4 x 4	300		X	6	4		4,217	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.19	0.024	0.002	0.0001	0.0000	0.0000	0.0007	0.0004
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		463	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.61	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Auto maintenance Truck	300		X	6	4		1,286	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.67	0.007	0.001	0.0000	0.0000	0.0000	0.0002	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		771	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.02	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Truck - Mechanic Rig H.D.	300	X		6	4		617	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.81	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck - 12 YD Dump	330	X		6	9		2,083	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.75	0.003	0.008	0.0005	0.0005	0.0000	0.0012	0.0001
Truck - Medium Duty Tractor	300	X		6	9		2,199	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.90	0.004	0.009	0.0005	0.0005	0.0000	0.0012	0.0001
Hydro vac truck	350	X		6	4		1,080	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.43	0.002	0.004	0.0003	0.0002	0.0000	0.0006	0.0001

Table 9D-40
NEXUS Project Construction Equipment Air Emissions - Lanawee Co. Raisen Rv. HDD

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	x		6	9	2270002069	100	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	8.22	0.006	0.020	0.0012	0.0012	0.0000	0.0023	0.0002
Sideboom - 583	310	x		6	9	2270002069	93	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	10.01	0.015	0.036	0.0022	0.0022	0.0001	0.0029	0.0002
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	100	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	13.29	0.016	0.040	0.0026	0.0026	0.0001	0.0037	0.0003
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	162	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	16.95	0.021	0.052	0.0033	0.0033	0.0001	0.0047	0.0004
Crane - 50 Ton Truck	280	X		6	5	2270002045	90	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	6.34	0.004	0.020	0.0009	0.0009	0.0000	0.0020	0.0001
HDD Machine	1200	X		7	24	2270002033	288	529.85	1.39	5.36	0.23	0.23	0.0032	0.37	0.012	0.43	86.79	0.228	0.878	0.0370	0.0370	0.0005	0.0611	0.0020
Nonroad Industrial Equipment																								
Compressor - 365 CFM	105	X		6	9	2270006015	46	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	1.22	0.001	0.005	0.0003	0.0003	0.0000	0.0005	0.0000
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	46	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.58	0.001	0.004	0.0001	0.0001	0.0000	0.0002	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	987	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	3.31	0.013	0.026	0.0020	0.0020	0.0000	0.0027	0.0001
Pressure washers	10		X	6	7	2265006030	48	1,046.57	276.86	2.18	0.11	0.11	0.0191	5.09	0.229	0.85	0.47	0.125	0.001	0.0001	0.0001	0.0000	0.0023	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	679	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	11.63	0.259	0.028	0.0011	0.0011	0.0002	0.0082	0.0038
Pump - 2-Inch Water	10		X	6	24	2265006010	864	1,046.25	277.04	2.12	0.12	0.12	0.0191	5.11	0.229	0.69	6.88	1.821	0.014	0.0008	0.0008	0.0001	0.0336	0.0015
Pump - 1500 GPM Fill	32		X	6	24	2265006010	288	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	4.93	0.110	0.012	0.0005	0.0005	0.0001	0.0035	0.0016
Pump - Test	32		X	6	6	2265006010	72	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	1.23	0.028	0.003	0.0001	0.0001	0.0000	0.0009	0.0004
On-road construction vehicles							Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)									2017 Emission Totals (Tons)							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		1,389	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.83	0.002	0.006	0.0003	0.0003	0.0000	0.0008	0.0001
Pickup 4 x 4	300		X	6	4		4,217	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.19	0.024	0.002	0.0001	0.0000	0.0000	0.0007	0.0004
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		463	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.61	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Auto maintenance Truck	300		X	6	4		823	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.43	0.005	0.000	0.0000	0.0000	0.0000	0.0001	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		771	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.02	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Truck - Mechanic Rig H.D.	300	X		6	4		617	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.81	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck - 12 YD Dump	330	X		6	9		2,777	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.67	0.004	0.011	0.0007	0.0006	0.0000	0.0016	0.0002
Truck - Medium Duty Tractor	300	X		6	9		1,504	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.99	0.002	0.006	0.0004	0.0003	0.0000	0.0009	0.0001
Hydro vac truck	350	X		6	4		1,080	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.43	0.002	0.004	0.0003	0.0002	0.0000	0.0006	0.0001

Table 9D-41
NEXUS Project Construction Equipment Air Emissions - Washentaw Co. Saline Rv. HDD

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	x		6	9	2270002069	100	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	8.22	0.006	0.020	0.0012	0.0012	0.0000	0.0023	0.0002
Sideboom - 583	310	x		6	9	2270002069	93	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	10.01	0.015	0.036	0.0022	0.0022	0.0001	0.0029	0.0002
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	100	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	13.29	0.016	0.040	0.0026	0.0026	0.0001	0.0037	0.0003
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	154	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	16.15	0.020	0.049	0.0031	0.0031	0.0001	0.0045	0.0004
Crane - 50 Ton Truck	280	X		6	5	2270002045	86	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	6.03	0.004	0.019	0.0009	0.0009	0.0000	0.0019	0.0001
HDD Machine	1200	X		7	24	2270002033	288	529.85	1.39	5.36	0.23	0.23	0.0032	0.37	0.012	0.43	86.79	0.228	0.878	0.0370	0.0370	0.0005	0.0611	0.0020
Nonroad Industrial Equipment																								
Compressor - 365 CFM	105	X		6	9	2270006015	46	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	1.22	0.001	0.005	0.0003	0.0003	0.0000	0.0005	0.0000
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	46	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.58	0.001	0.004	0.0001	0.0001	0.0000	0.0002	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	987	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	3.31	0.013	0.026	0.0020	0.0020	0.0000	0.0027	0.0001
Pressure washers	10		X	6	7	2265006030	48	1,046.57	276.86	2.18	0.11	0.11	0.0191	5.09	0.229	0.85	0.47	0.125	0.001	0.0001	0.0001	0.0000	0.0023	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	679	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	11.63	0.259	0.028	0.0011	0.0011	0.0002	0.0082	0.0038
Pump - 2-Inch Water	10		X	6	24	2265006010	946	1,046.25	277.04	2.12	0.12	0.12	0.0191	5.11	0.229	0.69	7.53	1.994	0.015	0.0008	0.0008	0.0001	0.0368	0.0016
Pump - 1500 GPM Fill	32		X	6	24	2265006010	288	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	4.93	0.110	0.012	0.0005	0.0005	0.0001	0.0035	0.0016
Pump - Test	32		X	6	6	2265006010	72	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	1.23	0.028	0.003	0.0001	0.0001	0.0000	0.0009	0.0004
On-road construction vehicles							Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)									2017 Emission Totals (Tons)							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		1,389	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.83	0.002	0.006	0.0003	0.0003	0.0000	0.0008	0.0001
Pickup 4 x 4	300		X	6	4		4,114	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.14	0.023	0.002	0.0001	0.0000	0.0000	0.0007	0.0004
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		463	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.61	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Auto maintenance Truck	300		X	6	4		1,234	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.64	0.007	0.001	0.0000	0.0000	0.0000	0.0002	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		823	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.09	0.001	0.003	0.0002	0.0002	0.0000	0.0005	0.0000
Truck - Mechanic Rig H.D.	300	X		6	4		617	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.81	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck - 12 YD Dump	330	X		6	9		2,083	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.75	0.003	0.008	0.0005	0.0005	0.0000	0.0012	0.0001
Truck - Medium Duty Tractor	300	X		6	9		2,199	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.90	0.004	0.009	0.0005	0.0005	0.0000	0.0012	0.0001
Hydro vac truck	350	X		6	4		1,080	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.43	0.002	0.004	0.0003	0.0002	0.0000	0.0006	0.0001

Table 9D-42
NEXUS Project Construction Equipment Air Emissions - Washentaw Co. Hydro Park HDD

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	x		6	9	2270002069	100	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	8.22	0.006	0.020	0.0012	0.0012	0.0000	0.0023	0.0002
Sideboom - 583	310	x		6	9	2270002069	170	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	18.35	0.027	0.066	0.0041	0.0041	0.0001	0.0053	0.0004
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	116	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	15.34	0.019	0.047	0.0030	0.0030	0.0001	0.0043	0.0004
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	278	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	29.06	0.036	0.088	0.0056	0.0056	0.0002	0.0081	0.0007
Crane - 50 Ton Truck	280	X		6	5	2270002045	111	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	7.85	0.005	0.025	0.0011	0.0011	0.0000	0.0025	0.0002
HDD Machine	1200	X		7	24	2270002033	600	529.85	1.39	5.36	0.23	0.23	0.0032	0.37	0.012	0.43	180.82	0.475	1.828	0.0771	0.0771	0.0011	0.1273	0.0042
Nonroad Industrial Equipment																								
Compressor - 365 CFM	105	X		6	9	2270006015	85	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	2.24	0.002	0.009	0.0006	0.0006	0.0000	0.0009	0.0001
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	108	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	1.36	0.002	0.008	0.0003	0.0003	0.0000	0.0004	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	1,646	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	5.51	0.022	0.043	0.0033	0.0033	0.0000	0.0044	0.0001
Pressure washers	10		X	6	7	2265006030	48	1,046.57	276.86	2.18	0.11	0.11	0.0191	5.09	0.229	0.85	0.47	0.125	0.001	0.0001	0.0001	0.0000	0.0023	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	1,070	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	18.33	0.409	0.045	0.0018	0.0018	0.0003	0.0130	0.0060
Pump - 2-Inch Water	10		X	6	24	2265006010	1,481	1,046.25	277.04	2.12	0.12	0.12	0.0191	5.11	0.229	0.69	11.79	3.121	0.024	0.0013	0.0013	0.0002	0.0576	0.0026
Pump - 1500 GPM Fill	32		X	6	24	2265006010	494	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	8.46	0.189	0.021	0.0008	0.0008	0.0002	0.0060	0.0028
Pump - Test	32		X	6	6	2265006010	123	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	2.11	0.047	0.005	0.0002	0.0002	0.0000	0.0015	0.0007
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		3,240	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.28	0.005	0.013	0.0008	0.0007	0.0000	0.0018	0.0002
Pickup 4 x 4	300		X	6	4		7,611	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		3.95	0.043	0.004	0.0001	0.0001	0.0000	0.0014	0.0007
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		1,080	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.43	0.002	0.004	0.0003	0.0002	0.0000	0.0006	0.0001
Auto maintenance Truck	300		X	6	4		2,057	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		1.07	0.012	0.001	0.0000	0.0000	0.0000	0.0004	0.0002
Truck - 3 Ton Flatbed	330	X		6	4		1,234	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.63	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Truck - Mechanic Rig H.D.	300	X		6	4		1,286	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.70	0.002	0.005	0.0003	0.0003	0.0000	0.0007	0.0001
Truck - 12 YD Dump	330	X		6	9		2,546	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		3.36	0.004	0.010	0.0006	0.0006	0.0000	0.0014	0.0001
Truck - Medium Duty Tractor	300	X		6	9		3,356	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		4.43	0.005	0.013	0.0008	0.0007	0.0000	0.0019	0.0002
Hydro vac truck	350	X		6	4		1,851	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.44	0.003	0.007	0.0004	0.0004	0.0000	0.0010	0.0001

Table 9D-43
NEXUS Project Construction Equipment Air Emissions - Washentaw Co. IH-94 HDD

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	x		6	9	2270002069	100	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	8.22	0.006	0.020	0.0012	0.0012	0.0000	0.0023	0.0002
Sideboom - 583	310	x		6	9	2270002069	93	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	10.01	0.015	0.036	0.0022	0.0022	0.0001	0.0029	0.0002
Backhoe - 350 (3.00 cy)	380	x		6	9	2270002036	100	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	13.29	0.016	0.040	0.0026	0.0026	0.0001	0.0037	0.0003
Backhoe - 330 (1.75 cy)	300	x		6	9	2270002036	162	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	16.95	0.021	0.052	0.0033	0.0033	0.0001	0.0047	0.0004
Crane - 50 Ton Truck	280	X		6	5	2270002045	86	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	6.03	0.004	0.019	0.0009	0.0009	0.0000	0.0019	0.0001
HDD Machine	1200	X		7	24	2270002033	288	529.85	1.39	5.36	0.23	0.23	0.0032	0.37	0.012	0.43	86.79	0.228	0.878	0.0370	0.0370	0.0005	0.0611	0.0020
Nonroad Industrial Equipment																								
Compressor - 365 CFM	105	X		6	9	2270006015	46	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	1.22	0.001	0.005	0.0003	0.0003	0.0000	0.0005	0.0000
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	46	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	0.58	0.001	0.004	0.0001	0.0001	0.0000	0.0002	0.0000
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	987	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	3.31	0.013	0.026	0.0020	0.0020	0.0000	0.0027	0.0001
Pressure washers	10		X	6	7	2265006030	48	1,046.57	276.86	2.18	0.11	0.11	0.0191	5.09	0.229	0.85	0.47	0.125	0.001	0.0001	0.0001	0.0000	0.0023	0.0001
Pump - 6-Inch Water	32		X	6	24	2265006010	699	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	11.98	0.267	0.029	0.0012	0.0012	0.0002	0.0085	0.0039
Pump - 2-Inch Water	10		X	6	24	2265006010	864	1,046.25	277.04	2.12	0.12	0.12	0.0191	5.11	0.229	0.69	6.88	1.821	0.014	0.0008	0.0008	0.0001	0.0336	0.0015
Pump - 1500 GPM Fill	32		X	6	24	2265006010	288	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	4.93	0.110	0.012	0.0005	0.0005	0.0001	0.0035	0.0016
Pump - Test	32		X	6	6	2265006010	67	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	1.15	0.026	0.003	0.0001	0.0001	0.0000	0.0008	0.0004
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		1,389	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.83	0.002	0.006	0.0003	0.0003	0.0000	0.0008	0.0001
Pickup 4 x 4	300		X	6	4		4,320	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.24	0.025	0.002	0.0001	0.0001	0.0000	0.0008	0.0004
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		463	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.61	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Auto maintenance Truck	300		X	6	4		1,286	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		0.67	0.007	0.001	0.0000	0.0000	0.0000	0.0002	0.0001
Truck - 3 Ton Flatbed	330	X		6	4		771	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.02	0.001	0.003	0.0002	0.0002	0.0000	0.0004	0.0000
Truck - Mechanic Rig H.D.	300	X		6	4		617	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		0.81	0.001	0.002	0.0001	0.0001	0.0000	0.0003	0.0000
Truck - 12 YD Dump	330	X		6	9		2,083	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.75	0.003	0.008	0.0005	0.0005	0.0000	0.0012	0.0001
Truck - Medium Duty Tractor	300	X		6	9		2,199	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		2.90	0.004	0.009	0.0005	0.0005	0.0000	0.0012	0.0001
Hydro vac truck	350	X		6	4		1,080	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		1.43	0.002	0.004	0.0003	0.0002	0.0000	0.0006	0.0001

Table 9D-44
NEXUS Project Construction Equipment Air Emissions - Hanoverton CS

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	X		6	9	2270002069	633	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	67.30	0.098	0.243	0.0149	0.0149	0.0004	0.0196	0.0015
Dozer - D7 w/Winch	235	X		6	9	2270002069	1,265	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	103.70	0.081	0.247	0.0149	0.0149	0.0006	0.0296	0.0024
Backhoe - 350 (3.00 cy)	380	X		6	9	2270002036	633	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	83.85	0.103	0.255	0.0161	0.0161	0.0005	0.0233	0.0019
Backhoe - 330 (1.75 cy)	300	X		6	9	2270002036	2,638	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	276.08	0.340	0.840	0.0531	0.0531	0.0015	0.0767	0.0063
Backhoe - 325 (1.38 cy)	180	X		6	9	2270002036	633	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	39.72	0.024	0.079	0.0041	0.0041	0.0002	0.0108	0.0009
Backhoe - 325 w/Hoe-Ram	180	X		6	9	2270002036	879	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	55.22	0.033	0.110	0.0057	0.0057	0.0003	0.0150	0.0013
Backhoe/Loader - 430	100	X		6	9	2270002060	2,924	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	101.97	0.140	0.330	0.0335	0.0335	0.0006	0.0338	0.0023
Loader - 966 Wheel	262	X		6	9	2270002060	1,512	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	138.17	0.140	0.412	0.0271	0.0271	0.0008	0.0429	0.0032
Motor Grader - 14M	259	X		6	9	2270002048	633	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	57.15	0.043	0.133	0.0079	0.0079	0.0003	0.0162	0.0013
Crane - 50 Ton Truck	280	X		6	5	2270002045	1,183	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	83.28	0.058	0.262	0.0119	0.0119	0.0005	0.0260	0.0019
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	1,616	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	65.00	0.062	0.223	0.0155	0.0155	0.0004	0.0218	0.0015
Crane - 150 Ton	170	X		6	5	2270002045	231	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	9.89	0.009	0.034	0.0024	0.0024	0.0001	0.0033	0.0002
CAT 815 COMPACTOR	200	X		6	9	2270002015	1,435	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	100.09	0.101	0.299	0.0196	0.0196	0.0006	0.0311	0.0023
Asphalt Compactor	140	X		6	7	2270002009	372	588.80	2.44	4.61	0.36	0.36	0.0040	0.49	0.012	0.43	14.53	0.060	0.114	0.0090	0.0090	0.0001	0.0121	0.0003
Asphalt Paver	175	X		6	7	2270002003	372	536.31	0.50	1.47	0.09	0.09	0.0029	0.16	0.012	0.59	22.71	0.021	0.062	0.0040	0.0040	0.0001	0.0068	0.0005
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	4,351	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	151.78	0.064	0.183	0.0100	0.0100	0.0008	0.0385	0.0035
Compressor - 1200 CFM	590	X		6	9	2270006015	201	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	29.75	0.047	0.170	0.0075	0.0075	0.0002	0.0113	0.0007
Compressor - 365 CFM	105	X		6	9	2270006015	2,569	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	67.81	0.075	0.285	0.0184	0.0184	0.0004	0.0261	0.0016
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	2,569	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	32.32	0.037	0.196	0.0060	0.0060	0.0002	0.0099	0.0007
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	9,257	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	31.01	0.126	0.239	0.0186	0.0186	0.0002	0.0249	0.0006
Concrete Mixer	100	X		6	7	2270002042	1,212	529.98	1.17	4.09	0.23	0.23	0.0033	0.33	0.012	0.43	30.45	0.067	0.235	0.0133	0.0133	0.0002	0.0191	0.0007
Pressure washers	10		X	6	7	2265006030	2,700	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	26.48	7.023	0.054	0.0029	0.0029	0.0005	0.1283	0.0058
650KW GENERATOR, 3 PHASE, 220 V	500	X		6	9	2270006005	1,736	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	218.10	0.448	1.499	0.0668	0.0668	0.0013	0.1066	0.0051
Generator - 250 KW	433	X		6	9	2270006005	818	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	88.98	0.183	0.611	0.0272	0.0272	0.0005	0.0435	0.0021
Generator - 20 KW	35	X		6	9	2270006005	4,227	589.15	1.55	4.41	0.30	0.30	0.0036	0.38	0.012	0.43	41.32	0.109	0.309	0.0210	0.0210	0.0003	0.0266	0.0009
Wacker Compactor	6		X	6	9	2265002006	3,981	1,046.59	277.94	2.19	0.11	0.11	0.0191	5.11	0.229	0.55	15.15	4.024	0.032	0.0016	0.0016	0.0003	0.0740	0.0033
Tamper	3		X	6	9	2265002006	5,585	1,046.59	277.94	2.19	0.11	0.11	0.0191	5.11	0.229	0.55	10.63	2.823	0.022	0.0012	0.0012	0.0002	0.0519	0.0023
Pump - 4-Inch Water	22		X	6	24	2265006010	2,139	1,046.71	277.85	2.21	0.11	0.11	0.0191	5.10	0.229	0.69	37.47	9.947	0.079	0.0040	0.0040	0.0007	0.1826	0.0082
Pump - 2-Inch Water	10		X	6	24	2265006010	8,558	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	68.10	18.081	0.136	0.0077	0.0077	0.0012	0.3312	0.0149
Pump - 1500 GPM Fill	32		X	6	8	2265006010	617	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	10.57	0.237	0.025	0.0010	0.0010	0.0002	0.0075	0.0034
Pump - Test	32		X	6	8	2265006010	617	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	10.57	0.237	0.025	0.0010	0.0010	0.0002	0.0075	0.0034

On-road construction vehicles							Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)								2017 Emission Totals (Tons)							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		135,617	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051	179.05	0.217	0.539	0.0322	0.0296	0.0016	0.0767	0.0076
Pickup 4 x 4	300		X	6	4		115,714	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085	60.09	0.657	0.064	0.0015	0.0014	0.0004	0.0206	0.0108
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		31,937	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051	42.17	0.051	0.127	0.0076	0.0070	0.0004	0.0181	0.0018
Auto maintenance Truck	300		X	6	4		11,571	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085	6.01	0.066	0.006	0.0002	0.0001	0.0000	0.0021	0.0011
Truck - 1 Ton Flatbed	300	X		6	4		10,389	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051	13.72	0.017	0.041	0.0025	0.0023	0.0001	0.0059	0.0006
Truck - 3 Ton Flatbed	330	X		6	4		36,309	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051	47.94	0.058	0.144	0.0086	0.0079	0.0004	0.0205	0.0020
Truck - 4000 Gal Water	330	X		6	9		26,036	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051	34.37	0.042	0.104	0.0062	0.0057	0.0003	0.0147	0.0015
Truck - Mechanic Rig H.D.	300	X		6	4		11,571	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051	15.28	0.019	0.046	0.0027	0.0025	0.0001	0.0065	0.0006
Truck - 12 YD Dump	330	X		6	9		62,023	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051	81.89	0.099	0.247	0.0147	0.0135	0.0007	0.0351	0.0035

Construction Workers	Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)								2017 Emission Totals (Tons)							
	2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
Worker Commutes	589,857	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085	306.32	3.350	0.325	0.0079	0.0070	0.0020	0.1048	0.0551

Deliveries / Removals	Empty Vehicle Weight (tons)	Full Vehicle Weight (tons)	Round Trip Distance (miles)	Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)								2017 Emission Totals (Tons)							
				2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
On-road delivery vehicles																				
Truck - 4000 Gallon Fuel	13.5	27.5	50.0	11,700	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	14.51	0.016	0.039	0.0023	0.0021	0.0001	0.0060	0.0011
Truck - Fuel/Lube	5.0	10.0	50.0	11,700	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	14.51	0.016	0.039	0.0023	0.0021	0.0001	0.0060	0.0011
Heavy duty diesel vehicles (>6,000 lb GVW)	12	30	50	27,611	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	34.25	0.038	0.092	0.0054	0.0049	0.0003	0.0142	0.0026
On-road material removal vehicles																				
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0	13,806	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	17.12	0.019	0.046	0.0027	0.0025	0.0001	0.0071	0.0013

Construction Areas	Disturbed Acreage (Acre-months)	WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)								2017 Emission Totals (Tons)							
		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
Area under construction (Exposed Soils)	770	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	84.6972	8.4697	NA	NA	NA

Table 9D-45
NEXUS Project Construction Equipment Air Emissions - Wadsworth CS

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	X		6	9	2270002069	633	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	67.30	0.098	0.243	0.0149	0.0149	0.0004	0.0196	0.0015
Dozer - D7 w/Winch	235	X		6	9	2270002069	1,265	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	103.70	0.081	0.247	0.0149	0.0149	0.0006	0.0296	0.0024
Backhoe - 350 (3.00 cy)	380	X		6	9	2270002036	633	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	83.85	0.103	0.255	0.0161	0.0161	0.0005	0.0233	0.0019
Backhoe - 330 (1.75 cy)	300	X		6	9	2270002036	2,638	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	276.08	0.340	0.840	0.0531	0.0531	0.0015	0.0767	0.0063
Backhoe - 325 (1.38 cy)	180	X		6	9	2270002036	633	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	39.72	0.024	0.079	0.0041	0.0041	0.0002	0.0108	0.0009
Backhoe - 325 w/Hoe-Ram	180	X		6	9	2270002036	879	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	55.22	0.033	0.110	0.0057	0.0057	0.0003	0.0150	0.0013
Backhoe/Loader - 430	100	X		6	9	2270002060	2,924	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	101.97	0.140	0.330	0.0335	0.0335	0.0006	0.0338	0.0023
Loader - 966 Wheel	262	X		6	9	2270002060	1,512	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	138.17	0.140	0.412	0.0271	0.0271	0.0008	0.0429	0.0032
Motor Grader - 14M	259	X		6	9	2270002048	633	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	57.15	0.043	0.133	0.0079	0.0079	0.0003	0.0162	0.0013
Crane - 50 Ton Truck	280	X		6	5	2270002045	1,183	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	83.28	0.058	0.262	0.0119	0.0119	0.0005	0.0260	0.0019
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	1,616	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	65.00	0.062	0.223	0.0155	0.0155	0.0004	0.0218	0.0015
Crane - 150 Ton	170	X		6	5	2270002045	231	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	9.89	0.009	0.034	0.0024	0.0024	0.0001	0.0033	0.0002
CAT 815 COMPACTOR	200	X		6	9	2270002015	1,435	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	100.09	0.101	0.299	0.0196	0.0196	0.0006	0.0311	0.0023
Asphalt Compactor	140	X		6	7	2270002009	372	588.80	2.44	4.61	0.36	0.36	0.0040	0.49	0.012	0.43	14.53	0.060	0.114	0.0090	0.0090	0.0001	0.0121	0.0003
Asphalt Paver	175	X		6	7	2270002003	372	536.31	0.50	1.47	0.09	0.09	0.0029	0.16	0.012	0.59	22.71	0.021	0.062	0.0040	0.0040	0.0001	0.0068	0.0005
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	4,351	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	151.78	0.064	0.183	0.0100	0.0100	0.0008	0.0385	0.0035
Compressor - 1200 CFM	590	X		6	9	2270006015	201	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	29.75	0.047	0.170	0.0075	0.0075	0.0002	0.0113	0.0007
Compressor - 365 CFM	105	X		6	9	2270006015	2,569	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	67.81	0.075	0.285	0.0184	0.0184	0.0004	0.0261	0.0016
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	2,569	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	32.32	0.037	0.196	0.0060	0.0060	0.0002	0.0099	0.0007
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	9,257	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	31.01	0.126	0.239	0.0186	0.0186	0.0002	0.0249	0.0006
Concrete Mixer	100	X		6	7	2270002042	1,212	529.98	1.17	4.09	0.23	0.23	0.0033	0.33	0.012	0.43	30.45	0.067	0.235	0.0133	0.0133	0.0002	0.0191	0.0007
Pressure washers	10		X	6	7	2265006030	2,700	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	26.48	7.023	0.054	0.0029	0.0029	0.0005	0.1283	0.0058
650KW GENERATOR, 3 PHASE, 220 V	500	X		6	9	2270006005	1,736	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	218.10	0.448	1.499	0.0668	0.0668	0.0013	0.1066	0.0051
Generator - 250 KW	433	X		6	9	2270006005	818	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	88.98	0.183	0.611	0.0272	0.0272	0.0005	0.0435	0.0021
Generator - 20 KW	35	X		6	9	2270006005	4,227	589.15	1.55	4.41	0.30	0.30	0.0036	0.38	0.012	0.43	41.32	0.109	0.309	0.0210	0.0210	0.0003	0.0266	0.0009
Wacker Compactor	6		X	6	9	2265002006	3,981	1,046.59	277.94	2.19	0.11	0.11	0.0191	5.11	0.229	0.55	15.15	4.024	0.032	0.0016	0.0016	0.0003	0.0740	0.0033
Tamper	3		X	6	9	2265002006	5,585	1,046.59	277.94	2.19	0.11	0.11	0.0191	5.11	0.229	0.55	10.63	2.823	0.022	0.0012	0.0012	0.0002	0.0519	0.0023
Pump - 4-Inch Water	22		X	6	24	2265006010	2,139	1,046.71	277.85	2.21	0.11	0.11	0.0191	5.10	0.229	0.69	37.47	9.947	0.079	0.0040	0.0040	0.0007	0.1826	0.0082
Pump - 2-Inch Water	10		X	6	24	2265006010	8,558	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	68.10	18.081	0.136	0.0077	0.0077	0.0012	0.3312	0.0149
Pump - 1500 GPM Fill	32		X	6	8	2265006010	617	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	10.57	0.237	0.025	0.0010	0.0010	0.0002	0.0075	0.0034
Pump - Test	32		X	6	8	2265006010	617	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	10.57	0.237	0.025	0.0010	0.0010	0.0002	0.0075	0.0034

On-road construction vehicles							Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)									2017 Emission Totals (Tons)							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		135,617	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		179.05	0.217	0.539	0.0322	0.0296	0.0016	0.0767	0.0076
Pickup 4 x 4	300		X	6	4		115,714	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		60.09	0.657	0.064	0.0015	0.0014	0.0004	0.0206	0.0108
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		31,937	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		42.17	0.051	0.127	0.0076	0.0070	0.0004	0.0181	0.0018
Auto maintenance Truck	300		X	6	4		11,571	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		6.01	0.066	0.006	0.0002	0.0001	0.0000	0.0021	0.0011
Truck - 1 Ton Flatbed	300	X		6	4		10,389	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		13.72	0.017	0.041	0.0025	0.0023	0.0001	0.0059	0.0006
Truck - 3 Ton Flatbed	330	X		6	4		36,309	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		47.94	0.058	0.144	0.0086	0.0079	0.0004	0.0205	0.0020
Truck - 4000 Gal Water	330	X		6	9		26,036	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		34.37	0.042	0.104	0.0062	0.0057	0.0003	0.0147	0.0015
Truck - Mechanic Rig H.D.	300	X		6	4		11,571	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		15.28	0.019	0.046	0.0027	0.0025	0.0001	0.0065	0.0006
Truck - 12 YD Dump	330	X		6	9		62,023	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		81.89	0.099	0.247	0.0147	0.0135	0.0007	0.0351	0.0035

Construction Workers	Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)								2017 Emission Totals (Tons)							
	2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
Worker Commutes	589,857	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		306.32	3.350	0.325	0.0079	0.0070	0.0020	0.1048	0.0551

Deliveries / Removals	Empty Vehicle Weight (tons)	Full Vehicle Weight (tons)	Round Trip Distance (miles)	Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)								2017 Emission Totals (Tons)							
				2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
On-road delivery vehicles																					
Truck - 4000 Gallon Fuel	13.5	27.5	50.0	11,700	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		14.51	0.016	0.039	0.0023	0.0021	0.0001	0.0060	0.0011
Truck - Fuel/Lube	5.0	10.0	50.0	11,700	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		14.51	0.016	0.039	0.0023	0.0021	0.0001	0.0060	0.0011
Heavy duty diesel vehicles (>6,000 lb GVW)	12	30	50	27,611	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		34.25	0.038	0.092	0.0054	0.0049	0.0003	0.0142	0.0026
On-road material removal vehicles																					
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0	13,806	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		17.12	0.019	0.046	0.0027	0.0025	0.0001	0.0071	0.0013

Construction Areas	Disturbed Acreage (Acre-months)	WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)								2017 Emission Totals (Tons)							
		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
Area under construction (Exposed Soils)	512	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	56.2799	5.6280	NA	NA	NA

Table 9D-46
NEXUS Project Construction Equipment Air Emissions - Clyde CS

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	X		6	9	2270002069	633	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	67.30	0.098	0.243	0.0149	0.0149	0.0004	0.0196	0.0015
Dozer - D7 w/Winch	235	X		6	9	2270002069	1,265	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	103.70	0.081	0.247	0.0149	0.0149	0.0006	0.0296	0.0024
Backhoe - 350 (3.00 cy)	380	X		6	9	2270002036	633	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	83.85	0.103	0.255	0.0161	0.0161	0.0005	0.0233	0.0019
Backhoe - 330 (1.75 cy)	300	X		6	9	2270002036	2,638	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	276.08	0.340	0.840	0.0531	0.0531	0.0015	0.0767	0.0063
Backhoe - 325 (1.38 cy)	180	X		6	9	2270002036	633	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	39.72	0.024	0.079	0.0041	0.0041	0.0002	0.0108	0.0009
Backhoe - 325 w/Hoe-Ram	180	X		6	9	2270002036	879	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	55.22	0.033	0.110	0.0057	0.0057	0.0003	0.0150	0.0013
Backhoe/Loader - 430	100	X		6	9	2270002060	2,924	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	101.97	0.140	0.330	0.0335	0.0335	0.0006	0.0338	0.0023
Loader - 966 Wheel	262	X		6	9	2270002060	1,512	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	138.17	0.140	0.412	0.0271	0.0271	0.0008	0.0429	0.0032
Motor Grader - 14M	259	X		6	9	2270002048	633	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	57.15	0.043	0.133	0.0079	0.0079	0.0003	0.0162	0.0013
Crane - 50 Ton Truck	280	X		6	5	2270002045	1,183	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	83.28	0.058	0.262	0.0119	0.0119	0.0005	0.0260	0.0019
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	1,616	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	65.00	0.062	0.223	0.0155	0.0155	0.0004	0.0218	0.0015
Crane - 150 Ton	170	X		6	5	2270002045	231	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	9.89	0.009	0.034	0.0024	0.0024	0.0001	0.0033	0.0002
CAT 815 COMPACTOR	200	X		6	9	2270002015	1,435	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	100.09	0.101	0.299	0.0196	0.0196	0.0006	0.0311	0.0023
Asphalt Compactor	140	X		6	7	2270002009	372	588.80	2.44	4.61	0.36	0.36	0.0040	0.49	0.012	0.43	14.53	0.060	0.114	0.0090	0.0090	0.0001	0.0121	0.0003
Asphalt Paver	175	X		6	7	2270002003	372	536.31	0.50	1.47	0.09	0.09	0.0029	0.16	0.012	0.59	22.71	0.021	0.062	0.0040	0.0040	0.0001	0.0068	0.0005
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	4,351	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	151.78	0.064	0.183	0.0100	0.0100	0.0008	0.0385	0.0035
Compressor - 1200 CFM	590	X		6	9	2270006015	201	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	29.75	0.047	0.170	0.0075	0.0075	0.0002	0.0113	0.0007
Compressor - 365 CFM	105	X		6	9	2270006015	2,569	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	67.81	0.075	0.285	0.0184	0.0184	0.0004	0.0261	0.0016
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	2,569	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	32.32	0.037	0.196	0.0060	0.0060	0.0002	0.0099	0.0007
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	9,257	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	31.01	0.126	0.239	0.0186	0.0186	0.0002	0.0249	0.0006
Concrete Mixer	100	X		6	7	2270002042	1,212	529.98	1.17	4.09	0.23	0.23	0.0033	0.33	0.012	0.43	30.45	0.067	0.235	0.0133	0.0133	0.0002	0.0191	0.0007
Pressure washers	10		X	6	7	2265006030	2,700	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	26.48	7.023	0.054	0.0029	0.0029	0.0005	0.1283	0.0058
650KW GENERATOR, 3 PHASE, 220 V	500	X		6	9	2270006005	1,736	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	218.10	0.448	1.499	0.0668	0.0668	0.0013	0.1066	0.0051
Generator - 250 KW	433	X		6	9	2270006005	818	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	88.98	0.183	0.611	0.0272	0.0272	0.0005	0.0435	0.0021
Generator - 20 KW	35	X		6	9	2270006005	4,227	589.15	1.55	4.41	0.30	0.30	0.0036	0.38	0.012	0.43	41.32	0.109	0.309	0.0210	0.0210	0.0003	0.0266	0.0009
Wacker Compactor	6		X	6	9	2265002006	3,981	1,046.59	277.94	2.19	0.11	0.11	0.0191	5.11	0.229	0.55	15.15	4.024	0.032	0.0016	0.0016	0.0003	0.0740	0.0033
Tamper	3		X	6	9	2265002006	5,585	1,046.59	277.94	2.19	0.11	0.11	0.0191	5.11	0.229	0.55	10.63	2.823	0.022	0.0012	0.0012	0.0002	0.0519	0.0023
Pump - 4-Inch Water	22		X	6	24	2265006010	2,139	1,046.71	277.85	2.21	0.11	0.11	0.0191	5.10	0.229	0.69	37.47	9.947	0.079	0.0040	0.0040	0.0007	0.1826	0.0082
Pump - 2-Inch Water	10		X	6	24	2265006010	8,558	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	68.10	18.081	0.136	0.0077	0.0077	0.0012	0.3312	0.0149
Pump - 1500 GPM Fill	32		X	6	8	2265006010	617	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	10.57	0.237	0.025	0.0010	0.0010	0.0002	0.0075	0.0034
Pump - Test	32		X	6	8	2265006010	617	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	10.57	0.237	0.025	0.0010	0.0010	0.0002	0.0075	0.0034

On-road construction vehicles							Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)									2017 Emission Totals (Tons)							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		135,617	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		179.05	0.217	0.539	0.0322	0.0296	0.0016	0.0767	0.0076
Pickup 4 x 4	300		X	6	4		115,714	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		60.09	0.657	0.064	0.0015	0.0014	0.0004	0.0206	0.0108
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		31,937	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		42.17	0.051	0.127	0.0076	0.0070	0.0004	0.0181	0.0018
Auto maintenance Truck	300		X	6	4		11,571	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		6.01	0.066	0.006	0.0002	0.0001	0.0000	0.0021	0.0011
Truck - 1 Ton Flatbed	300	X		6	4		10,389	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		13.72	0.017	0.041	0.0025	0.0023	0.0001	0.0059	0.0006
Truck - 3 Ton Flatbed	330	X		6	4		36,309	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		47.94	0.058	0.144	0.0086	0.0079	0.0004	0.0205	0.0020
Truck - 4000 Gal Water	330	X		6	9		26,036	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		34.37	0.042	0.104	0.0062	0.0057	0.0003	0.0147	0.0015
Truck - Mechanic Rig H.D.	300	X		6	4		11,571	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		15.28	0.019	0.046	0.0027	0.0025	0.0001	0.0065	0.0006
Truck - 12 YD Dump	330	X		6	9		62,023	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		81.89	0.099	0.247	0.0147	0.0135	0.0007	0.0351	0.0035

Construction Workers	Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)									2017 Emission Totals (Tons)							
	2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
Worker Commutes	589,857	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		306.32	3.350	0.325	0.0079	0.0070	0.0020	0.1048	0.0551

Deliveries / Removals	Empty Vehicle Weight (tons)	Full Vehicle Weight (tons)	Round Trip Distance (miles)	Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)									2017 Emission Totals (Tons)								
				2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
On-road delivery vehicles																					
Truck - 4000 Gallon Fuel	13.5	27.5	50.0	11,700	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		14.51	0.016	0.039	0.0023	0.0021	0.0001	0.0060	0.0011
Truck - Fuel/Lube	5.0	10.0	50.0	11,700	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08		14.51	0.016	0.039	0.0023	0.0021	0.0001	0.0060	0.0011
Heavy duty diesel vehicles (>6,000 lb GVW)	12	30	50	27,611	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		34.25	0.038	0.092	0.0054	0.0049	0.0003	0.0142	0.0026
On-road material removal vehicles																					
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0	13,806	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085		17.12	0.019	0.046	0.0027	0.0025	0.0001	0.0071	0.0013

Construction Areas	Disturbed Acreage (Acre-months)	WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)									2017 Emission Totals (Tons)							
		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
Area under construction (Exposed Soils)	486	NA	NA	NA	0.11	0.01	NA	NA	NA		NA	NA	NA	53.4090	5.3409	NA	NA	NA

Table 9D-47
NEXUS Project Construction Equipment Air Emissions - Waterville CS

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D8 w/Ripper	305	X		6	9	2270002069	633	536.33	0.78	1.93	0.12	0.12	0.0031	0.16	0.012	0.59	67.30	0.098	0.243	0.0149	0.0149	0.0004	0.0196	0.0015
Dozer - D7 w/Winch	235	X		6	9	2270002069	1,265	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	103.70	0.081	0.247	0.0149	0.0149	0.0006	0.0296	0.0024
Backhoe - 350 (3.00 cy)	380	X		6	9	2270002036	633	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	83.85	0.103	0.255	0.0161	0.0161	0.0005	0.0233	0.0019
Backhoe - 330 (1.75 cy)	300	X		6	9	2270002036	2,638	536.35	0.66	1.63	0.10	0.10	0.0030	0.15	0.012	0.59	276.08	0.340	0.840	0.0531	0.0531	0.0015	0.0767	0.0063
Backhoe - 325 (1.38 cy)	180	X		6	9	2270002036	633	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	39.72	0.024	0.079	0.0041	0.0041	0.0002	0.0108	0.0009
Backhoe - 325 w/Hoe-Ram	180	X		6	9	2270002036	879	536.36	0.32	1.07	0.06	0.06	0.0028	0.15	0.012	0.59	55.22	0.033	0.110	0.0057	0.0057	0.0003	0.0150	0.0013
Backhoe/Loader - 430	100	X		6	9	2270002060	2,924	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	101.97	0.140	0.330	0.0335	0.0335	0.0006	0.0338	0.0023
Loader - 966 Wheel	262	X		6	9	2270002060	1,512	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	138.17	0.140	0.412	0.0271	0.0271	0.0008	0.0429	0.0032
Motor Grader - 14M	259	X		6	9	2270002048	633	536.34	0.41	1.25	0.07	0.07	0.0028	0.15	0.012	0.59	57.15	0.043	0.133	0.0079	0.0079	0.0003	0.0162	0.0013
Crane - 50 Ton Truck	280	X		6	5	2270002045	1,183	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	83.28	0.058	0.262	0.0119	0.0119	0.0005	0.0260	0.0019
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	1,616	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	65.00	0.062	0.223	0.0155	0.0155	0.0004	0.0218	0.0015
Crane - 150 Ton	170	X		6	5	2270002045	231	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	9.89	0.009	0.034	0.0024	0.0024	0.0001	0.0033	0.0002
CAT 815 COMPACTOR	200	X		6	9	2270002015	1,435	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	100.09	0.101	0.299	0.0196	0.0196	0.0006	0.0311	0.0023
Asphalt Compactor	140	X		6	7	2270002009	372	588.80	2.44	4.61	0.36	0.36	0.0040	0.49	0.012	0.43	14.53	0.060	0.114	0.0090	0.0090	0.0001	0.0121	0.0003
Asphalt Paver	175	X		6	7	2270002003	372	536.31	0.50	1.47	0.09	0.09	0.0029	0.16	0.012	0.59	22.71	0.021	0.062	0.0040	0.0040	0.0001	0.0068	0.0005
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	4,351	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	151.78	0.064	0.183	0.0100	0.0100	0.0008	0.0385	0.0035
Compressor - 1200 CFM	590	X		6	9	2270006015	201	530.40	0.83	3.02	0.13	0.13	0.0032	0.20	0.012	0.43	29.75	0.047	0.170	0.0075	0.0075	0.0002	0.0113	0.0007
Compressor - 365 CFM	105	X		6	9	2270006015	2,569	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	67.81	0.075	0.285	0.0184	0.0184	0.0004	0.0261	0.0016
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	2,569	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	32.32	0.037	0.196	0.0060	0.0060	0.0002	0.0099	0.0007
Nonroad Commercial Equipment																								
4 KW Light Plant	12	X		6	12	2270002027	9,257	588.86	2.40	4.55	0.35	0.35	0.0040	0.47	0.012	0.43	31.01	0.126	0.239	0.0186	0.0186	0.0002	0.0249	0.0006
Concrete Mixer	100	X		6	7	2270002042	1,212	529.98	1.17	4.09	0.23	0.23	0.0033	0.33	0.012	0.43	30.45	0.067	0.235	0.0133	0.0133	0.0002	0.0191	0.0007
Pressure washers	10		X	6	7	2265006030	2,700	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	26.48	7.023	0.054	0.0029	0.0029	0.0005	0.1283	0.0058
650KW GENERATOR, 3 PHASE, 220 V	500	X		6	9	2270006005	1,736	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	218.10	0.448	1.499	0.0668	0.0668	0.0013	0.1066	0.0051
Generator - 250 KW	433	X		6	9	2270006005	818	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	88.98	0.183	0.611	0.0272	0.0272	0.0005	0.0435	0.0021
Generator - 20 KW	35	X		6	9	2270006005	4,227	589.15	1.55	4.41	0.30	0.30	0.0036	0.38	0.012	0.43	41.32	0.109	0.309	0.0210	0.0210	0.0003	0.0266	0.0009
Wacker Compactor	6		X	6	9	2265002006	3,981	1,046.59	277.94	2.19	0.11	0.11	0.0191	5.11	0.229	0.55	15.15	4.024	0.032	0.0016	0.0016	0.0003	0.0740	0.0033
Tamper	3		X	6	9	2265002006	5,585	1,046.59	277.94	2.19	0.11	0.11	0.0191	5.11	0.229	0.55	10.63	2.823	0.022	0.0012	0.0012	0.0002	0.0519	0.0023
Pump - 4-Inch Water	22		X	6	24	2265006010	2,139	1,046.71	277.85	2.21	0.11	0.11	0.0191	5.10	0.229	0.69	37.47	9.947	0.079	0.0040	0.0040	0.0007	0.1826	0.0082
Pump - 2-Inch Water	10		X	6	24	2265006010	8,558	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	68.10	18.081	0.136	0.0077	0.0077	0.0012	0.3312	0.0149
Pump - 1500 GPM Fill	32		X	6	8	2265006010	617	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	10.57	0.237	0.025	0.0010	0.0010	0.0002	0.0075	0.0034
Pump - Test	32		X	6	8	2265006010	617	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	10.57	0.237	0.025	0.0010	0.0010	0.0002	0.0075	0.0034

On-road construction vehicles							Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)								2017 Emission Totals (Tons)							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		135,617	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051	179.05	0.217	0.539	0.0322	0.0296	0.0016	0.0767	0.0076
Pickup 4 x 4	300		X	6	4		115,714	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085	60.09	0.657	0.064	0.0015	0.0014	0.0004	0.0206	0.0108
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		31,937	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051	42.17	0.051	0.127	0.0076	0.0070	0.0004	0.0181	0.0018
Auto maintenance Truck	300		X	6	4		11,571	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085	6.01	0.066	0.006	0.0002	0.0001	0.0000	0.0021	0.0011
Truck - 1 Ton Flatbed	300	X		6	4		10,389	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051	13.72	0.017	0.041	0.0025	0.0023	0.0001	0.0059	0.0006
Truck - 3 Ton Flatbed	330	X		6	4		36,309	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051	47.94	0.058	0.144	0.0086	0.0079	0.0004	0.0205	0.0020
Truck - 4000 Gal Water	330	X		6	9		26,036	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051	34.37	0.042	0.104	0.0062	0.0057	0.0003	0.0147	0.0015
Truck - Mechanic Rig H.D.	300	X		6	4		11,571	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051	15.28	0.019	0.046	0.0027	0.0025	0.0001	0.0065	0.0006
Truck - 12 YD Dump	330	X		6	9		62,023	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051	81.89	0.099	0.247	0.0147	0.0135	0.0007	0.0351	0.0035

Construction Workers	Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)								2017 Emission Totals (Tons)							
	2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
Worker Commutes	589,857	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085	306.32	3.350	0.325	0.0079	0.0070	0.0020	0.1048	0.0551

Deliveries / Removals	Empty Vehicle Weight (tons)	Full Vehicle Weight (tons)	Round Trip Distance (miles)	Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)								2017 Emission Totals (Tons)							
				2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
On-road delivery vehicles																				
Truck - 4000 Gallon Fuel	13.5	27.5	50.0	11,700	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	14.51	0.016	0.039	0.0023	0.0021	0.0001	0.0060	0.0011
Truck - Fuel/Lube	5.0	10.0	50.0	11,700	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	14.51	0.016	0.039	0.0023	0.0021	0.0001	0.0060	0.0011
Heavy duty diesel vehicles (>6,000 lb GVW)	12	30	50	27,611	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	34.25	0.038	0.092	0.0054	0.0049	0.0003	0.0142	0.0026
On-road material removal vehicles																				
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0	13,806	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	17.12	0.019	0.046	0.0027	0.0025	0.0001	0.0071	0.0013

Construction Areas	Disturbed Acreage (Acre-months)	WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)								2017 Emission Totals (Tons)							
		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
Area under construction (Exposed Soils)	301	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	33.1433	3.3143	NA	NA	NA

Table 9D-48
NEXUS Project Construction Equipment Air Emissions - M&R 01 TGP Columbiana Co.

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	X		6	9	2270002069	116	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	9.49	0.007	0.023	0.0014	0.0014	0.0001	0.0027	0.0002
Backhoe/Loader - 430	100	X		6	9	2270002060	933	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	32.55	0.045	0.105	0.0107	0.0107	0.0002	0.0108	0.0007
Crane - 50 Ton Truck	280	X		6	5	2270002045	424	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	29.87	0.021	0.094	0.0043	0.0043	0.0002	0.0093	0.0007
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	424	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	17.07	0.016	0.059	0.0041	0.0041	0.0001	0.0057	0.0004
CAT 815 COMPACTOR	200	X		6	9	2270002015	363	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	25.29	0.026	0.075	0.0050	0.0050	0.0001	0.0078	0.0006
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	764	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	26.64	0.011	0.032	0.0018	0.0018	0.0001	0.0068	0.0006
Compressor - 365 CFM	105	X		6	9	2270006015	494	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	13.03	0.014	0.055	0.0035	0.0035	0.0001	0.0050	0.0003
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	494	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	6.21	0.007	0.038	0.0011	0.0011	0.0000	0.0019	0.0001
Nonroad Commercial Equipment																								
Pressure washers	10		X	6	7	2265006030	600	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	5.88	1.561	0.012	0.0006	0.0006	0.0001	0.0285	0.0013
Generator - 250 KW	433	X		6	9	2270006005	471	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	51.21	0.105	0.352	0.0157	0.0157	0.0003	0.0250	0.0012
Generator - 50 KW	100	X		6	9	2270006005	941	529.98	1.15	3.85	0.24	0.24	0.0033	0.33	0.012	0.43	23.64	0.051	0.172	0.0105	0.0105	0.0001	0.0148	0.0005
Generator - 20 KW	35	X		6	9	2270006005	1,543	589.15	1.55	4.41	0.30	0.30	0.0036	0.38	0.012	0.43	15.08	0.040	0.113	0.0077	0.0077	0.0001	0.0097	0.0003
Wacker Compactor	6		X	6	9	2265002006	602	1,046.59	277.94	2.19	0.11	0.11	0.0191	5.11	0.229	0.55	2.29	0.608	0.005	0.0002	0.0002	0.0000	0.0112	0.0005
Tamper	3		X	6	9	2265002006	602	1,046.59	277.94	2.19	0.11	0.11	0.0191	5.11	0.229	0.55	1.15	0.304	0.002	0.0001	0.0001	0.0000	0.0056	0.0003
Pump - 2-Inch Water	10		X	6	24	2265006010	1,317	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	10.48	2.782	0.021	0.0012	0.0012	0.0002	0.0510	0.0023
Pump - 1500 GPM Fill	32		X	6	8	2265006010	69	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	1.17	0.026	0.003	0.0001	0.0001	0.0000	0.0008	0.0004
Pump - Test	32		X	6	8	2265006010	69	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	1.17	0.026	0.003	0.0001	0.0001	0.0000	0.0008	0.0004
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		20,481	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		27.04	0.033	0.081	0.0049	0.0045	0.0002	0.0116	0.0011
Pickup 4 x 4	300		X	6	4		27,771	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		14.42	0.158	0.015	0.0004	0.0003	0.0001	0.0049	0.0026
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		4,937	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.52	0.008	0.020	0.0012	0.0011	0.0001	0.0028	0.0003
Auto maintenance Truck	300		X	6	4		5,091	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.64	0.029	0.003	0.0001	0.0001	0.0000	0.0009	0.0005
Truck - 3 Ton Flatbed	330	X		6	4		7,817	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		10.32	0.013	0.031	0.0019	0.0017	0.0001	0.0044	0.0004
Bus - 26 Passenger	300	X		6	4		5,091	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.72	0.008	0.020	0.0012	0.0011	0.0001	0.0029	0.0003

Construction Workers	Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)								2017 Emission Totals (Tons)							
	2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
Worker Commutes	91,629	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085	47.58	0.520	0.050	0.0012	0.0011	0.0003	0.0163	0.0086

Deliveries / Removals	Empty Vehicle Weight (tons)	Full Vehicle Weight (tons)	Round Trip Distance (miles)	Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)								2017 Emission Totals (Tons)							
				2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
On-road delivery vehicles																				
Truck - 4000 Gallon Fuel	13.5	27.5	50.0	1,714	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	2.13	0.002	0.006	0.0003	0.0003	0.0000	0.0009	0.0002
Truck - Fuel/Lube	5.0	10.0	50.0	1,714	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	2.13	0.002	0.006	0.0003	0.0003	0.0000	0.0009	0.0002
Heavy duty diesel vehicles (>6,000 lb GVW)	12	30	50	4,143	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	5.14	0.006	0.014	0.0008	0.0007	0.0000	0.0021	0.0004
On-road material removal vehicles																				
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0	1,381	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	1.71	0.002	0.005	0.0003	0.0002	0.0000	0.0007	0.0001

Construction Areas	Distrubed Acreage (acre months)	WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)								2017 Emission Totals (Tons)							
		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
Area under construction (Exposed Soils)	21	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	2.2983	0.2298	NA	NA	NA

Table 9D-49
NEXUS Project Construction Equipment Air Emissions - Kensington M&R

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	X		6	9	2270002069	116	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	9.49	0.007	0.023	0.0014	0.0014	0.0001	0.0027	0.0002
Backhoe/Loader - 430	100	X		6	9	2270002060	933	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	32.55	0.045	0.105	0.0107	0.0107	0.0002	0.0108	0.0007
Crane - 50 Ton Truck	280	X		6	5	2270002045	424	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	29.87	0.021	0.094	0.0043	0.0043	0.0002	0.0093	0.0007
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	424	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	17.07	0.016	0.059	0.0041	0.0041	0.0001	0.0057	0.0004
CAT 815 COMPACTOR	200	X		6	9	2270002015	363	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	25.29	0.026	0.075	0.0050	0.0050	0.0001	0.0078	0.0006
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	764	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	26.64	0.011	0.032	0.0018	0.0018	0.0001	0.0068	0.0006
Compressor - 365 CFM	105	X		6	9	2270006015	494	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	13.03	0.014	0.055	0.0035	0.0035	0.0001	0.0050	0.0003
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	494	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	6.21	0.007	0.038	0.0011	0.0011	0.0000	0.0019	0.0001
Nonroad Commercial Equipment																								
Pressure washers	10		X	6	7	2265006030	600	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	5.88	1.561	0.012	0.0006	0.0006	0.0001	0.0285	0.0013
Generator - 250 KW	433	X		6	9	2270006005	471	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	51.21	0.105	0.352	0.0157	0.0157	0.0003	0.0250	0.0012
Generator - 50 KW	100	X		6	9	2270006005	941	529.98	1.15	3.85	0.24	0.24	0.0033	0.33	0.012	0.43	23.64	0.051	0.172	0.0105	0.0105	0.0001	0.0148	0.0005
Generator - 20 KW	35	X		6	9	2270006005	1,543	589.15	1.55	4.41	0.30	0.30	0.0036	0.38	0.012	0.43	15.08	0.040	0.113	0.0077	0.0077	0.0001	0.0097	0.0003
Wacker Compactor	6		X	6	9	2265002006	602	1,046.59	277.94	2.19	0.11	0.11	0.0191	5.11	0.229	0.55	2.29	0.608	0.005	0.0002	0.0002	0.0000	0.0112	0.0005
Tamper	3		X	6	9	2265002006	602	1,046.59	277.94	2.19	0.11	0.11	0.0191	5.11	0.229	0.55	1.15	0.304	0.002	0.0001	0.0001	0.0000	0.0056	0.0003
Pump - 2-Inch Water	10		X	6	24	2265006010	1,317	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	10.48	2.782	0.021	0.0012	0.0012	0.0002	0.0510	0.0023
Pump - 1500 GPM Fill	32		X	6	8	2265006010	69	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	1.17	0.026	0.003	0.0001	0.0001	0.0000	0.0008	0.0004
Pump - Test	32		X	6	8	2265006010	69	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	1.17	0.026	0.003	0.0001	0.0001	0.0000	0.0008	0.0004
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		20,481	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		27.04	0.033	0.081	0.0049	0.0045	0.0002	0.0116	0.0011
Pickup 4 x 4	300		X	6	4		27,771	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		14.42	0.158	0.015	0.0004	0.0003	0.0001	0.0049	0.0026
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		4,937	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.52	0.008	0.020	0.0012	0.0011	0.0001	0.0028	0.0003
Auto maintenance Truck	300		X	6	4		5,091	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.64	0.029	0.003	0.0001	0.0001	0.0000	0.0009	0.0005
Truck - 3 Ton Flatbed	330	X		6	4		7,817	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		10.32	0.013	0.031	0.0019	0.0017	0.0001	0.0044	0.0004
Bus - 26 Passenger	300	X		6	4		5,091	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.72	0.008	0.020	0.0012	0.0011	0.0001	0.0029	0.0003

Construction Workers	Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)								2017 Emission Totals (Tons)							
	2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
Worker Commutes	91,629	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085	47.58	0.520	0.050	0.0012	0.0011	0.0003	0.0163	0.0086

Deliveries / Removals	Empty Vehicle Weight (tons)	Full Vehicle Weight (tons)	Round Trip Distance (miles)	Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)								2017 Emission Totals (Tons)							
				2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
On-road delivery vehicles																				
Truck - 4000 Gallon Fuel	13.5	27.5	50.0	1,714	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	2.13	0.002	0.006	0.0003	0.0003	0.0000	0.0009	0.0002
Truck - Fuel/Lube	5.0	10.0	50.0	1,714	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	2.13	0.002	0.006	0.0003	0.0003	0.0000	0.0009	0.0002
Heavy duty diesel vehicles (>6,000 lb GVW)	12	30	50	4,143	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	5.14	0.006	0.014	0.0008	0.0007	0.0000	0.0021	0.0004
On-road material removal vehicles																				
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0	1,381	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	1.71	0.002	0.005	0.0003	0.0002	0.0000	0.0007	0.0001

Construction Areas	Distrubed Acreage (acre months)	WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)								2017 Emission Totals (Tons)							
		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
Area under construction (Exposed Soils)	21	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	2.2983	0.2298	NA	NA	NA

Table 9D-50
NEXUS Project Construction Equipment Air Emissions - M&R 03 OPEN Columbiana Co.

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	X		6	9	2270002069	116	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	9.49	0.007	0.023	0.0014	0.0014	0.0001	0.0027	0.0002
Backhoe/Loader - 430	100	X		6	9	2270002060	933	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	32.55	0.045	0.105	0.0107	0.0107	0.0002	0.0108	0.0007
Crane - 50 Ton Truck	280	X		6	5	2270002045	424	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	29.87	0.021	0.094	0.0043	0.0043	0.0002	0.0093	0.0007
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	424	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	17.07	0.016	0.059	0.0041	0.0041	0.0001	0.0057	0.0004
CAT 815 COMPACTOR	200	X		6	9	2270002015	363	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	25.29	0.026	0.075	0.0050	0.0050	0.0001	0.0078	0.0006
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	764	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	26.64	0.011	0.032	0.0018	0.0018	0.0001	0.0068	0.0006
Compressor - 365 CFM	105	X		6	9	2270006015	494	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	13.03	0.014	0.055	0.0035	0.0035	0.0001	0.0050	0.0003
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	494	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	6.21	0.007	0.038	0.0011	0.0011	0.0000	0.0019	0.0001
Nonroad Commercial Equipment																								
Pressure washers	10		X	6	7	2265006030	600	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	5.88	1.561	0.012	0.0006	0.0006	0.0001	0.0285	0.0013
Generator - 250 KW	433	X		6	9	2270006005	471	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	51.21	0.105	0.352	0.0157	0.0157	0.0003	0.0250	0.0012
Generator - 50 KW	100	X		6	9	2270006005	941	529.98	1.15	3.85	0.24	0.24	0.0033	0.33	0.012	0.43	23.64	0.051	0.172	0.0105	0.0105	0.0001	0.0148	0.0005
Generator - 20 KW	35	X		6	9	2270006005	1,543	589.15	1.55	4.41	0.30	0.30	0.0036	0.38	0.012	0.43	15.08	0.040	0.113	0.0077	0.0077	0.0001	0.0097	0.0003
Wacker Compactor	6		X	6	9	2265002006	602	1,046.59	277.94	2.19	0.11	0.11	0.0191	5.11	0.229	0.55	2.29	0.608	0.005	0.0002	0.0002	0.0000	0.0112	0.0005
Tamper	3		X	6	9	2265002006	602	1,046.59	277.94	2.19	0.11	0.11	0.0191	5.11	0.229	0.55	1.15	0.304	0.002	0.0001	0.0001	0.0000	0.0056	0.0003
Pump - 2-Inch Water	10		X	6	24	2265006010	1,317	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	10.48	2.782	0.021	0.0012	0.0012	0.0002	0.0510	0.0023
Pump - 1500 GPM Fill	32		X	6	8	2265006010	69	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	1.17	0.026	0.003	0.0001	0.0001	0.0000	0.0008	0.0004
Pump - Test	32		X	6	8	2265006010	69	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	1.17	0.026	0.003	0.0001	0.0001	0.0000	0.0008	0.0004

On-road construction vehicles							Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)									2017 Emission Totals (Tons)							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		20,481	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		27.04	0.033	0.081	0.0049	0.0045	0.0002	0.0116	0.0011
Pickup 4 x 4	300		X	6	4		27,771	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		14.42	0.158	0.015	0.0004	0.0003	0.0001	0.0049	0.0026
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		4,937	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.52	0.008	0.020	0.0012	0.0011	0.0001	0.0028	0.0003
Auto maintenance Truck	300		X	6	4		5,091	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.64	0.029	0.003	0.0001	0.0001	0.0000	0.0009	0.0005
Truck - 3 Ton Flatbed	330	X		6	4		7,817	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		10.32	0.013	0.031	0.0019	0.0017	0.0001	0.0044	0.0004
Bus - 26 Passenger	300	X		6	4		5,091	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.72	0.008	0.020	0.0012	0.0011	0.0001	0.0029	0.0003

Construction Workers	Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)								2017 Emission Totals (Tons)							
	2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
Worker Commutes	91,629	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085	47.58	0.520	0.050	0.0012	0.0011	0.0003	0.0163	0.0086

Deliveries / Removals	Empty Vehicle Weight (tons)	Full Vehicle Weight (tons)	Round Trip Distance (miles)	Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)								2017 Emission Totals (Tons)							
				2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
On-road delivery vehicles																				
Truck - 4000 Gallon Fuel	13.5	27.5	50.0	1,714	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	2.13	0.002	0.006	0.0003	0.0003	0.0000	0.0009	0.0002
Truck - Fuel/Lube	5.0	10.0	50.0	1,714	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	2.13	0.002	0.006	0.0003	0.0003	0.0000	0.0009	0.0002
Heavy duty diesel vehicles (>6,000 lb GVW)	12	30	50	4,143	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	5.14	0.006	0.014	0.0008	0.0007	0.0000	0.0021	0.0004
On-road material removal vehicles																				
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0	1,381	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	1.71	0.002	0.005	0.0003	0.0002	0.0000	0.0007	0.0001

Construction Areas	Distrubed Acreage (acre months)	WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)								2017 Emission Totals (Tons)							
		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
Area under construction (Exposed Soils)	42	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	4.5922	0.4592	NA	NA	NA

Table 9D-51
NEXUS Project Construction Equipment Air Emissions - DTE Willow Run M&R

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	X		6	9	2270002069	116	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	9.49	0.007	0.023	0.0014	0.0014	0.0001	0.0027	0.0002
Backhoe/Loader - 430	100	X		6	9	2270002060	933	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	32.55	0.045	0.105	0.0107	0.0107	0.0002	0.0108	0.0007
Crane - 50 Ton Truck	280	X		6	5	2270002045	424	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	29.87	0.021	0.094	0.0043	0.0043	0.0002	0.0093	0.0007
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	424	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	17.07	0.016	0.059	0.0041	0.0041	0.0001	0.0057	0.0004
CAT 815 COMPACTOR	200	X		6	9	2270002015	363	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	25.29	0.026	0.075	0.0050	0.0050	0.0001	0.0078	0.0006
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	764	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	26.64	0.011	0.032	0.0018	0.0018	0.0001	0.0068	0.0006
Compressor - 365 CFM	105	X		6	9	2270006015	494	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	13.03	0.014	0.055	0.0035	0.0035	0.0001	0.0050	0.0003
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	494	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	6.21	0.007	0.038	0.0011	0.0011	0.0000	0.0019	0.0001
Nonroad Commercial Equipment																								
Pressure washers	10		X	6	7	2265006030	600	1,046.57	276.86	2.18	0.11	0.11	0.0191	5.09	0.229	0.85	5.88	1.556	0.012	0.0006	0.0006	0.0001	0.0286	0.0013
Generator - 250 KW	433	X		6	9	2270006005	471	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	51.21	0.105	0.352	0.0157	0.0157	0.0003	0.0250	0.0012
Generator - 50 KW	100	X		6	9	2270006005	941	529.98	1.15	3.85	0.24	0.24	0.0033	0.33	0.012	0.43	23.64	0.051	0.172	0.0105	0.0105	0.0001	0.0148	0.0005
Generator - 20 KW	35	X		6	9	2270006005	1,543	589.15	1.55	4.41	0.30	0.30	0.0036	0.38	0.012	0.43	15.08	0.040	0.113	0.0077	0.0077	0.0001	0.0097	0.0003
Wacker Compactor	6		X	6	9	2265002006	602	1,046.59	277.19	2.22	0.11	0.11	0.0191	5.13	0.229	0.55	2.29	0.607	0.005	0.0002	0.0002	0.0000	0.0112	0.0005
Tamper	3		X	6	9	2265002006	602	1,046.59	277.19	2.22	0.11	0.11	0.0191	5.13	0.229	0.55	1.15	0.303	0.002	0.0001	0.0001	0.0000	0.0056	0.0003
Pump - 2-Inch Water	10		X	6	24	2265006010	1,317	1,046.25	277.04	2.12	0.12	0.12	0.0191	5.11	0.229	0.69	10.48	2.774	0.021	0.0012	0.0012	0.0002	0.0512	0.0023
Pump - 1500 GPM Fill	32		X	6	8	2265006010	69	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	1.17	0.026	0.003	0.0001	0.0001	0.0000	0.0008	0.0004
Pump - Test	32		X	6	8	2265006010	69	703.99	15.71	1.71	0.07	0.07	0.0128	0.50	0.229	0.69	1.17	0.026	0.003	0.0001	0.0001	0.0000	0.0008	0.0004

On-road construction vehicles							Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)									2017 Emission Totals (Tons)							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		20,481	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		27.04	0.033	0.081	0.0049	0.0045	0.0002	0.0116	0.0011
Pickup 4 x 4	300		X	6	4		27,771	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		14.42	0.158	0.015	0.0004	0.0003	0.0001	0.0049	0.0026
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		4,937	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.52	0.008	0.020	0.0012	0.0011	0.0001	0.0028	0.0003
Auto maintenance Truck	300		X	6	4		5,091	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.64	0.029	0.003	0.0001	0.0001	0.0000	0.0009	0.0005
Truck - 3 Ton Flatbed	330	X		6	4		7,817	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		10.32	0.013	0.031	0.0019	0.0017	0.0001	0.0044	0.0004
Bus - 26 Passenger	300	X		6	4		5,091	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.72	0.008	0.020	0.0012	0.0011	0.0001	0.0029	0.0003

Construction Workers	Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)								2017 Emission Totals (Tons)							
	2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
Worker Commutes	91,629	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085	47.58	0.520	0.050	0.0012	0.0011	0.0003	0.0163	0.0086

Deliveries / Removals	Empty Vehicle Weight (tons)	Full Vehicle Weight (tons)	Round Trip Distance (miles)	Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)								2017 Emission Totals (Tons)							
				2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
On-road delivery vehicles																				
Truck - 4000 Gallon Fuel	13.5	27.5	50.0	1,714	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	2.13	0.002	0.006	0.0003	0.0003	0.0000	0.0009	0.0002
Truck - Fuel/Lube	5.0	10.0	50.0	1,714	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	2.13	0.002	0.006	0.0003	0.0003	0.0000	0.0009	0.0002
Heavy duty diesel vehicles (>6,000 lb GVW)	12	30	50	4,143	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	5.14	0.006	0.014	0.0008	0.0007	0.0000	0.0021	0.0004
On-road material removal vehicles																				
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0	1,381	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	1.71	0.002	0.005	0.0003	0.0002	0.0000	0.0007	0.0001

Construction Areas	Distrubed Acreage (acre months)	WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)								2017 Emission Totals (Tons)							
		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
Area under construction (Exposed Soils)	4	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	0.4369	0.0437	NA	NA	NA

Table 9D-52
NEXUS Project Construction Equipment Air Emissions - Dominion East Ohio M&R

On-site Road and Nonroad Construction Equipment	Equipment Engine HP	Fuel		Schedule		SCC	Number of Operating Hours	NONROAD2008a Emission Factor (g/hp-hr)								Engine Load Factor	2017 Emission Totals (Tons)							
		Diesel	Gasoline	days/week	hours/day		2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Nonroad construction equipment																								
Dozer - D7 w/Winch	235	X		6	9	2270002069	116	536.34	0.42	1.28	0.08	0.08	0.0029	0.15	0.012	0.59	9.49	0.007	0.023	0.0014	0.0014	0.0001	0.0027	0.0002
Backhoe/Loader - 430	100	X		6	9	2270002060	933	536.26	0.74	1.73	0.18	0.18	0.0030	0.18	0.012	0.59	32.55	0.045	0.105	0.0107	0.0107	0.0002	0.0108	0.0007
Crane - 50 Ton Truck	280	X		6	5	2270002045	424	530.51	0.37	1.67	0.08	0.08	0.0030	0.17	0.012	0.43	29.87	0.021	0.094	0.0043	0.0043	0.0002	0.0093	0.0007
Crane - Hydraulic 20 Ton	160	X		6	5	2270002045	424	530.47	0.50	1.82	0.13	0.13	0.0030	0.18	0.012	0.43	17.07	0.016	0.059	0.0041	0.0041	0.0001	0.0057	0.0004
CAT 815 COMPACTOR	200	X		6	9	2270002015	363	536.30	0.54	1.60	0.11	0.11	0.0030	0.17	0.012	0.59	25.29	0.026	0.075	0.0050	0.0050	0.0001	0.0078	0.0006
Nonroad Industrial Equipment																								
Forklift	100	X		6	9	2270003020	764	536.39	0.23	0.65	0.04	0.04	0.0027	0.14	0.012	0.59	26.64	0.011	0.032	0.0018	0.0018	0.0001	0.0068	0.0006
Compressor - 365 CFM	105	X		6	9	2270006015	494	530.39	0.58	2.23	0.14	0.14	0.0031	0.20	0.012	0.43	13.03	0.014	0.055	0.0035	0.0035	0.0001	0.0050	0.0003
SANDBLAST & RESIN SPRAY RIG (FBE)	45	X		6	9	2270003040	494	589.79	0.67	3.57	0.11	0.11	0.0032	0.18	0.012	0.43	6.21	0.007	0.038	0.0011	0.0011	0.0000	0.0019	0.0001
Nonroad Commercial Equipment																								
Pressure washers	10		X	6	7	2265006030	600	1,046.57	277.61	2.15	0.11	0.11	0.0191	5.07	0.229	0.85	5.88	1.561	0.012	0.0006	0.0006	0.0001	0.0285	0.0013
Generator - 250 KW	433	X		6	9	2270006005	471	530.21	1.09	3.64	0.16	0.16	0.0032	0.26	0.012	0.43	51.21	0.105	0.352	0.0157	0.0157	0.0003	0.0250	0.0012
Generator - 50 KW	100	X		6	9	2270006005	941	529.98	1.15	3.85	0.24	0.24	0.0033	0.33	0.012	0.43	23.64	0.051	0.172	0.0105	0.0105	0.0001	0.0148	0.0005
Generator - 20 KW	35	X		6	9	2270006005	1,543	589.15	1.55	4.41	0.30	0.30	0.0036	0.38	0.012	0.43	15.08	0.040	0.113	0.0077	0.0077	0.0001	0.0097	0.0003
Wacker Compactor	6		X	6	9	2265002006	602	1,046.59	277.94	2.19	0.11	0.11	0.0191	5.11	0.229	0.55	2.29	0.608	0.005	0.0002	0.0002	0.0000	0.0112	0.0005
Tamper	3		X	6	9	2265002006	602	1,046.59	277.94	2.19	0.11	0.11	0.0191	5.11	0.229	0.55	1.15	0.304	0.002	0.0001	0.0001	0.0000	0.0056	0.0003
Pump - 2-Inch Water	10		X	6	24	2265006010	1,317	1,046.25	277.78	2.09	0.12	0.12	0.0191	5.09	0.229	0.69	10.48	2.782	0.021	0.0012	0.0012	0.0002	0.0510	0.0023
Pump - 1500 GPM Fill	32		X	6	8	2265006010	69	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	1.17	0.026	0.003	0.0001	0.0001	0.0000	0.0008	0.0004
Pump - Test	32		X	6	8	2265006010	69	703.99	15.75	1.69	0.07	0.07	0.0128	0.50	0.229	0.69	1.17	0.026	0.003	0.0001	0.0001	0.0000	0.0008	0.0004
On-road construction vehicles							**Number of Vehicle Miles Traveled**	**MOVES Emission Factors (g/VMT)**									**2017 Emission Totals (Tons)**							
								CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAPs
Welding Rig w/ 2 x 300 Amp	45	X		6	9		20,481	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		27.04	0.033	0.081	0.0049	0.0045	0.0002	0.0116	0.0011
Pickup 4 x 4	300		X	6	4		27,771	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		14.42	0.158	0.015	0.0004	0.0003	0.0001	0.0049	0.0026
NDT, U/T RIG, Mobil, Mainline	400	X		6	6		4,937	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.52	0.008	0.020	0.0012	0.0011	0.0001	0.0028	0.0003
Auto maintenance Truck	300		X	6	4		5,091	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085		2.64	0.029	0.003	0.0001	0.0001	0.0000	0.0009	0.0005
Truck - 3 Ton Flatbed	330	X		6	4		7,817	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		10.32	0.013	0.031	0.0019	0.0017	0.0001	0.0044	0.0004
Bus - 26 Passenger	300	X		6	4		5,091	1,197.75	1.45	3.61	0.22	0.20	0.0105	0.51	0.051		6.72	0.008	0.020	0.0012	0.0011	0.0001	0.0029	0.0003

Construction Workers	Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)								2017 Emission Totals (Tons)							
	2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
Worker Commutes	91,629	471.11	5.15	0.50	0.01	0.01	0.0031	0.16	0.085	47.58	0.520	0.050	0.0012	0.0011	0.0003	0.0163	0.0086

Deliveries / Removals	Empty Vehicle Weight (tons)	Full Vehicle Weight (tons)	Round Trip Distance (miles)	Number of Vehicle Miles Traveled	MOVES Emission Factors (g/VMT)								2017 Emission Totals (Tons)							
				2017	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
On-road delivery vehicles																				
Truck - 4000 Gallon Fuel	13.5	27.5	50.0	1,714	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	2.13	0.002	0.006	0.0003	0.0003	0.0000	0.0009	0.0002
Truck - Fuel/Lube	5.0	10.0	50.0	1,714	1,125.22	1.25	3.01	0.18	0.16	0.01	0.47	0.08	2.13	0.002	0.006	0.0003	0.0003	0.0000	0.0009	0.0002
Heavy duty diesel vehicles (>6,000 lb GVW)	12	30	50	4,143	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	5.14	0.006	0.014	0.0008	0.0007	0.0000	0.0021	0.0004
On-road material removal vehicles																				
Heavy duty diesel vehicles (>6,000 lb GVW)	12.0	30.0	50.0	1,381	1,125.22	1.25	3.01	0.18	0.16	0.0098	0.47	0.085	1.71	0.002	0.005	0.0003	0.0002	0.0000	0.0007	0.0001

Construction Areas	Distrubed Acreage (acre months)	WRAP Fugitive Dust Handbook Emission Factor (tons/acre-month)								2017 Emission Totals (Tons)							
		CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP	CO2	CO	NOx	PM10	PM25	SO2	VOC	HAP
Area under construction (Exposed Soils)	35	NA	NA	NA	0.11	0.01	NA	NA	NA	NA	NA	NA	3.8665	0.3866	NA	NA	NA

APPENDIX 9E

Results of the Ambient Sound Survey and Acoustical Analysis for each Compressor Station Associated with the NEXUS Project

HANOVERTON COMPRESSOR STATION
(COLUMBIANA COUNTY, OHIO)

RESULTS OF AN AMBIENT SOUND SURVEY AND ACOUSTICAL ANALYSIS OF THE NATURAL GAS COMPRESSOR STATION ASSOCIATED WITH THE NEXUS GAS TRANSMISSION PROJECT

H&K Report No. 3224

H&K Job No. 4875

Date of Report: June 9, 2015

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REPORT SUMMARY

This report provides the results of an acoustical analysis for the new **Hanoverton Compressor Station** (referred to as "Station" or "CS-1" in the report) associated with the proposed **NEXUS Gas Transmission Project** ("Project" or "NEXUS Project"). Also included are the results of the recent ambient sound survey at the proposed site of the Station. The intent of the acoustical analysis is to project the sound contribution of the Station during full load operation and determine noise control measures to insure that applicable sound criteria are not exceeded at the nearby noise-sensitive areas (NSAs). The purpose of the ambient sound survey was to identify and verify the nearby NSAs surrounding the Station and to quantify the current ambient sound environment at the nearby NSAs.

The following table summarizes the ambient sound level at the identified closest NSAs, the estimated sound level contribution of the Station at the closest NSAs if the Station was operated at full load and the total sound level contribution of the Station (i.e., sound level contribution of the Station plus the ambient noise level). The results provided in this table are referred to as the "Noise Quality Analysis" for the Station.

Noise Quality Analysis for Hanoverton Compressor Station associated with the NEXUS Project

Closest NSA(s) and Type of NSA	Distance and Direction of NSA to Station Site Center	Ambient Ldn (via Meas'd Ld & Est'd Ln)	Est'd Sound Level (Ldn) of the Station at Full Load	Est'd "Total" Ldn (Station Noise + Ambient Noise)	Potential Noise Increase
NSA #1 (Residences)	1,040 ft. (SSE)	46.4 dBA	51.0 dBA	52.3 dBA	5.9 dB
NSA #2 (Residence)	1,680 ft. (west)	45.5 dBA	45.9 dBA	48.7 dBA	3.2 dB
NSA #3 (Residence)	1,800 ft. (NE)	41.1 dBA	45.2 dBA	46.6 dBA	5.5 dB
NSA #4 (Residence)	1,740 ft. (south)	45.5 dBA	45.6 dBA	48.5 dBA	3.0 dB
NSA #5 (Residence)	1,900 ft. (SW)	45.5 dBA	44.7 dBA	48.1 dBA	2.6 dB

The results of the acoustical analysis indicates that if the anticipated and/or recommended noise control measures are implemented successfully, the sound contribution of the proposed Station should be equal to or lower than **55 dBA** (L_{dn}) at the nearby NSAs, which is the FERC sound level requirement for this type of facility. In addition, the acoustical analyses indicate that the noise of construction activities and noise resulting from a unit blowdown event at the Station should have limited noise impact on the surrounding environment. Also, since Station noise sources that could cause perceptible vibration (e.g., turbine exhaust noise) will be adequately mitigated, there should not be any perceptible increase in vibration at any NSA during Station operation.

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1.0 INTRODUCTION

In this report, **Hoover & Keith Inc.** (H&K) presents the results of an acoustical analysis for the new **Hanoverton Compressor Station** (referred to as "Station" or "CS-1" in the report) associated with the proposed **NEXUS Gas Transmission Project** ("Project" or "NEXUS Project"). Also included are the results of the recent ambient sound survey at the proposed site of the Station. The following summarizes the purpose of the ambient sound survey and Station acoustical analysis:

(1) Quantify the existing acoustic environment (i.e., measure the typical ambient sound levels) and verify the current noise-sensitive areas (NSAs) around the Station, such as residences, hospitals and schools;

(2) Estimate the sound level contribution of the Station at the nearby NSAs and estimate the "total" Station sound level contribution (i.e., Station noise plus the ambient sound level);

(3) Determine noise mitigation measures to insure that applicable sound level criteria are not exceeded after installation and full load operation of the Station; and

(4) Project the noise at the nearby NSAs resulting from construction activities at the Station, and estimate the noise contribution due to a unit blowdown event at the Station.

2.0 SOUND CRITERIA

Federal: It is anticipated that certificate conditions of the Office of Energy Projects (OEP) of the Federal Energy Regulatory Commission (FERC) will require that the sound level attributable to a new natural gas compressor station during full load operation not exceed a day-night average sound level (i.e., L_{dn}) of **55 dBA** at any nearby NSA. In addition, the operation of the Station should not result in a perceptible increase in vibration at any nearby NSA. The L_{dn} is an energy average of the measured daytime L_{eq} (L_d) and measured nighttime L_{eq} (L_n) plus **10 dB**. The **10-dB** adjustment to the L_n is intended to compensate for nighttime sensitivity. For a steady sound source that operates continuously over a 24-hour period and controls the environmental sound level, the L_{dn} is approximately **6.4 dB** above the measured L_{eq}. Consequently, an L_{dn} of **55 dBA** corresponds to a L_{eq} of **48.6 dBA**. If both the L_d and L_n are measured and/or estimated, then the L_{dn} is calculated using the following formula:

$$L_{\mathrm{dn}} = 10\log_{10}\left(\frac{15}{24}10^{L_{\mathrm{d}}/10} + \frac{9}{24}10^{(L_{\mathrm{n}}+10)/10}\right)$$

State of Ohio: The State of Ohio or the Ohio EPA does not have regulations related to acceptable noise levels. We understand that sometimes noise level regulations are covered under local ordinances or city codes (e.g., public nuisance and limit excessive noise between certain hours).

County/Township: Columbiana County Code of Ordinances includes "nuisance-type" of noise and vibration requirements for facilities in "Light Industrial Districts". In summary, the code of ordinances states that facilities should not be offensive to the occupants of adjacent premises or the community at large by reason of noise/vibration disturbances. No applicable local/township noise regulations have been identified, although any local noise regulations, if required, will be addressed during the local permitting process.

3.0 SITE/FACILITY DESCRIPTION

Figure 1 (**Appendix**, p. 11) provides an area layout around the Station that shows the NSAs within 1 mile of the Station and other areas of interest. **Figure 2** (**Appendix**, p. 12) provides a layout around the Station that shows the identified closest NSAs, reported sound measurement positions near the identified closest NSAs and a conceptual layout of equipment and buildings at the Station. The Station will be located in Columbiana County, Ohio, approximately 1 mile south of Hanoverton, OH. There are a few NSAs (e.g., residences) located within 1 mile of the Station, and the closest NSAs are residences located 1,040 south-southeast (SSE) of the Station (along Railroad Street).

The proposed Station will consist of two (2) Solar Titan 250 gas turbine-driven centrifugal gas compressor units [i.e., 30,000 horsepower (HP) rating (ISO/each)]. We understand that the turbines and compressors for the compressor units will be installed inside an acoustically-insulated metal building (i.e., Compressor Building). The following describes the anticipated auxiliary equipment and other notable items associated with the Station compressor units:

- Outdoor lube oil cooler ("LO cooler");
- Turbine exhaust system designed with an adequate muffler system;
- Turbine air intake filter system designed with in-duct silencer;
- Gas piping and associated piping components, and most gas piping will be buried;
- Gas aftercooler (i.e., air-cooled heat exchanger) that serves the compressor units; and
- Gas blowdown silencer associated with a unit blowdown.

There will also be two (2) types of gas blowdown events: (1) gas blowdown that occurs when a compressor is stopped and gas between the suction/discharge valves and compressor is vented to the atmosphere ("unit blowdown") via a blowdown silencer, and (2) emergency shutdown ("ESD") that will only occur at required Department of Transportation (DOT) test intervals or in an emergency situation (e.g., gas leak or fire). The unit blowdown will be a "maintenance" type of unit blowdown which can occur when the compressor unit is stopped and gas between the suction/discharge valves and compressor unit is vented to the atmosphere through a silencer. During the period of commissioning and testing, it is estimated that a unit blowdown could occur 2 to 4 times/day and typically only during the daytime. During normal operation of the Station (i.e., after the commissioning period), a unit blowdown event occurs infrequently (e.g., 1 to 3 times/month). In addition, a unit blowdown event only occurs for a short time frame (e.g., unit

blowdown event would persist for approximately 1 to 5 minutes). There also can be an emergency shutdown ("ESD") that will only occur only during an emergency situation (e.g., gas leak or fire), which rarely occurs, noting that some natural gas facilities operate for years without having an ESD, and the gas blowdown related to an ESD may be vented via a blowdown silencer. Note that for required DOT test intervals of the ESD operations (e.g., once or twice a year), it is not necessary to vent/blowdown the pipeline gas to atmosphere.

4.0 MEASUREMENT METHODOLOGY, MEASUREMENT LOCATIONS AND CONDITIONS

Ambient sound levels were measured near three (3) of the identified closest NSAs (i.e., "NSA #1", "NSA #2" & "NSA #3"). The following provides a description of the identified closest surrounding NSAs and the reported sound measurement positions ("Pos."):

Pos. 1: Near NSA #1 (closest NSA): Residences located 1,040 feet south-southeast (SSE) of the Station site center (i.e., anticipated location of the Compressor Building);

Pos. 2: Near NSA #2: Residence located approximately 1,680 feet west of Station site center;

Pos. 3: Near NSA #3: Residence located 1,800 feet northeast (NE) of the Station site center,

NSA #4: Residence located approximately 1,740 feet south of the Station site center, and in our opinion, the ambient sound level measured at Meas. Pos. 2 is representative of the ambient sound level at NSA #4; and

NSA #5: Residence located approximately 1,900 feet southwest (SW) of the Station site center, and in our opinion, the ambient sound level measured at Meas. Pos. 2 is representative of the ambient sound level at NSA #5.

The sound survey was conducted by Garrett Porter of H&K during the daytime of Feb. 3, 2015. During the site ambient sound survey, the temperature was 27 degrees F, the wind was from the west and there were overcast sky conditions. At the reported sound measurement locations, the A-wt. equivalent sound levels (i.e., L_{eq}) and the unweighted octave-band (O.B.) sound pressure levels (SPLs) were measured at approximately 5 feet above ground. The sound measurements attempted to exclude "extraneous sound" such as the noise contribution of occasional vehicle passing by the measurement position and/or other intermittent sources. The acoustical measurement system consisted of a Rion NA-27 Sound Level Meter (a Type 1 SLM per ANSI S1.4 & S1.11) equipped with microphone, covered with a windscreen. The SLM was calibrated with a microphone calibrator (calibrated within 1 year of the test date).

5.0 MEASUREMENT RESULTS AND OBSERVATIONS

Table A (**Appendix**, p. 13) summarizes the measured daytime L_{eq} (L_d) and the estimated nighttime L_{eq} (L_n) at the NSA sound measurement locations along with the average of the measured L_d since several samples of the ambient sound level were measured. **Table A** also includes the resulting ambient L_{dn} as calculated from the measured L_d and estimated L_n. Meteorological conditions that occurred during the sound survey are summarized in **Table B** (**Appendix**, p. 13). The measured daytime sound levels (L_d) and related unweighted O.B. SPLs at the reported sound measurement positions are provided in **Table C** (**Appendix**, p. 13).

The following **Table 1** summarizes the measured ambient L_d and estimated ambient L_n at the closest NSAs along with the resulting ambient L_{dn} at the closest NSAs, as calculated from the measured ambient L_d and estimated L_n.

Meas. Pos.	Description of the Identified Closest NSAs, as related to the Sound Measurement Location	Meas'd Ambient Ld	Est'd Ambient Ln	Resulting Ambient Ldn
Pos. 1	NSA #1: Residences 1,040 ft. SSE of the Station	46.4 dBA	36.4 dBA	46.4 dBA
Pos. 2	NSA #2: Residence 1,680 ft. west of the Station; NSA #4 (1,740 ft. south of Station); NSA #5 (1,900 ft. SW of Station)	45.5 dBA	35.5 dBA	45.5 dBA
Pos. 3	NSA #3: Residence 1,800 ft. NE of the Station	40.2 dBA	32.2 dBA	41.1 dBA

Table 1: Summary of the Measured Ld, Estimated Ln and Resulting Ambient Ldn at the Closest NSAs

It is our opinion that the measured sound level data adequately quantifies the existing ambient sound level for the meteorological conditions that occurred during the sound survey. The ambient L_n were not measured but were estimated based on our site observations to provide a more accurate representation of the ambient L_{dn} (i.e., ambient nighttime levels could be lower than the measured daytime levels). At the reported sound measurement location near all of the identified NSAs, noise sources that contributed to the ambient A-wt. sound level included primarily the noise of distant vehicle traffic, sound of birds and at times, sound of wind blowing in trees.

6.0 ACOUSTICAL ANALYSIS (COMPRESSOR STATION)

6.1 Sound Level Contribution of the Station

The acoustical analysis considers the noise produced by equipment for the Station compressor units that could impact the sound contribution at any NSA. The predicted sound contribution of the Station were performed only for the closest NSAs (i.e., NSA #1, NSA #2, NSA #3, NSA #4 & NSA #5) since the Station sound contribution at other more distant NSAs should be equal to or less than the predicted Station sound level at these closest NSAs. A description of the acoustical analysis methodology and source of sound data for the analysis is provided in the **Appendix** (pp. 17–18). The following sound sources were considered significant and included in the Station acoustical analysis:

- Noise generated by the turbines/compressors that penetrates the Compressor Building;
- Noise of the turbine exhaust radiated from the turbine exhaust stack for each unit;
- Noise radiated from aboveground/outdoor gas piping and associated components;
- Noise of the outdoor LO coolers and associated outdoor piping;
- Noise generated by the turbine air intake systems, and
- Noise of the gas aftercooler(s) and associated aboveground piping.

Table D (**Appendix**, p. 14) shows the spreadsheet analysis of the estimated A-wt. sound level and unweighted O.B. SPLs at the closest NSA ("NSA #1") contributed by the Station compressor units during full load operation for standard day propagating conditions (i.e., no wind, 60 deg. F., 70% R.H.). Included in **Table D** is the estimated "total" sound level contribution of the Station at NSA #1 (i.e., sound level contribution of the Station plus the ambient sound level).

Table E (**Appendix**, p. 15) provides the estimated A-wt. sound level and unweighted O.B. SPLs of the Station at NSA #2 based on the acoustical analysis at NSA #1, along with the estimated total sound level contribution of the Station at NSA #2 (i.e., sound level contribution of the Station plus the ambient sound level).

Table F (**Appendix**, p. 15) provides the estimated A-wt. sound level and unweighted O.B. SPLs of the Station at NSA #3 based on the acoustical analysis at NSA #1, along with the estimated total sound level contribution of the Station at NSA #3 (i.e., sound level contribution of the Station plus the ambient sound level).

Table G (**Appendix**, p. 16) provides the estimated A-wt. sound level and unweighted O.B. SPLs of the Station at NSA #4 based on the acoustical analysis at NSA #1, along with the estimated total sound level contribution of the Station at NSA #4 (i.e., sound level contribution of the Station plus the ambient sound level).

Table H (**Appendix**, p. 16) provides the estimated A-wt. sound level and unweighted O.B. SPLs of the Station at NSA #5 based on the acoustical analysis at NSA #1, along with the estimated total sound level contribution of the Station at NSA #5 (i.e., sound level contribution of the Station plus the ambient sound level).

The following **Table 2** summarizes the calculated sound level contribution of the Station at the identified closest NSAs assuming full load operation of all equipment associated with the Station, noting that the estimated A-wt. sound level was used to calculate the representative L_{dn}.

Operating Condition and associated NSA	Est'd A-Wt. Sound Level of Station	Calc'd Ldn (via Est'd A-Wt. Level)
Est'd sound contribution of Station during full load operation at NSA #1	44.6 dBA	51.0 dBA
Est'd sound contribution of Station during full load operation at NSA #2	39.5 dBA	45.9 dBA
Est'd sound contribution of Station during full load operation at NSA #3	38.8 dBA	45.2 dBA
Est'd sound contribution of Station during full load operation at NSA #4	39.2 dBA	45.6 dBA
Est'd sound contribution of Station during full load operation at NSA #5	38.3 dBA	44.7 dBA

Table 2: Estimated Sound Contribution of the Station during Full Load Operation at the Closest NSAs

6.2 Sound Contribution of a Unit Blowdown Event at the Station

The noise level of the unit blowdown event via a blowdown silencer will be specified to meet an A-wt. sound level of **60 dBA** at a distance of 300 feet. If this sound requirement is achieved, the noise of a unit blowdown will be approximately **46 dBA** (i.e., L_{dn} of approximately **52 to 53 dBA**) at the closest NSA, located approximately 1,040 feet from the unit blowdown silencer, which would be lower than **55 dBA** (L_{dn}). Consequently, although the noise of a unit blowdown event could be slightly audible at the nearby NSAs, it is not expected to present a noise impact, noting also that a unit blowdown event occurs infrequently for a short time frame (e.g., 1 to 5 minute period). A description of the acoustical analysis methodology and source of sound data related to blowdown noise are provided in the **Appendix** (p. 18)

7.0 ACOUSTICAL ANALYSIS (SITE CONSTRUCTION ACTIVITIES)

The acoustical analysis of the construction-related activities at the site of the Station considers the noise produced by any significant sound sources associated with the primary construction equipment that could impact the sound contribution at the nearby NSAs. The predicted sound contribution of construction equipment/activities was performed only for the closest NSA (i.e., NSA #1). Construction of the Station will consist of earth work (e.g., site grading, clearing and grubbing) and construction of the Station buildings, and it is assumed that the highest level of construction noise would occur during site earth work (i.e., time frame when the largest amount of construction equipment would operate).

Table I (**Appendix**, p. 19) shows the calculation of the estimated maximum A-wt. sound level at the closest NSA contributed by the construction activities at the Station for standard day propagating conditions. A description of the methodology and source of sound data for the construction noise analysis are provided in the **Appendix** (p. 20). The analysis indicates that the maximum A-wt. noise level of construction activities at the closest NSA would be equal to or less than **53 dBA** (i.e., L_{dn} of approximately **51 dBA**, since nighttime construction activities are not anticipated).

8.0 NOISE CONTROL MEASURES (COMPRESSOR STATION)

The following section provides the recommended noise control measures and equipment sound level requirements along with other assumptions that may affect the noise of the Station.

8.1 Building enclosing the Turbines/Compressors

We understand that the turbines and compressors will be installed inside an acoustically-insulated metal building (i.e., Compressor Building). The following describes specific sound requirements and other items related to the components of the Compressor Building.

- As a minimum, walls/roof should be constructed with an exterior skin of 22–gauge metal. In addition, building interior surfaces should be covered with a minimum of 6–inch thick "high-density" mineral wool or fiberglass (i.e., 6.0–8.0 pcf uniform density) covered with a perforated liner. Note that "low-density" insulation (e.g., 0.6 to 0.75 pcf density) should **not** be substituted for the high-density material although low-density insulation could be employed in addition to the high-density insulation;

- No windows or louvers should be installed in the building walls; Personnel entry doors should be a **STC-36 sound rating**, even if glazing is employed, and should be self-closing and should seal well when closed; Large access doors ("roll-up doors") should seal well when closed and consist of an insulated-type door (e.g., 18-ga. exterior facing, 24-ga. backskin with insulation core);

- It is anticipated that the building air ventilation system will be designed with air supply fans mounted in the building walls along with roof-mounted air exhaust vents. Assuming this type of air ventilation system, the sound level for each wall air-supply fan should not exceed **50 dBA** at **50 feet**, which will require that each supply fan employ an exterior dissipative-type silencer (e.g., minimum 3-ft. length) and an acoustically-lined weatherhood.

8.2 Turbine Exhaust System

The turbine exhaust system for each compressor unit should include a silencer system that provides the following dynamic sound insertion loss ("DIL") values at rated operating conditions.

DIL Values for the Exhaust Silencer System in dB per Octave-Band (O.B.) Center Freq. (Hz)

31.5	63	125	250	500	1000	2000	4000	8000
5	16	25	35	45	45	45	35	30

To meet these recommended DIL values and minimize the impact of the turbine exhaust noise at surrounding residences, a "2–stage" exhaust silencer system should be implemented. One (1) of the 2-stage silencers should be employed horizontally in the exhaust ducting located inside the Compressor Building for the compressor unit (i.e., "1st stage silencer"), and the other silencer

system could be integrated into the vertical outdoor exhaust stack (i.e., "2nd stage silencer") or in the horizontal exhaust ducting located outside the Compressor Building. If a CO converter is employed, which is anticipated, it is assumed that a CO converter system would be inserted upstream of the 1st stage silencer, inside the Compressor Building.

8.3 Outdoor Aboveground Gas Piping

The acoustical analysis indicates that noise control measures, such as acoustical pipe insulation, will be required for outdoor aboveground gas piping to meet applicable sound criteria. The following items associated with the gas piping and piping components should be addressed:

- Acoustical pipe insulation should be employed for aboveground suction and discharge gas piping. Acoustical pipe insulation should consist of a minimum 3-inch thick fiberglass or mineral wool (6.0-8.0 pcf density) that is covered with a mass-filled vinyl jacket (e.g., composite of 1.0 psf mass-filled vinyl laminated to 0.020-inch thick aluminum). All exposed pipe supports for the insulated gas piping should be covered with acoustical material;

- Outdoor valves should be covered with acoustical blanket material. Filter–separator(s) and associated aboveground gas piping should not have to be covered with acoustical material. It is also recommended that the suction pipe strainer for the compressor units be removed soon after the Station is placed in service, if feasible.

8.4 Lube Oil Cooler

The LO cooler should not exceed **60 dBA** at **50 feet** from the cooler perimeter at the full rated operating conditions (i.e., equivalent to a PWL of **92–93 dBA**). Note that a "standard" Solar LO cooler may not be capable of meeting this sound requirement, and consequently, a "special" or "custom" LO cooler will be required to meet the recommended sound requirement.

8.5 Turbine Air Intake System

The turbine air intake system for each compressor unit should be designed with at least one (1) in-duct silencer (e.g., 7-ft. length "special" silencer or combination of 2 Solar "standard" silencers), and at least one of the silencers (i.e., if 2 separate silencers are employed) should be installed in the intake ductwork located inside the Compressor Building. As a minimum, the air intake silencer system should provide the following DIL values at the rated operating conditions of the turbine-driven compressor units, noting that only one (1) "standard" Solar air intake silencer may not be capable of meeting these DIL values.

DIL Values in dB per O.B. Center Frequency for the Turbine Air Intake System

31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
4	10	20	35	45	55	60	60	55

8.6 Gas Aftercooler

The sound level generated by any multi-fan gas cooler that serves the compressor units should not exceed **62 dBA** at **50 feet** at the full rated operating conditions (i.e., all fans operating at maximum design speed). To meet this sound level requirement, the gas aftercooler will need to be designed with "low-noise" fans that operate at relatively low tip speeds (e.g., fans operating at below 7,200 fpm tip speeds). In addition, aboveground inlet pipe risers and inlet header (if above ground) for the gas cooler should be covered with acoustical pipe insulation.

8.7 Unit Blowdown Silencer

The unit blowdown silencer should attenuate the unsilenced blowdown noise to a noise level equal to or less than **60 dBA** at 300 feet from the outlet of the silencer, which includes the noise radiated from the shell of the silencer during the blowdown event.

9.0 SUMMARY AND FINAL COMMENT

The following **Table 3** summarizes the ambient sound level at the identified closest NSAs, the estimated sound level contribution of the Station at the closest NSAs during full load Station operation and the "total" sound level contribution of the Station (i.e., sound level contribution of Station during operation plus the ambient sound level). The results provided in this table are referred to as the "Noise Quality Analysis" for the Station.

Closest NSA(s) and Type of NSA	Distance and Direction of NSA to Station Site Center	Ambient Ldn (via Meas'd Ld & Est'd Ln)	Est'd Sound Level (Ldn) of the Station at Full Load	Est'd "Total" Ldn (Station Noise + Ambient Noise)	Potential Noise Increase
NSA #1 (Residences)	1,040 ft. (SSE)	46.4 dBA	51.0 dBA	52.3 dBA	5.9 dB
NSA #2 (Residence)	1,680 ft. (west)	45.5 dBA	45.9 dBA	48.7 dBA	3.2 dB
NSA #3 (Residence)	1,800 ft. (NE)	41.1 dBA	45.2 dBA	46.6 dBA	5.5 dB
NSA #4 (Residence)	1,740 ft. (south)	45.5 dBA	45.6 dBA	48.5 dBA	3.0 dB
NSA #5 (Residence)	1,900 ft. (SW)	45.5 dBA	44.7 dBA	48.1 dBA	2.6 dB

Table 3: Noise Quality Analysis for the Hanoverton Station associated with NEXUS Project

The results of the acoustical analysis indicates that if the noise control measures are employed successfully, the sound contribution of the Station should be equal to or lower than **55 dBA** (L_{dn}) at the nearby NSAs, which is the FERC sound level requirement for this type of facility. In addition, the acoustical analyses indicate that the noise of construction activities and noise resulting from a unit blowdown event at the Station should have limited noise impact on the surrounding environment. Also, since Station noise sources that could cause perceptible vibration (e.g., turbine exhaust noise) will be adequately mitigated, there should not be any perceptible increase in vibration at any NSA during Station operation.

APPENDIX

- **FIGURE 1: GENERAL AREA LAYOUT AROUND THE STATION SHOWING THE NSAs LOCATED WITHIN 1 MILE OF THE STATION AND OTHER AREAS OF INTEREST**
- **FIGURE 2: AREA LAYOUT SHOWING IDENTIFIED CLOSEST NSAs, REPORTED SOUND MEASUREMENT POSITIONS NEAR THE CLOSEST NSAs, AND CONCEPTUAL LAYOUT OF THE STATION SHOWING THE EQUIPMENT, BUILDINGS AND STATION FENCELINE**
- **SUMMARY OF THE MEASURED AMBIENT SOUND DATA**
- **ACOUSTICAL ANALYSIS (COMPRESSOR STATION)**
- **ANALYSIS METHODOLOGY (NOISE ATTRIBUTABLE TO THE STATION AND A BLOWDOWN EVENT) AND THE SOURCE OF SOUND DATA**
- **ACOUSTICAL ANALYSIS (CONSTRUCTION ACTIVITIES)**
- **DESCRIPTION OF THE ANALYSES METHODOLOGY (CONSTRUCTION ACTIVITIES) AND THE SOURCE OF SOUND DATA**

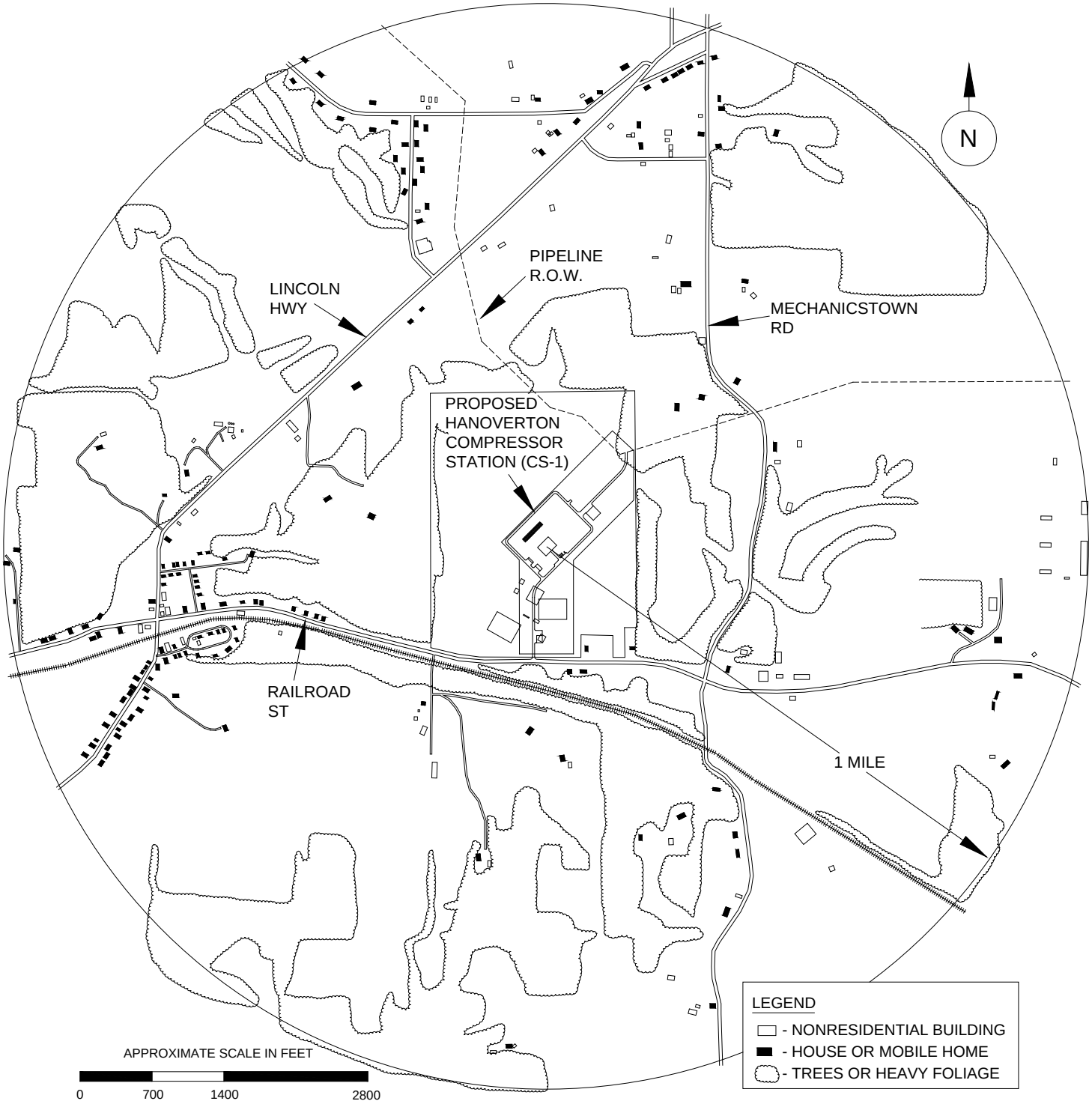

Figure 1: NEXUS Hanoverton Compressor Station (CS-1): General Area Layout showing the NSAs within 1 Mile of the Station Site and Other Areas of Interest.

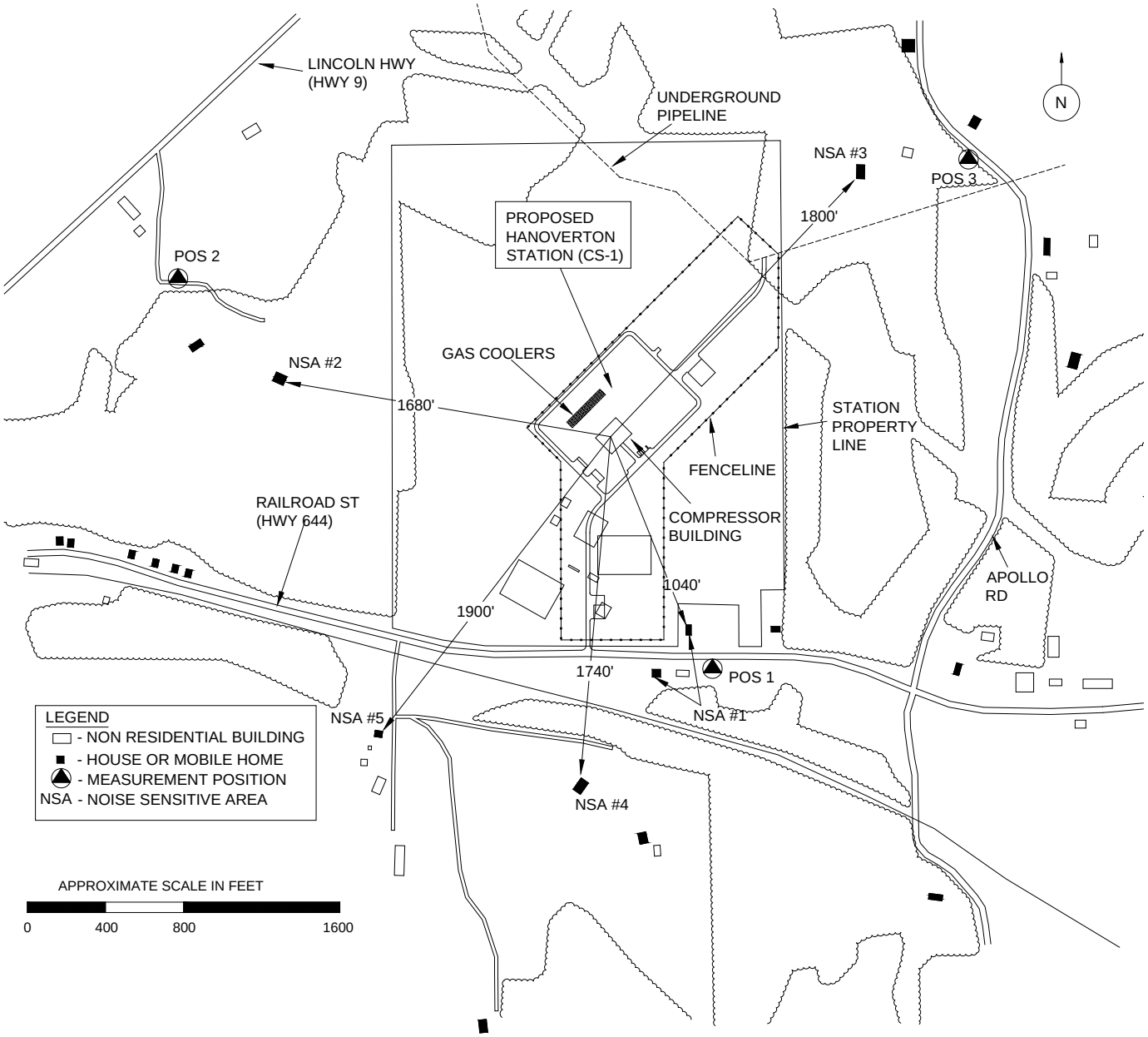

Figure 2: NEXUS Hanoverton Compressor Station (CS-1): Area Layout showing the Identified Closest NSAs, Chosen Sound Measurement Positions near the Closest NSAs and Conceptual Layout of Station Equipment and Buildings.

Measurement Set		Meas'd/Calc'd A-Wt. Levels (dBA)				
		Day-time	Avg'd of	Night time	Calc'd Ldn	
Meas. Pos. & NSA	Time/Date of Test	Leq(Ld)	Ld	Leq(Ln)	Note (2)	Notes/Observations
Pos. 1 (NSA #1)	12:01 PM (2/3/15)	46.2				Primary noise during tests: Sound of birds, sound of wind
Residences approx.	12:03 PM (2/3/15)	45.4	**46.4**	**36.4**	**46.4**	blowing in trees, noise of distant vehicle traffic traveling
1,040 ft. SSE of the	12:03 PM (2/3/15)	47.5		Note (1)	Note (2)	along Hwy. 644 (Railroad Street).
Station Site Center						
Pos. 2 (NSA #2)	12:12 PM (2/3/15)	43.0				Primary noise during tests: Noise of traffic along Lincoln
Residence approx.	12:13 PM (2/3/15)	48.1	**45.5**	**35.5**	**45.5**	Highway and sound of wind blowing in trees.
1,680 ft. west of the	12:14 PM (2/3/15)	45.3		Note (1)	Note (2)	Ambient levels at identified NSA #4 & NSA #5 should be
Station Site Center						similar to ambient levels at Pos. 2 (NSA #2).
Pos. 3 (NSA #3)	12:25 PM (2/3/15)	37.8				Primary noise during tests: Sound of wind in trees
Residence approx.	12:27 PM (2/3/15)	42.3	**40.2**	**32.2**	**41.1**	and noise of distant vehicle traffic.
1,800 ft. NE of the	12:28 PM (2/3/15)	40.5		Note (1)	Note (2)	
Station Site Center						

Table A: **Hanoverton Compressor Station (CS-1): Summary of Ambient Daytime Sound Levels (Ld) at the Closest NSAs, as Meas'd on Feb. 3, 2015, Est'd Nighttime Levels (Ln) and Resulting Ldn.**

Note (1): Nightime sound levels (Ln) were not measured but since there should be less noise during night, the Ln was estimated to provide a representative ambient Ldn (e.g., 3 to 10 dB subtracted from the daytime levels).

Note (2): Ldn calculated by adding 6.4 dB to the measured Ld. If both the Ld and Ln are measured and/or estimated, the Ldn is calculated using the following formula:

$$L_{\mathrm{dn}} = 10\log_{10}\left(\frac{15}{24}10^{L_{\mathrm{d}}/10} + \frac{9}{24}10^{(L_{\mathrm{n}}+10)/10}\right)$$

Measurement Set		Temp.	R.H.	Wind	Wind	Peak	
Meas. Pos.	Time Frame/Date of Tests	(°F)	(%)	Direction	Speed	Wind	Sky Conditions
Pos. 1 - 3	12:00 PM to 1:00 PM (2/3/15)	27	57	From the west	0-3 mph	4 mph	Overcast

Table B: **Hanoverton Compressor Station (CS-1): Summary of the Meteorological Conditions during the Ambent Sound Survey on Feb. 3, 2015.**

Measurement Set		Unweighted Sound Pressure Level (SPL) in dB per O.B. Frequency (in Hz)									A-Wt.
Meas. Pos. & NSA	Time/Date of Test	31.5	63	125	250	500	1000	2000	4000	8000	Level
Pos. 1 (NSA #1)	12:01 PM (2/3/15)	60.3	50.3	46.6	46.9	36.8	40.3	41.5	32.4	27.6	46.2
Residences approx.	12:03 PM (2/3/15)	59.3	48.8	41.6	36.5	36.1	41.3	40.6	33.7	30.5	45.4
1,040 ft. SSE of the	12:03 PM (2/3/15)	74.6	64.8	52.8	42.0	37.9	42.2	41.2	31.4	26.2	47.5
Station Site Center	**Avg. A-Wt. & SPL**	**64.7**	**54.6**	**47.0**	**41.8**	**36.9**	**41.3**	**41.1**	**32.5**	**28.1**	**46.4**
Pos. 2 (NSA #2)	12:12 PM (2/3/15)	66.8	46.7	41.5	39.4	38.8	39.9	34.6	27.0	22.3	43.0
Residence approx.	12:13 PM (2/3/15)	66.8	48.1	43.3	43.7	45.6	45.4	36.9	28.6	23.9	48.1
1,680 ft. west of the	12:14 PM (2/3/15)	66.3	47.1	42.5	38.9	41.8	42.1	36.7	31.5	26.4	45.3
Station Site Center	**Avg. A-Wt. & SPL**	**66.6**	**47.3**	**42.4**	**40.7**	**42.1**	**42.5**	**36.1**	**29.0**	**24.2**	**45.5**
Pos. 3 (NSA #3)	12:25 PM (2/3/15)	58.2	46.7	38.9	35.4	35.2	32.5	28.9	26.7	23.2	37.8
Residence approx.	12:27 PM (2/3/15)	53.3	42.6	40.5	38.6	39.3	39.3	30.6	29.0	26.2	42.3
1,800 ft. NE of the	12:28 PM (2/3/15)	52.1	45.0	40.0	35.2	35.0	38.1	31.5	26.6	23.5	40.5
Station Site Center	**Avg. A-Wt. & SPL**	**54.5**	**44.8**	**39.8**	**36.4**	**36.5**	**36.6**	**30.3**	**27.4**	**24.3**	**40.2**

Table C: **Hanoverton Compressor Station (CS-1): Measured Ambient Ld and Unweighted Octave-Band ("O.B.") SPLs at the Closest NSAs, as Measured on Feb. 3, 2015.**

Source No. & Dist (Ft)	Noise Sources and Other Conditions/Factors associated with Acoustical Analysis	Unweighted PWL or SPL in dB per O.B. Center Frequency (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
1)	PWL of Turbines/Compressors inside Building	108	112	114	116	118	115	115	120	118	125	
	Atten. of Additional Noise Control (Building)	-6	-10	-18	-25	-30	-35	-40	-45	-45		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	0	0	-1	-1	-2		
1040	Hemispherical Radiation	-58	-58	-58	-58	-58	-58	-58	-58	-58		
1040	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	-1	-2	-3	-8	-14		
1040	Source Sound Level Contribution	44	44	38	33	29	20	13	8	0	30	
2)	PWL of Unsilenced Titan 250 Exhaust (2 Units)	129	133	131	134	138	133	125	115	105	138	
	Atten. Of Noise Control (Exhaust Muffler)	-5	-16	-25	-40	-45	-45	-45	-35	-25		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	0	0	0	0	0		
1040	Hemispherical Radiation	-58	-58	-58	-58	-58	-58	-58	-58	-58		
1040	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	-1	-2	-3	-8	-14		
1040	Source Sound Level Contribution	66	59	48	36	34	28	19	14	8	38	
3)	PWL of the LO Cooler (1 Unit)	105	98	92	90	88	86	85	82	75	92	
	PWL of All LO Coolers for 2 Units (+3 dB)	108	101	95	93	91	89	88	85	78	95	
	Atten. of Additional Noise Control	0	0	0	0	0	0	0	0	0		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	0	0	-1	-1	-2		
1040	Hemispherical Radiation	-58	-58	-58	-58	-58	-58	-58	-58	-58		
1040	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	0	0	0	0		
1040	Source Sound Level Contribution	50	43	37	35	33	31	29	26	18	36	
4)	PWL of Outdoor Piping/Components	95	95	98	92	92	105	114	112	105	118	
	Atten. of Noise Control (Acoustical Insulation)	2	2	0	-2	-6	-10	-12	-15	-15		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	-1	-2	-4	-5	-5		
1040	Hemispherical Radiation	-58	-58	-58	-58	-58	-58	-58	-58	-58		
1040	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-2	-1	-2	-3	-8	-14		
1040	Source Sound Level Contribution	39	39	40	30	26	33	37	26	13	40	
5)	PWL of Unsilenced Titan 250 Intakes (2 Units)	119	122	131	132	133	135	138	177	169	178	
	Est'd Attenuation of Intake Silencer System	-2	-10	-15	-25	-30	-40	-50	-60	-50		
	Est'd Attenuation of Air Intake Filter	-1	-4	-6	-15	-20	-25	-28	-30	-30		
1040	Hemispherical Radiation	-58	-58	-58	-58	-58	-58	-58	-58	-58		
1040	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	-1	-2	-3	-8	-14		
1040	Source Sound Level Contribution	58	50	52	34	24	10	0	21	17	37	
6)	PWL of All Outdoor Gas Aftercooler(s)	115	108	95	94	92	90	86	84	82	95	
	Atten. of Additional Noise Control	0	0	0	0	0	0	0	0	0		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	0	0	-1	-1	-2		
1150	Hemispherical Radiation	-59	-59	-59	-59	-59	-59	-59	-59	-59		
1150	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	-1	-2	-3	-9	-16		Calc'd
1150	Source Sound Level Contribution	56	49	36	35	32	29	23	15	5	34	Ldn
Est'd Total Sound Contribution of Sources at NSA #1		**67**	**60**	**54**	**42**	**39**	**37**	**38**	**30**	**21**	**44.6**	**51.0**

Ambient Sound Level (Ldn) at the NSA	**46.4**
Sound Contribution of Station (Ldn) plus Ambient Sound Level (Ldn)	52.3
Potential Increase above Ambient Sound Level (dB)	**5.9**

Table D: Hanoverton Compressor Station (CS-1): Est'd Sound Contribution of Station at NSA #1 (i.e., Residences located approx. 1,040 Ft. SSE of the Site Center) assuming Operation of Two (2) Solar Titan 250 Turbine-Driven Compressor Units. In addition, Estimated Increase above the Ambient Sound Level.

NOTE: Muffler DIL & Equipment PWL values on this spreadsheet should not be used as the specified values. Refer to "Noise Control Measures" section in report or other company specifications for actual specified values.

Dist (Ft.)	Noise Sources and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL in dB per O.B. Center Frequency (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Est'd SPLs of Station at 1,040 Ft. (RE: Table D)	67	60	54	42	39	37	38	30	21	44.6	
1680	Hemisph Radiation [20*log(1680/1040)=4.2 dB]	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2		Calc'd
1680	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-2	-5	-9		Ldn
Est'd Total Sound Contribution of Station at NSA #4		**63**	**56**	**50**	**37**	**34**	**32**	**32**	**21**	**8**	**39.5**	**45.9**

Ambient Sound Level (Ldn) at the NSA	**45.5**
Sound Contribution of Station (Ldn) plus Ambient Sound Level (Ldn)	48.7
Potential Increase above Ambient Sound Level (dB)	**3.2**

Table E: Hanoverton Compressor Station (CS-1): Est'd Sound Contribution of Station at NSA #2 (i.e., Residence located approx. 1,680 Ft. West of the Site Center) assuming Operation of Two (2) Solar Titan 250 Turbine-Driven Compressor Units. In addition, Estimated Increase above the Ambient Sound Level.

Dist (Ft.)	Noise Sources and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL in dB per O.B. Center Frequency (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Est'd SPLs of Station at 1,040 Ft. (RE: Table D)	67	60	54	42	39	37	38	30	21	44.6	
1800	Hemisph Radiation [20*log(1800/1040)=4.8 dB]	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8	-4.8		Calc'd
1800	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	-1	-1	-2	-6	-10		Ldn
Est'd Total Sound Contribution of Station at NSA #2		**62**	**55**	**49**	**37**	**34**	**31**	**31**	**19**	**6**	**38.8**	**45.2**

Ambient Sound Level (Ldn) at the NSA	**41.1**
Sound Contribution of Station (Ldn) plus Ambient Sound Level (Ldn)	46.6
Potential Increase above Ambient Sound Level (dB)	**5.5**

Table F: Hanoverton Compressor Station (CS-1): Est'd Sound Contribution of Station at NSA #3 (i.e., Residence located approx. 1,800 Ft. NE of the Site Center) assuming Operation of Two (2) Solar Titan 250 Turbine-Driven Compressor Units. In addition, Estimated Increase above the Ambient Sound Level.

Source No. & Dist (Ft)	Noise Sources and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL in dB per O.B. Center Frequency (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Est'd SPLs of Station at 1,040 Ft. (RE: Table D)	67	60	54	42	39	37	38	30	21	44.6	
1740	Hemisph Radiation [20*log(1740/1040)=4.5 dB]	-4.5	-4.5	-4.5	-4.5	-4.5	-4.5	-4.5	-4.5	-4.5		Calc'd
1740	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-2	-5	-10		Ldn
Est'd Total Sound Contribution of Station at NSA #4		**62**	**55**	**49**	**37**	**34**	**32**	**31**	**20**	**7**	**39.2**	**45.6**

Ambient Sound Level (Ldn) at the NSA	**45.5**
Sound Contribution of Station (Ldn) plus Ambient Sound Level (Ldn)	48.5
Potential Increase above Ambient Sound Level (dB)	**3.0**

Table G: Hanoverton Compressor Station (CS-1): Est'd Sound Contribution of Station at NSA #4 (i.e., Residence located approx. 1,740 Ft. South of the Site Center) assuming Operation of Two (2) Solar Titan 250 Turbine-Driven Compressor Units. In addition, Estimated Increase above the Ambient Sound Level.

Source No. & Dist (Ft)	Noise Sources and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL in dB per O.B. Center Frequency (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Est'd SPLs of Station at 1,040 Ft. (RE: Table D)	67	60	54	42	39	37	38	30	21	44.6	
1900	Hemisph Radiation [20*log(1900/1040)=5.2 dB]	-5.2	-5.2	-5.2	-5.2	-5.2	-5.2	-5.2	-5.2	-5.2		Calc'd
1900	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	-1	-1	-3	-7	-12		Ldn
Est'd Total Sound Contribution of Station at NSA #5		**62**	**55**	**49**	**36**	**33**	**31**	**30**	**18**	**4**	**38.3**	**44.7**

Ambient Sound Level (Ldn) at the NSA	**45.5**
Sound Contribution of Station (Ldn) plus Ambient Sound Level (Ldn)	48.1
Potential Increase above Ambient Sound Level (dB)	**2.6**

Table H: Hanoverton Compressor Station (CS-1): Est'd Sound Contribution of Station at NSA #5 (i.e., Residence located approx. 1,900 Ft. SW of the Site Center) assuming Operation of Two (2) Solar Titan 250 Turbine-Driven Compressor Units. In addition, Estimated Increase above the Ambient Sound Level.

DESCRIPTION OF THE ANALYSIS METHODOLOGY AND THE SOURCE OF SOUND DATA USED FOR THE ANALYSIS OF THE STATION COMPRESSOR UNITS

ANALYSIS METHODOLOGY

In general, the predicted sound level contributed by the Station compressor units was calculated as a function of frequency from estimated unweighted octave-band (O.B.) sound power levels (PWLs) for each significant sound source associated with the compressor unit(s). The following summarizes the analysis procedure for the analysis of the Station compressor unit(s):

- Initially, unweighted O.B. PWLs of the significant noise sources associated with the compressor unit(s) were determined from actual sound level measurements performed by H&K at similar type of gas compressor facilities and/or equipment manufacturer's sound data;

- Then, expected noise reduction (NR) or attenuation in dB per O.B. frequency due to any noise control measures, hemispherical sound propagation (discussed in more detail below*) and atmospheric sound absorption (discussed in more detail below**) were subtracted from the unweighted O.B. PWLs to obtain the unweighted O.B. SPLs of each noise source. Since sound shielding by buildings can influence the sound level contributed at the NSAs, we also included the sound shielding due to buildings, if appropriate. The sound attenuation effect due to vegetation or land contour were typically not considered in the analyses since there appears there could be limited amount of vegetation (e.g., trees) or hills between the site and the nearby NSAs;

- Finally, the resulting estimated O.B. SPLs for all noise sources associated with the compressor units (with noise control and other sound attenuation effects) were logarithmically summed, and the total O.B. SPLs for all noise sources were corrected for A-weighting to provide the estimated overall A-wt. sound level contributed by the compressor units at the closest NSA to the compressor units. The predicted sound contribution of the Station at the closest NSA was utilized to estimate the noise contribution of the Station at the other NSAs more distant that the closest NSA.

*Attenuation due to hemispherical sound propagation: Sound propagates outwards in all directions (i.e., length, width, height) from a point source, and the sound energy of a noise source decreases with increasing distance from the source. In the case of hemispherical sound propagation, the source is located on a flat continuous plane/surface (e.g., ground), and the sound radiates hemispherically (i.e., outward, over and above the surface) from the source. The following equation is the theoretical decrease of sound energy when determining the resulting SPLs of a noise source at a specific distance ("r") of a receiver from a source PWL values:

> Decrease in SPL ("hemispherical propagation") from a noise source = **20*log(r) – 2.3 dB**
> where "r" is distance of the receiver from the noise source.

Attenuation due to air absorption: Air absorbs sound energy, and the amount of absorption ("attenuation") is dependent on the temperature and relative humidity (R.H.) of air and frequency of sound. For example, the attenuation due to air absorption for 1000 Hz O.B. SPL is approximately **1.5 dB per 1,000 feet for standard day conditions (i.e., no wind, 60 deg. F and 70% R.H.).

ANALYSIS METHODOLOGY (NOISE ATTRIBUTABLE TO A BLOWDOWN EVENT)

The noise resulting from a blowdown event was estimated by using the "inverse-square law" and included some attenuation due to atmospheric sound absorption. Consequently, the estimated noise of a blowdown event at the receptor (closest NSA) was calculated as follows:

SPL (receptor) = (Blowdown SPL at R1) – 20*log(R2/R1)– Atm. Atten.= **60 dBA** – 20*log (1,040/300)–3 dB = **46 dBA**

Where: R1 = Distance of Specified Blowdown Noise Level Requirement (i.e., 300 ft.)
R2 = Distance of the Receptor from the Blowdown Silencer (1,040 ft.)

SOURCE OF SOUND DATA

The following describes the source of sound data for estimating the source sound levels and source PWLs used in the acoustical analysis for the compressor units. Note that equipment noise levels utilized in the acoustical analysis (i.e., spreadsheet analysis) are generally higher than the sound level requirement for the equipment to insure that the design incorporates an acoustical "margin of safety."

(1) PWL values of the specific equipment inside the building (i.e., noise of the turbine and compressor) was calculated from sound data measured by H&K on a very similar type of gas compressor installation.

(2) Turbine exhaust PWL values for the Solar turbine were calculated from sound data provided by Solar (i.e., Solar Noise Prediction Manual) and sound data recently measured in the field by H&K on a similar type of turbine installation.

(3) The noise radiated from aboveground gas piping is primarily a result the noise generated by the gas compressors. Consequently, measurement of both near field and far field sound data on gas piping is presumed to be an accurate method of quantifying the noise associated with the new gas piping, and the estimated PWL values for gas piping used in the analysis were determined from near field and far field sound data by H&K on a similar type of compressor to that of the proposed compressor units.

(4) PWL values for the turbine LO cooler(s) and gas aftercooler(s) were designated to meet the design noise goal. Note that the estimated PWL for the cooler(s) utilized in the acoustical analysis assumes some noise associated with piping associated with the coolers. The noise level for the LO cooler and gas aftercooler used in the acoustical analysis is generally higher than the sound level requirement in order that the noise design analysis incorporates an acoustical "margin of safety." In addition, there can be other noise associated with the cooler that is not directly related to the operation of the cooler fans.

(5) PWL values for turbine air intake were calculated from sound data provided by Solar (i.e., Solar Noise Prediction Manual), although low-frequency SPLs were modified as a result of field acoustical tests by H&K.

Type of Equipment	Equipment Power Rating or Capacity	Est'd Number Required	Est'd A-Wt. Sound Level at 50 Ft.: Note (1)	Resulting A-Wt. PWL of Single Piece of Equip.	Assumed Max. No. Operating at One Time	Est'd Max. A-Wt. PWL or Sound Level of Equip.
Diesel Generator	250 to 400 HP	1 to 2	65 - 70 dBA	102 dBA	1	102
Bulldozer	250 to 700 HP	1 to 2	75 - 80 dBA	110 dBA	1	110
Grader	450 to 600 HP	1 to 2	70 - 75 dBA	105 dBA	1	105
Backhoe	130 to 210 HP	1 to 2	65 - 72 dBA	104 dBA	1	104
Front End Loader	150 to 250 HP	1 to 2	65 - 70 dBA	102 dBA	1	102
Truck Loaded	40 Ton	As needed	70 - 75 dBA	105 dBA	1	105

Est'd Total Maximum A-Wt. PWL (dBA) of All Construction Site Equipment	113	Calc'd Ldn Note (4)
Atten. (dB) due to Hemispherical Sound Propagation (1,040 Ft.): Note (2)	-58	
Est'd Attenuation (in dB) due to Air Absorption and/or Foliage-Shielding: Note (3)	-2	
Est'd Sound Level (dBA) at Closest NSA (NSA #1) Considering a Maximum Number of Equipment Operating at One Time	53 dBA	51 dBA

Table I: **Hanoverton Compressor Station (CS-1): Est'd Sound Contribution at the Closest NSA (NSA #1, Residences approx. 1,040 Ft. SSE of Site Center) during Construction Activity at the Station. Sound Contribution assumes Operation of the "Loudest" Equipment during a Time Frame with the Largest Amount of Equipment Operating (e.g., Site Grading & Clearing/Grubbing)**

Note (1): Noise Emission Levels of construction equipment based on an EPA Report (meas'd sound data for a railroad construction project) and measured sound data in the field by H&K or other published sound data.

Note (2): Noise attenuation due to hemispherical sound propagation: Sound propagates outwards in all directions (i.e., length, width, height) from a point source, and the sound energy of a noise source decreases with increasing distance from the source. In the case of hemispherical sound propagation, the source is located on a flat continuous plane/surface (e.g., ground), and the sound radiates hemispherically from the source.

The following equation is the theoretical decrease of sound energy when determining the resulting SPL of a noise source at a specific distance (“r”) of a receiver from a source sound power level (PWL):

Decrease in SPL (“hemispherical propagation”) from a noise source = 20*log(r) – 2.3 dB, where “r” is distance of the receiver from the noise source. For example, if the distance "r" is 1,040 feet between the site and closest NSA, the “hemispherical propagation” = **20*log(1,040) – 2.3 dB = 58 dB**.

Note (3): Noise attenuation due to air absorption & foliage: Air absorbs sound energy, and the amount of absorption ("attenuation") is dependent on temperature and relative humidity (R.H.) of the air and the frequency of sound. For standard day conditions (i.e., no wind, 60 deg. F. and 70% R.H.), the attenuation due to air absorption for the medium frequency” (i.e., 1000 Hz O.B. SPL) is approximately **1.5 dB** per 1,000 feet. In addition, foliage such as forest/trees between the Station site and nearby NSAs can have a sound attenuation effect depending on the amount/thickness of the foliage.

Note (4): Calc'd Ldn is approx. 2 dB lower than A-wt. sound level since construction activities will occur only during daytime.

ANALYSIS METHODOLOGY AND SOURCE OF SOUND DATA (CONSTRUCTION ACTIVITIES)

The predicted sound level contributed by the construction-related activity (i.e., construction of the compressor station) was calculated from estimated A-wt. PWL of noise sources (i.e., construction equipment noise) that typically operate during the specific construction activity. The following summarizes the acoustical analysis procedure utilized for the construction activity at the site:

- Initially, the A-wt. PWL of noise sources associated with the construction activity were determined from published sound data and/or actual sound level measurements by H&K, and the total PWL of each noise source (equipment) was based on the anticipated number of equipment operating;

- Next, A-wt. PWL of all sources were logarithmically summed to provide the overall A-wt. PWL contributed by construction activity. It is assumed that the highest level of construction noise would occur during site earth work (i.e., time frame when the largest amount of equipment would operate);

- Finally, the estimated A-wt. sound level of the construction activity at the specific distance was determined by compensating for sound attenuation due to propagation (hemispherical radiation), atmospheric sound absorption and sound attenuation effect of foliage/forest***.

The noise levels of construction equipment were based on an EPA Report (i.e., measured sound data from railroad construction equipment taken during the Northeast Corridor Improvement Project) that was summarized in a 1995 Report to the Federal Transit Administration as prepared by Harris Miller Miller & Hanson Inc. Also, construction equipment noise levels listed in an article in the Journal of Noise Control Engineering and sound data at a typical compressor station construction site, as measured by H&K, was utilized. The following list some references used by H&K to determine construction equipment noise emission levels:

(1) "Transit Noise and Vibration Impact Assessment", dated April 1995, prepared by Harris Miller Miller & Hanson Inc. for the Office of Planning of the Federal Transit Administration.
(2) Erich Thalheimer, "Construction Noise Control Program and Mitigation Strategy at the Central Artery/Tunnel Project", J of Noise Control Eng., 48 (5), pp. 157-165 (2000 Sep-Oct).
(3) "Noise Control for Building Manufacturing Plant Equipment and Products", course handout notes for a noise course given by Hoover & Keith Inc.

***Discussion of noise attenuation due to foliage: Since there will be a substantial amount of trees between the Station and NSAs, the sound attenuation effect of foliage was included. The potential attenuation of foliage, based on our experience and an ISO Standard[1], the "medium-frequency" attenuation (i.e., 1000 Hz) due to forest/trees greater than 500 feet thick is approximately **10 dB**. Consequently, for this Station (i.e., distance of 1,040 feet from closest NSA), the "medium-frequency" air absorption attenuation would be approximately **2 dB** (i.e., 1.5 dB x 1,040/1000 = 2 dB). Then, adding the attenuation due to foliage (approx. **0 dB**) to the air absorption attenuation, an overall attenuation of **2 dB** was utilized as the estimated attenuation due to air absorption and foliage.

End of Report

[1] ISO Standard 9613-1: 1993 (E), entitled "Acoustics – Attenuation of sound during propagation outdoors – Part 1: Calculation of the absorption of sound by the atmosphere, and Part 2: General method of calculation"

WADSWORTH COMPRESSOR STATION
(MEDINA COUNTY, OHIO)

RESULTS OF AN AMBIENT SOUND SURVEY AND ACOUSTICAL ANALYSIS OF THE NATURAL GAS COMPRESSOR STATION (CS-2) ASSOCIATED WITH THE NEXUS GAS TRANSMISSION PROJECT

H&K Report No. 3225

H&K Job No. 4875

Date of Report: June 9, 2015

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REPORT SUMMARY

This report provides the results of an acoustical analysis for the new **Wadsworth Compressor Station** (referred to as "Station" in the report) associated with the proposed **NEXUS Gas Transmission Project** ("Project" or "NEXUS Project"). Also included are the results of the recent ambient sound survey at the proposed site of the Station. The intent of the acoustical analysis is to project the sound contribution of the Station during full load operation and determine noise control measures to insure that applicable sound criteria are not exceeded at the nearby noise-sensitive areas (NSAs). The purpose of the ambient sound survey was to identify and verify the nearby NSAs surrounding the Station and to quantify the current ambient sound environment at the nearby NSAs.

The following table summarizes the ambient sound level at the identified closest NSAs, the estimated sound level contribution of the Station at the closest NSAs if the Station was operated at full load and the total sound level contribution of the Station (i.e., sound level contribution of the Station plus the ambient noise level). The results provided in this table are referred to as the "Noise Quality Analysis" for the Station.

Noise Quality Analysis for the Wadsworth Compressor Station associated with the NEXUS Project

Closest NSA(s) and Type of NSA	Distance and Direction of NSA to Station Site Center	Ambient Ldn (via Meas'd Ld & Est'd Ln)	Est'd Sound Level (Ldn) of the Station at Full Load	Est'd "Total" Ldn (Station Noise + Ambient Noise)	Potential Noise Increase
NSA #1 (Residences)	1,800 ft. (west)	56.7 dBA	44.5 dBA	57.0 dBA	0.3 dB
NSA #2 (Residences)	1,840 ft. (WNW)	46.9 dBA	44.2 dBA	48.8 dBA	1.9 dB
NSA #3 (Residences)	2,490 ft. (NE)	48.5 dBA	40.7 dBA	49.2 dBA	0.7 dB

The results of the acoustical analysis indicates that if the anticipated and/or recommended noise control measures are implemented successfully, the sound contribution of the proposed Station should be equal to or lower than **55 dBA** (L_{dn}) at the nearby NSAs, which is the FERC sound level requirement for this type of facility. In addition, the acoustical analyses indicate that the noise of construction activities and noise resulting from a unit blowdown event at the Station should have limited noise impact on the surrounding environment. Also, since Station noise sources that could cause perceptible vibration (e.g., turbine exhaust noise) will be adequately mitigated, there should not be any perceptible increase in vibration at any NSA during Station operation.

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1.0 INTRODUCTION

In this report, **Hoover & Keith Inc.** (H&K) presents the results of an acoustical analysis for the new **Wadsworth Compressor Station** (referred to as "Station" in the report) associated with the proposed **NEXUS Gas Transmission Project** ("Project" or "NEXUS Project"). Also included are the results of the recent ambient sound survey at the proposed site of the Station. The following summarizes the purpose of the ambient sound survey and Station acoustical analysis:

(1) Quantify the existing acoustic environment (i.e., measure the typical ambient sound levels) and verify the current noise-sensitive areas (NSAs) around the Station, such as residences, hospitals and schools;

(2) Estimate the sound level contribution of the Station at the nearby NSAs and estimate the "total" Station sound level contribution (i.e., Station noise plus the ambient sound level);

(3) Determine noise mitigation measures to insure that applicable sound level criteria are not exceeded after installation and full load operation of the Station; and

(4) Project the noise at the nearby NSAs resulting from construction activities at the Station, and estimate the noise contribution due to a unit blowdown event at the Station.

2.0 SOUND CRITERIA

Federal: It is anticipated that certificate conditions of the Office of Energy Projects (OEP) of the Federal Energy Regulatory Commission (FERC) will require that the sound level attributable to a new natural gas compressor station during full load operation not exceed a day-night average sound level (i.e., L_{dn}) of **55 dBA** at any nearby NSA. In addition, the operation of the Station should not result in a perceptible increase in vibration at any nearby NSA. The L_{dn} is an energy average of the measured daytime L_{eq} (L_d) and measured nighttime L_{eq} (L_n) plus **10 dB**. The **10-dB** adjustment to the L_n is intended to compensate for nighttime sensitivity. For a steady sound source that operates continuously over a 24-hour period and controls the environmental sound level, the L_{dn} is approximately **6.4 dB** above the measured L_{eq}. Consequently, an L_{dn} of **55 dBA** corresponds to a L_{eq} of **48.6 dBA**. If both the L_d and L_n are measured and/or estimated, then the L_{dn} is calculated using the following formula:

$$L_{\text{dn}} = 10\log_{10}\left(\frac{15}{24}10^{L_{\text{d}}/10} + \frac{9}{24}10^{(L_{\text{n}}+10)/10}\right)$$

State of Ohio: The State of Ohio or the Ohio EPA does not have regulations related to acceptable noise levels. We understand that sometimes noise level regulations are covered under local ordinances or city codes (e.g., public nuisance and limit excessive noise between certain hours).

County/Township: No applicable county or township noise regulations have been identified, although any local noise regulations, if required, will be addressed during the local permitting process.

3.0 SITE/FACILITY DESCRIPTION

Figure 1 (**Appendix**, p. 11) provides an area layout around the Station that shows the NSAs within 1 mile of the Station and other areas of interest. **Figure 2** (**Appendix**, p. 12) provides a layout around the Station that shows the identified closest NSAs, reported sound measurement positions near the identified closest NSAs and a conceptual layout of equipment and buildings at the Station. The Station will be located in Medina County, Ohio, approximately 6 miles west of Wadsworth, OH and approximately 7 miles south of Medina, OH. There are a few NSAs (e.g., primarily residences) located within 1 mile of the Station, and the closest NSAs are residences located approximately 1,800 feet west of the Station site (along Guilford Road). The Station site is surrounding by some foliage that could provide additional attenuation of the Station noise.

The proposed Station will consist of one (1) Solar Titan 250 gas turbine-driven centrifugal gas compressor unit [i.e., 30,000 horsepower (HP) rating (ISO)]. We understand that the turbine and compressor for the compressor unit will be installed inside an acoustically-insulated metal building (i.e., Compressor Building). The following describes the anticipated auxiliary equipment and other notable items associated with the Station compressor unit:

- Outdoor lube oil cooler (“LO cooler”);
- Turbine exhaust system designed with an adequate muffler system;
- Turbine air intake filter system designed with in-duct silencer;
- Gas piping and associated piping components, and most gas piping will be buried;
- Gas aftercooler (i.e., air-cooled heat exchanger) that serves the compressor unit; and
- Gas blowdown silencer associated with a unit blowdown.

There will also be two (2) types of gas blowdown events: (1) gas blowdown that occurs when a compressor is stopped and gas between the suction/discharge valves and compressor is vented to the atmosphere (“unit blowdown”) via a blowdown silencer, and (2) emergency shutdown (“ESD”) that will only occur at required Department of Transportation (DOT) test intervals or in an emergency situation (e.g., gas leak or fire). The unit blowdown will be a “maintenance” type of unit blowdown which can occur when the compressor unit is stopped and gas between the suction/discharge valves and compressor unit is vented to the atmosphere through a silencer. During the period of commissioning and testing, it is estimated that a unit blowdown could occur 2 to 4 times/day and typically only during the daytime. During normal operation of the Station (i.e., after the commissioning period), a unit blowdown event occurs infrequently (e.g., 1 to 3 times/month). In addition, a unit blowdown event only occurs for a short time frame (e.g., unit blowdown event would persist for approximately 1 to 5 minutes). There also can be an emergency shutdown (“ESD”) that will only occur only during an emergency situation (e.g., gas

leak or fire), which rarely occurs, noting that some natural gas facilities operate for years without having an ESD, and the gas blowdown related to an ESD may be vented via a blowdown silencer. Note that for required DOT test intervals of the ESD operations (e.g., once or twice a year), it is not necessary to vent/blowdown the pipeline gas to atmosphere.

4.0 MEASUREMENT METHODOLOGY, MEASUREMENT LOCATIONS AND CONDITIONS

Ambient sound levels were measured near three (3) of the identified surrounding NSAs (i.e., "NSA #1", "NSA #2" & "NSA #3"). The following provides a description of the identified NSAs and the reported sound measurement positions ("Pos."):

Pos. 1: Near NSA #1 (closest NSA): Residences located 1,800 feet west of the Station site center (i.e., anticipated location of the Compressor Building);
Pos. 2: Near NSA #2: Residences located 1,840 feet west-northwest (WNW) of the Station site center; and
Pos. 3: Near NSA #3: Residences located 2,490 feet northeast (NE) of the Station site center.

The sound survey was conducted by Garrett Porter of H&K during the daytime of Feb. 3, 2015. During the site ambient sound survey, the temperature was 33 degrees F, the wind was from the south and there were overcast sky conditions. At the reported sound measurement locations, the A-wt. equivalent sound levels (i.e., L_{eq}) and the unweighted octave-band (O.B.) sound pressure levels (SPLs) were measured at approximately 5 feet above ground. The sound measurements attempted to exclude "extraneous sound" such as the noise contribution of occasional vehicle passing by the measurement position and/or other intermittent sources. The acoustical measurement system consisted of a Rion NA-27 Sound Level Meter (a Type 1 SLM per ANSI S1.4 & S1.11) equipped with microphone, covered with a windscreen. The SLM was calibrated with a microphone calibrator (calibrated within 1 year of the test date).

5.0 MEASUREMENT RESULTS AND OBSERVATIONS

Table A (**Appendix**, p. 13) summarizes the measured daytime L_{eq} (L_d) and the estimated nighttime L_{eq} (L_n) at the NSA sound measurement locations along with the average of the measured L_d since several samples of the ambient sound level were measured. **Table A** also includes the resulting ambient L_{dn} as calculated from the measured L_d and estimated L_n. Meteorological conditions that occurred during the sound survey are summarized in **Table B** (**Appendix**, p. 13). The measured daytime sound levels (L_d) and related unweighted O.B. SPLs at the reported sound measurement positions are provided in **Table C** (**Appendix**, p. 13).

The following **Table 1** summarizes the measured ambient L_d and estimated ambient L_n at the closest NSAs along with the resulting ambient L_{dn} at the closest NSAs, as calculated from the measured ambient L_d and estimated L_n.

Meas. Pos.	Description of the Identified Closest NSAs, as related to the Sound Measurement Location	Meas'd Ambient Ld	Est'd Ambient Ln	Resulting Ambient Ldn
Pos. 1	NSA #1: Residences 1,800 feet west of the Station site	56.7 dBA	46.7 dBA	56.7 dBA
Pos. 2	NSA #2: Residences 1,840 feet WNW of the Station site	43.0 dBA	40.0 dBA	46.9 dBA
Pos. 3	NSA #3: Residences 2,490 feet NE of the Station site	47.6 dBA	39.6 dBA	48.5 dBA

Table 1: Summary of the Measured Ld, Estimated Ln and Resulting Ambient Ldn at the Identified NSAs

It is our opinion that the measured sound level data adequately quantifies the existing ambient sound level for the meteorological conditions that occurred during the sound survey. The ambient L_n were not measured but were estimated based on our site observations to provide a more accurate representation of the ambient L_{dn} (i.e., ambient nighttime levels could be lower than the measured daytime levels). At the reported sound measurement location near all of the identified NSAs, noise sources that contributed to the ambient A-wt. sound level included the sound of birds, the noise of distant vehicle traffic along Interstate 76 ("I-76"), and occasionally, the sound of wind blowing in the nearby foliage/trees.

6.0 ACOUSTICAL ANALYSIS (COMPRESSOR STATION)

6.1 Sound Level Contribution of the Station

The acoustical analysis considers the noise produced by equipment for the Station compressor unit that could impact the sound contribution at any NSA. The predicted sound contribution of the Station were performed only for the closest NSAs (i.e., NSA #1, NSA #2 & NSA #3) since the Station sound contribution at other nearby NSAs should be equal to or less than the Station sound level at these closest NSAs. A description of the acoustical analysis methodology and source of sound data for the analysis is provided in the **Appendix** (pp. 16–17). The following sound sources were considered significant and included in the Station acoustical analysis:

- Noise generated by the turbine/compressor that penetrates the Compressor Building;
- Noise of the turbine exhaust radiated from the turbine exhaust stack;
- Noise radiated from aboveground/outdoor gas piping and associated components;
- Noise of the outdoor LO cooler and associated outdoor piping;
- Noise generated by the turbine air intake system, and
- Noise of the gas aftercooler and associated aboveground piping.

Table D (**Appendix**, p. 14) shows the spreadsheet analysis of the estimated A-wt. sound level and unweighted O.B. SPLs at the closest NSA ("NSA #1") contributed by the Station compressor unit during full load operation for standard day propagating conditions (i.e., no wind, 60 deg. F., 70% R.H.). Included in **Table D** is the estimated "total" sound level contribution of the Station at NSA #1 (i.e., sound level contribution of the Station plus the ambient sound level).

Table E (**Appendix**, p. 15) provides the estimated A-wt. sound level and unweighted O.B. SPLs of the Station at NSA #2 based on the acoustical analysis at NSA #1, along with the estimated

total sound level contribution of the Station at NSA #2 (i.e., sound level contribution of the Station plus the ambient sound level).

Table F (**Appendix**, p. 15) provides the estimated A-wt. sound level and unweighted O.B. SPLs of the Station at NSA #3 based on the acoustical analysis at NSA #1, along with the estimated total sound level contribution of the Station at NSA #3 (i.e., sound level contribution of the Station plus the ambient sound level).

The following **Table 2** summarizes the calculated sound level contribution of the Station at the closest NSAs assuming full load operation of all equipment associated with the Station, noting that the estimated A-wt. sound level was used to calculate the representative L_{dn}.

Operating Condition and associated NSA	Est'd A-Wt. Sound Level of Station	Calc'd Ldn (via Est'd A-Wt. Level)
Est'd sound contribution of Station during full load operation at NSA #1	38.1 dBA	44.5 dBA
Est'd sound contribution of Station during full load operation at NSA #2	37.8 dBA	44.2 dBA
Est'd sound contribution of Station during full load operation at NSA #3	34.3 dBA	40.7 dBA

Table 2: Estimated Sound Contribution of the Station during Full Load Operation at the Closest NSAs

6.2 Sound Contribution of a Unit Blowdown Event at the Station

The noise level of the unit blowdown event via a blowdown silencer will be specified to meet an A-wt. sound level of **60 dBA** at a distance of 300 feet. If this sound requirement is achieved, the noise of a unit blowdown will be approximately **42 dBA** (i.e., L_{dn} of approximately **48 to 49 dBA**) at the closest NSA, located approximately 1,800 feet from the unit blowdown silencer, which would be lower than **55 dBA** (L_{dn}). Consequently, although the noise of a unit blowdown event could be slightly audible at the nearby NSAs, it is not expected to present a noise impact, noting also that a unit blowdown event occurs infrequently for a short time frame (e.g., 1 to 5 minute period). A description of the acoustical analysis methodology and source of sound data related to blowdown noise are provided in the **Appendix** (p. 17)

7.0 ACOUSTICAL ANALYSIS (SITE CONSTRUCTION ACTIVITIES)

The acoustical analysis of the construction-related activities at the site of the Station considers the noise produced by any significant sound sources associated with the primary construction equipment that could impact the sound contribution at the nearby NSAs. The predicted sound contribution of construction equipment/activities was performed only for the closest NSA (i.e., NSA #1). Construction of the Station will consist of earth work (e.g., site grading, clearing and grubbing) and construction of the Station buildings, and it is assumed that the highest level of construction noise would occur during site earth work (i.e., time frame when the largest amount of construction equipment would operate).

Table G (**Appendix**, p. 18) shows the calculation of the estimated maximum A-wt. sound level at the closest NSA contributed by the construction activities at the Station for standard day propagating conditions. A description of the methodology and source of sound data for the construction noise analysis are provided in the **Appendix** (p. 19). The acoustical analysis indicates that the maximum A-wt. noise level of construction activities at the closest NSA would be equal to or less than **45 dBA** (i.e., L_{dn} of approximately **43 dBA**, since nighttime construction activities are not anticipated).

8.0 NOISE CONTROL MEASURES (COMPRESSOR STATION)

The following section provides the recommended noise control measures and equipment sound level requirements along with other assumptions that may affect the noise of the Station.

8.1 Building enclosing the Turbine/Compressor

We understand that the turbine and compressor will be installed inside an acoustically-insulated metal building (i.e., Compressor Building). The following describes specific sound requirements and other items related to the components of the Compressor Building.

- As a minimum, walls/roof should be constructed with an exterior skin of 22–gauge metal, and building interior surfaces should be covered with 6–inch thick “high-density” mineral wool (i.e., 6.0-8.0 pcf uniform density) covered with a perforated liner; Note that “low-density” insulation (e.g., 0.6 to 0.75 pcf density) should **not** be substituted for the high-density material although low-density insulation could be employed in addition to the high-density insulation;

- No windows or louvers should be installed in the building walls although a minimum number of skylights could be installed in the building roof although not anticipated;

- Each large access door system (i.e., “roll-up door”) should consist of an insulated-type door (e.g., 18-ga. exterior facing, 24-ga. backskin with insulation core); Personnel entry doors should be a **STC-36 sound rating**, even if glazing is employed and should be self-closing and should seal well when closed;

- It is anticipated that the building air ventilation system will be designed with air supply fans mounted in the building walls along with roof-mounted air exhaust vents or a roof ridge vent to exhaust the air (i.e., wall louvers should not be employed). Assuming this type of air ventilation system, the sound level for each wall air-supply fan should not exceed **50 dBA** at **50 feet**, which will require that each fan employ an exterior dissipative-type silencer (e.g., 3-ft. length) and an acoustically-lined weatherhood.

8.2 Turbine Exhaust System

The turbine exhaust system for the turbine-driven compressor unit should include a silencer system that provides the following dynamic sound insertion loss ("DIL") values at the rated turbine operating conditions.

DIL Values for the Exhaust Silencer System in dB per Octave-Band (O.B.) Center Freq. (Hz)

31.5	63	125	250	500	1000	2000	4000	8000
5	16	25	35	45	45	45	35	30

To meet these recommended DIL values and minimize the impact of the turbine exhaust noise at surrounding residences, a "2–stage" exhaust silencer system should be implemented. One (1) of the 2-stage silencers should be employed horizontally in the exhaust ducting located inside the Compressor Building for the compressor unit (i.e., "1st stage silencer"), and the other silencer system could be integrated into the vertical outdoor exhaust stack (i.e., "2nd stage silencer") or in the horizontal exhaust ducting located outside the Compressor Building. If a CO converter is employed, which is anticipated, it is assumed that a CO converter system would be inserted upstream of the 1st stage silencer, inside the Compressor Building.

8.3 Outdoor Aboveground Gas Piping

The analysis indicates that noise control measures, such as acoustical pipe insulation, will be required for outdoor aboveground gas piping to meet applicable sound criteria. The following items associated with the gas piping and piping components should be addressed:

- Acoustical pipe insulation should be employed for aboveground suction and discharge gas piping. Acoustical pipe insulation should consist of a minimum 3-inch thick fiberglass or mineral wool (6.0-8.0 pcf density) that is covered with a mass-filled vinyl jacket (e.g., composite of 1.0 psf mass-filled vinyl laminated to 0.020-inch thick aluminum). All exposed pipe supports for the insulated gas piping should be covered with acoustical insulation;

- Outdoor valves should not have to be covered with acoustical blanket material. Filter–separator(s) and associated aboveground gas piping should not have to be covered with any type of acoustical material. It is also recommended that the suction pipe strainer for the compressor units be removed soon after the Station is placed in service, if feasible.

8.4 Lube Oil Cooler

Lube oil cooler ("LO cooler") should not exceed **60 dBA** at **50 feet** from the cooler perimeter at the full rated operating conditions (i.e., equivalent to a PWL of **92–93 dBA**), and a "custom" Solar LO cooler may be required to meet the recommended sound level requirement.

8.5 Turbine Air Intake System

The turbine air intake system for the compressor unit should be designed with at least one (1) in-duct silencer (e.g., 7-ft. length "special" silencer or combination of 2 Solar "standard" silencers), and at least one of the silencers (i.e., if 2 separate silencers are employed) should be installed in the intake ductwork located inside the Compressor Building. As a minimum, the air intake silencer system should provide the following DIL values at the rated operating conditions of the turbine-driven compressor unit, noting that only one (1) "standard" Solar air intake silencer may not be capable of meeting these DIL values although the use of two (2) "standard" Solar air intake silencers (per Solar's "Noise Prediction Guidelines") should be capable of meeting the DIL values.

DIL Values in dB per O.B. Center Frequency for the Turbine Air Intake System

31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
3	8	18	30	45	55	60	60	55

8.6 Gas Aftercooler

The sound level generated by the multi-fan gas cooler that serves the compressor unit should not exceed **62 dBA** at **50 feet** at the full rated operating conditions (i.e., all fans operating at maximum design speed). To meet this sound level requirement, the gas aftercooler will need to be designed with "low-noise" fans that operate at relatively low tip speeds (e.g., fans operating at below 7,200 fpm tip speeds). In addition, aboveground inlet pipe risers and inlet header for the gas cooler should be covered with acoustical pipe insulation but the outlet pipe risers should not have to be covered with acoustical pipe insulation.

8.7 Unit Blowdown Silencer

The unit blowdown silencer should attenuate the unsilenced blowdown noise to a noise level equal to or less than **60 dBA** at 300 feet from the outlet of the silencer, which includes the noise radiated from the shell of the silencer during the blowdown event.

9.0 SUMMARY AND FINAL COMMENT

The following **Table 3** summarizes the ambient sound level at the closest NSAs, the estimated sound level contribution of the Station at the closest NSAs during full load Station operation and the "total" sound level contribution of the Station (i.e., sound level contribution of Station during operation plus the ambient sound level). The results provided in this table are referred to as the "Noise Quality Analysis" for the Station.

Closest NSA(s) and Type of NSA	Distance and Direction of NSA to Station Site Center	Ambient Ldn (via Meas'd Ld & Est'd Ln)	Est'd Sound Level (Ldn) of the Station at Full Load	Est'd "Total" Ldn (Station Noise + Ambient Noise)	Potential Noise Increase
NSA #1 (Residences)	1,800 ft. (west)	56.7 dBA	44.5 dBA	57.0 dBA	0.3 dB
NSA #2 (Residences)	1,840 ft. (WNW)	46.9 dBA	44.2 dBA	48.8 dBA	1.9 dB
NSA #3 (Residences)	2,490 ft. (NE)	48.5 dBA	40.7 dBA	49.2 dBA	0.7 dB

Table 3: Noise Quality Analysis for the Wadsworth Compressor Station associated with NEXUS Project

The results of the acoustical analysis indicates that if the noise control measures are employed successfully, the sound contribution of the Station should be equal to or lower than **55 dBA** (L_{dn}) at the nearby NSAs, which is the FERC sound level requirement for this type of facility. In addition, the acoustical analyses indicate that the noise of construction activities and noise resulting from a unit blowdown event at the Station should have limited noise impact on the surrounding environment. Also, since Station noise sources that could cause perceptible vibration (e.g., turbine exhaust noise) will be adequately mitigated, there should not be any perceptible increase in vibration at any NSA during Station operation.

APPENDIX

- **FIGURE 1: GENERAL AREA LAYOUT AROUND THE STATION SHOWING THE NSAs LOCATED WITHIN 1 MILE OF THE STATION AND OTHER AREAS OF INTEREST**
- **FIGURE 2: AREA LAYOUT SHOWING IDENTIFIED CLOSEST NSAs, REPORTED SOUND MEASUREMENT POSITIONS NEAR THE CLOSEST NSAs, AND CONCEPTUAL LAYOUT OF THE STATION SHOWING THE EQUIPMENT, BUILDINGS AND STATION FENCELINE**
- **SUMMARY OF THE MEASURED AMBIENT SOUND DATA**
- **ACOUSTICAL ANALYSIS (COMPRESSOR STATION)**
- **ANALYSIS METHODOLOGY (NOISE ATTRIBUTABLE TO THE STATION AND A BLOWDOWN EVENT) AND THE SOURCE OF SOUND DATA**
- **ACOUSTICAL ANALYSIS (CONSTRUCTION ACTIVITIES)**
- **DESCRIPTION OF THE ANALYSES METHODOLOGY (CONSTRUCTION ACTIVITIES) AND THE SOURCE OF SOUND DATA**

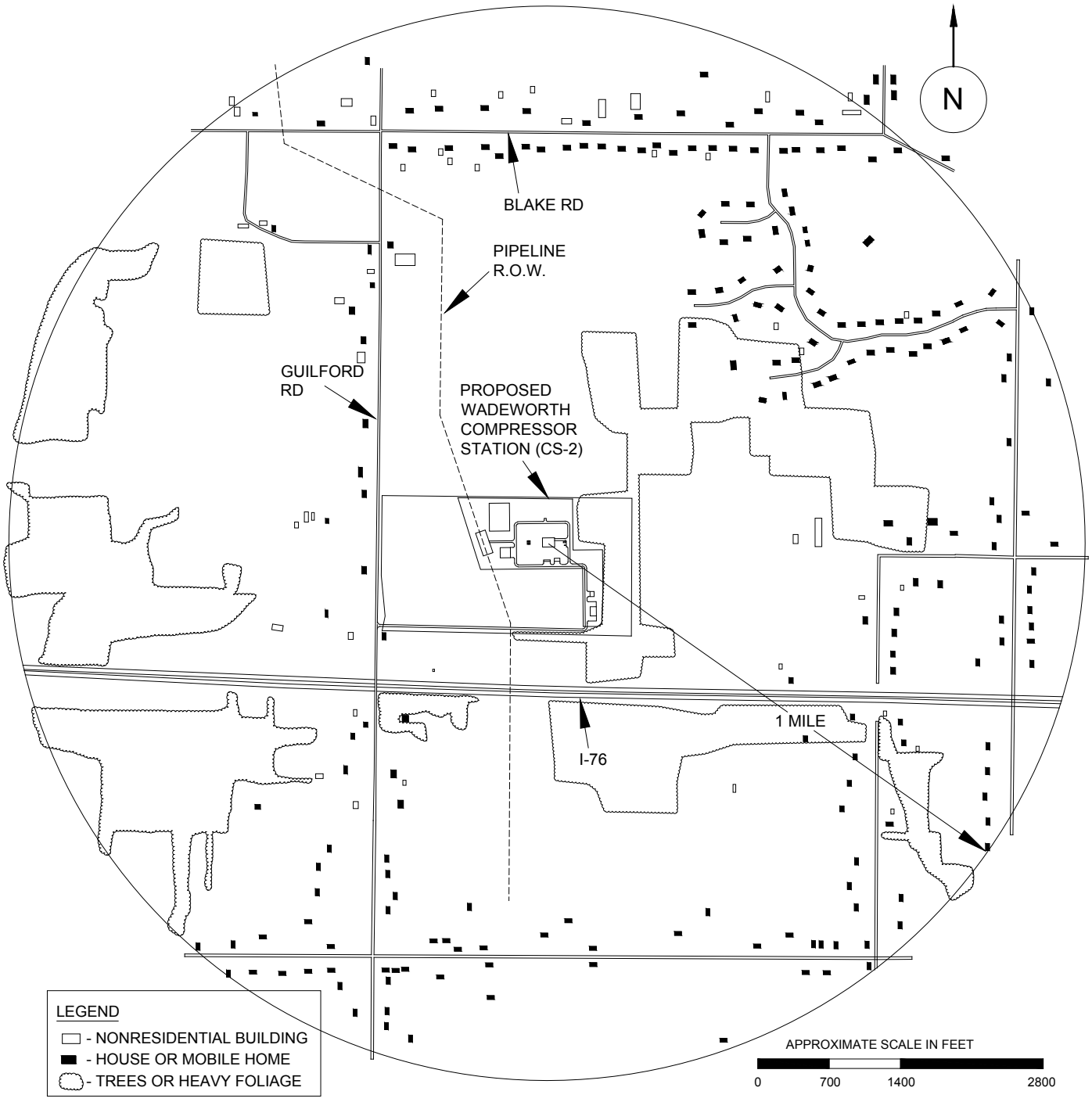

Figure 1: NEXUS Wadsworth Compressor Station (CS-2): General Area Layout showing the NSAs within 1 Mile of the Station Site and Other Areas of Interest.

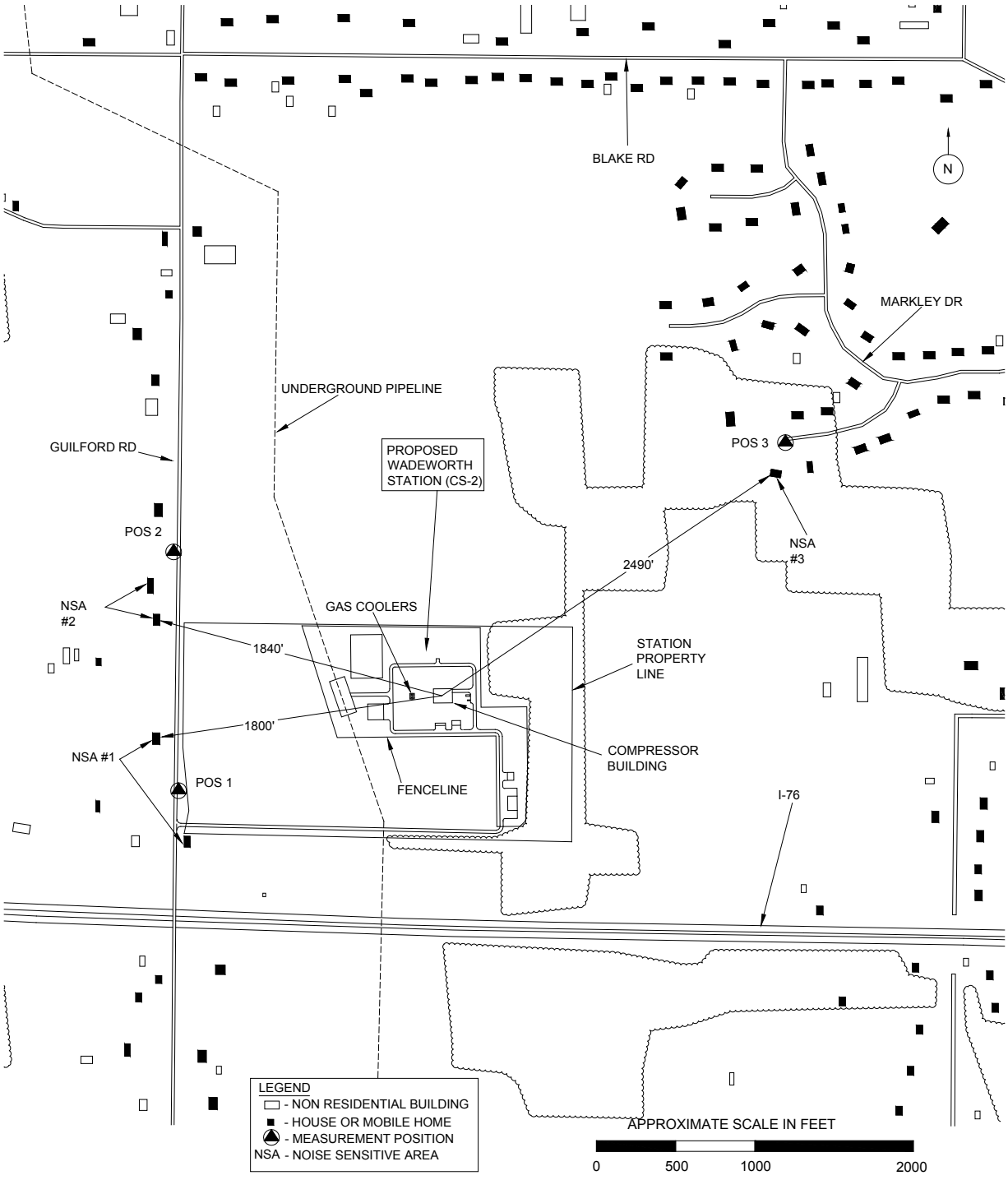

Figure 2: NEXUS Wadsworth Compressor Station (CS-2): Layout showing the Identified Closest NSAs, Chosen Sound Measurement Positions near the Closest NSAs and Conceptual Layout of Station Equipment and Buildings.

Measurement Set		Meas'd/Calc'd A-Wt. Levels (dBA)				
Meas. Pos. & NSA	Time/Date of Test	Day-time Leq(Ld)	Avg'd of Ld	Night time Leq(Ln)	Calc'd Ldn Note (2)	Notes/Observations
Pos. 1 (NSA #1)	9:36 AM (2/3/15)	56.3				Primary noise during tests: Noise of traffic on I-76 and
Residences approx.	9:38 AM (2/3/15)	58.2	**56.7**	**46.7**	**56.7**	the sound of birds.
1,800 ft. west of the	9:40 AM (2/3/15)	55.8		Note (1)	Note (2)	
Station Site Center						
Pos. 2 (NSA #2)	9:47 AM (2/3/15)	43.4				Primary noise during tests: Noise of traffic on I-76;
Residences approx.	9:51 AM (2/3/15)	43.4	**43.0**	**40.0**	**46.9**	sound of wind blowing in trees and sound of birds.
1,840 ft. WNW of the	9:52 AM (2/3/15)	42.1		Note (1)	Note (2)	
Station Site Center						
Pos. 3 (NSA #3)	9:59 AM (2/3/15)	48.3				Primary noise during tests: Noise of traffic on I-76 and
Residences approx.	10:00 AM (2/3/15)	46.9	**47.6**	**39.6**	**48.5**	the sound of wind blowing in trees.
2,490 ft. NE of the	10:01 AM (2/3/15)	47.7		Note (1)	Note (2)	
Station Site Center						

Table A: **Wadsworth Compressor Station (CS-2): Summary of Ambient Daytime Sound Levels (Ld) at the Closest NSAs, as Meas'd on Feb. 3, 2015, Est'd Nighttime Levels (Ln) and Resulting Ldn.**

Note (1): Nightime sound levels (Ln) were not measured but since there should be less noise during night, the Ln was estimated to provide a representative ambient Ldn (e.g., 3 to 10 dB subtracted from the daytime levels).

Note (2): Ldn calculated by adding 6.4 dB to the measured Ld. If both the Ld and Ln are measured and/or estimated, the Ldn is calculated using the following formula:

$$L_{\mathrm{dn}} = 10\log_{10}\left(\frac{15}{24}10^{L_{\mathrm{d}}/10} + \frac{9}{24}10^{(L_{\mathrm{n}}+10)/10}\right)$$

Measurement Set		Temp.	R.H.	Wind	Wind	Peak	
Meas. Pos.	Time Frame/Date of Tests	(°F)	(%)	Direction	Speed	Wind	Sky Conditions
Pos. 1 - 3	9:00 AM to 11:00 AM (2/3/15)	33	57	From the south	1-3 mph	3 mph	Overcast

Table B: **Wadsworth Compressor Station (CS-2): Summary of the Meteorological Conditions during Ambent Sound Survey on Feb. 3, 2015.**

Measurement Set		Unweighted Sound Pressure Level (SPL) in dB per O.B. Frequency (in Hz)									A-Wt.
Meas. Pos. & NSA	Time/Date of Test	31.5	63	125	250	500	1000	2000	4000	8000	Level
Pos. 1 (NSA #1)	9:36 AM (2/3/15)	58.3	54.3	52.6	49.8	51.2	54.3	47.2	33.8	27.1	56.3
Residences approx.	9:38 AM (2/3/15)	58.3	52.3	51.3	47.9	53.1	56.4	49.1	34.9	26.3	58.2
1,800 ft. west of the	9:40 AM (2/3/15)	59.2	53.7	53.0	47.2	51.3	53.5	47.6	34.0	27.7	55.8
Station Site Center	**Avg. A-Wt. & SPL**	**58.6**	**53.4**	**52.3**	**48.3**	**51.9**	**54.7**	**48.0**	**34.2**	**27.0**	**56.7**
Pos. 2 (NSA #2)	9:47 AM (2/3/15)	48.4	45.6	42.6	41.1	41.9	39.4	33.1	24.8	20.3	43.4
Residences approx.	9:51 AM (2/3/15)	51.9	47.7	44.0	40.2	42.8	37.7	28.3	34.0	25.7	43.4
1,840 ft. WNW of the	9:52 AM (2/3/15)	56.9	49.4	45.1	40.8	41.6	36.2	28.4	29.2	26.0	42.1
Station Site Center	**Avg. A-Wt. & SPL**	**52.4**	**47.6**	**43.9**	**40.7**	**42.1**	**37.8**	**29.9**	**29.3**	**24.0**	**43.0**
Pos. 3 (NSA #3)	9:59 AM (2/3/15)	52.5	51.2	54.2	45.8	47.0	44.4	32.2	24.6	21.3	48.3
Residences approx.	10:00 AM (2/3/15)	50.2	51.1	48.8	47.2	45.7	42.8	31.8	22.5	18.9	46.9
2,490 ft. NE of the	10:01 AM (2/3/15)	50.1	51.6	49.6	47.2	47.3	43.2	29.8	21.5	18.8	47.7
Station Site Center	**Avg. A-Wt. & SPL**	**50.9**	**51.3**	**50.9**	**46.7**	**46.7**	**43.5**	**31.3**	**22.9**	**19.7**	**47.6**

Table C: **Wadsworth Compressor Station (CS-2): Measured Ambient Ld and Unweighted Octave-Band ("O.B.") SPLs at the Closest NSAs, as Measured on Feb. 3, 2015.**

Source No. & Dist (Ft)	Noise Sources and Other Conditions/Factors associated with Acoustical Analysis	Unwighted PWL or SPL in dB per O.B. Center Frequency (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
1)	PWL of Turbine/Compressor inside Building	108	112	114	116	118	115	115	120	118	125	
	Atten. of Additional Noise Control (Building)	-6	-10	-18	-25	-30	-35	-40	-45	-45		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	0	-1	-2	-3	-3		
1800	Hemispherical Radiation	-63	-63	-63	-63	-63	-63	-63	-63	-63		
1800	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-1	-1	-3	-5	-14	-25		
1800	Source Sound Level Contribution	39	39	33	27	24	13	5	0	0	25	
2)	PWL of Unsilenced Titan 250 Exhaust (1 Unit)	126	130	128	131	135	130	122	112	102	135	
	Atten. Of Noise Control (Exhaust Muffler)	-5	-16	-25	-40	-45	-45	-45	-35	-25		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	0	0	0	0	0		
1800	Hemispherical Radiation	-63	-63	-63	-63	-63	-63	-63	-63	-63		
1800	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-1	-1	-3	-5	-14	-25		
1800	Source Sound Level Contribution	58	51	40	27	26	19	9	1	0	30	
3)	PWL of the LO Cooler (1 Unit)	105	98	92	90	88	86	85	82	75	92	
	Atten. of Additional Noise Control	0	0	0	0	0	0	0	0	0		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	0	-1	-2	-3	-3		
1800	Hemispherical Radiation	-63	-63	-63	-63	-63	-63	-63	-63	-63		
1800	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-1	-1	-3	-5	-14	-25		
1800	Source Sound Level Contribution	42	35	29	26	24	19	15	3	0	25	
4)	PWL of Outdoor Piping/Components	95	95	98	92	92	105	114	112	105	118	
	Atten. of Noise Control (Acoustical Insulation)	2	2	0	-2	-6	-10	-12	-15	-15		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	0	-1	-2	-3	-3		
1800	Hemispherical Radiation	-63	-63	-63	-63	-63	-63	-63	-63	-63		
1800	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-2	-1	-3	-5	-14	-25		
1800	Source Sound Level Contribution	34	34	35	25	22	28	32	18	0	35	
5)	PWL of Unsilenced Titan 250 Intake (1 Unit)	116	120	128	129	130	132	135	174	166	175	
	Est'd Attenuation of Intake Silencer System	-2	-6	-15	-20	-25	-30	-40	-60	-50		
	Est'd Attenuation of Air Intake Filter	-1	-4	-6	-15	-20	-25	-28	-30	-30		
1800	Hemispherical Radiation	-63	-63	-63	-63	-63	-63	-63	-63	-63		
1800	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-1	-1	-3	-5	-14	-25		
1800	Source Sound Level Contribution	50	47	44	30	21	11	0	8	0	30	
6)	PWL of All Outdoor Gas Aftercooler	115	108	96	94	90	90	88	85	82	95	
	Atten. of Additional Noise Control	0	0	0	0	0	0	0	0	0		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	0	-1	-2	-3	-3		
1700	Hemispherical Radiation	-62	-62	-62	-62	-62	-62	-62	-62	-62		
1700	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-1	-1	-3	-5	-13	-23		Calc'd
1700	Source Sound Level Contribution	53	46	33	31	27	24	19	7	0	30	Ldn
Est'd Total Sound Contribution of Sources at NSA #1		**60**	**54**	**46**	**36**	**32**	**31**	**32**	**18**	**0**	**38.1**	**44.5**

Ambient Sound Level (Ldn) at the NSA	**56.7**
Sound Contribution of Station (Ldn) plus Ambient Sound Level (Ldn)	57.0
Potential Increase above Ambient Sound Level (dB)	**0.3**

Table D: Wadsworth Compressor Station (CS-2): Est'd Sound Contribution of Station at NSA #1 (i.e., Residences located approx. 1,800 Ft. West of the Site Center) assuming Operation of One (1) Solar Titan 250 Turbine-Driven Compressor Unit. In addition, Estimated Increase above the Ambient Sound Level.

NOTE: Muffler DIL & Equipment PWL values on this spreadsheet should <u>not</u> be used as the specified values. Refer to "Noise Control Measures" section in report or other company specifications for actual specified values.

Dist (Ft.)	Noise Sources and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL in dB per O.B. Center Frequency (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Est'd SPLs of Station at 1,800 Ft. (RE: Table D)	60	54	46	36	32	31	32	18	0	38.1	
1840	Hemisph Radiation [20*log(1840/1800)=0.2 dB]	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2		Calc'd
1840	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	0	0	0	-1		Ldn
Est'd Total Sound Contribution of Station at NSA #2		**60**	**53**	**46**	**36**	**32**	**30**	**32**	**18**	**0**	**37.8**	**44.2**

Ambient Sound Level (Ldn) at the NSA	**46.9**
Sound Contribution of Station (Ldn) plus Ambient Sound Level (Ldn)	48.8
Potential Increase above Ambient Sound Level (dB)	**1.9**

Table E: Wadsworth Compressor Station (CS-2): Est'd Sound Contribution of Station at NSA #2 (i.e., Residences located approx. 1,840 Ft. WNW of the Site Center) assuming Operation of One (1) Solar Titan 250 Turbine-Driven Compressor Unit. In addition, Estimated Increase above the Ambient Sound Level.

Dist (Ft.)	Noise Sources and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL in dB per O.B. Center Frequency (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Est'd SPLs of Station at 1,800 Ft. (RE: Table D)	60	54	46	36	32	31	32	18	0	38.1	
2490	Hemisph Radiation [20*log(2490/1800)=2.8 dB]	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8		Calc'd
2490	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-2	-5	-9		Ldn
Est'd Total Sound Contribution of Station at NSA #3		**57**	**51**	**43**	**33**	**29**	**27**	**27**	**10**	**0**	**34.3**	**40.7**

Ambient Sound Level (Ldn) at the NSA	**48.5**
Sound Contribution of Station (Ldn) plus Ambient Sound Level (Ldn)	49.2
Potential Increase above Ambient Sound Level (dB)	**0.7**

Table F: Wadsworth Compressor Station (CS-2): Est'd Sound Contribution of Station at NSA #3 (i.e., Residences located approx. 2,490 Ft. NE of the Site Center) assuming Operation of One (1) Solar Titan 250 Turbine-Driven Compressor Unit. In addition, Estimated Increase above the Ambient Sound Level.

DESCRIPTION OF THE ANALYSIS METHODOLOGY AND THE SOURCE OF SOUND DATA USED FOR THE ANALYSIS OF THE STATION COMPRESSOR UNIT

ANALYSIS METHODOLOGY

In general, the predicted sound level contributed by the Station compressor unit was calculated as a function of frequency from estimated unweighted octave-band (O.B.) sound power levels (PWLs) for each significant sound source associated with the compressor unit(s). The following summarizes the analysis procedure for the analysis of the Station compressor unit(s):

- Initially, unweighted O.B. PWLs of the significant noise sources associated with the compressor unit(s) were determined from actual sound level measurements performed by H&K at similar type of gas compressor facilities and/or equipment manufacturer's sound data;

- Then, expected noise reduction (NR) or attenuation in dB per O.B. frequency due to any noise control measures, hemispherical sound propagation (discussed in more detail below*) and atmospheric sound absorption (discussed in more detail below**) were subtracted from the unweighted O.B. PWLs to obtain the unweighted O.B. SPLs of each noise source. Since sound shielding by buildings can influence the sound level contributed at the NSAs, we also included the sound shielding due to buildings, if appropriate. The sound attenuation effect due to vegetation or land contour were typically not considered in the analyses since there appears there could be limited amount of vegetation (e.g., trees) or hills between the site and the nearby NSAs;

- Finally, the resulting estimated O.B. SPLs for all noise sources associated with the compressor units (with noise control and other sound attenuation effects) were logarithmically summed, and the total O.B. SPLs for all noise sources were corrected for A-weighting to provide the estimated overall A-wt. sound level contributed by the compressor unit at the closest NSA to the compressor unit. The predicted sound contribution of the Station at the closest NSA was utilized to estimate the noise contribution of the Station at the other NSAs more distant that the closest NSA.

*Attenuation due to hemispherical sound propagation: Sound propagates outwards in all directions (i.e., length, width, height) from a point source, and the sound energy of a noise source decreases with increasing distance from the source. In the case of hemispherical sound propagation, the source is located on a flat continuous plane/surface (e.g., ground), and the sound radiates hemispherically (i.e., outward, over and above the surface) from the source. The following equation is the theoretical decrease of sound energy when determining the resulting SPLs of a noise source at a specific distance ("r") of a receiver from a source PWL values:

> Decrease in SPL ("hemispherical propagation") from a noise source = **20*log(r) – 2.3 dB**
> where "r" is distance of the receiver from the noise source.

Attenuation due to air absorption: Air absorbs sound energy, and the amount of absorption ("attenuation") is dependent on the temperature and relative humidity (R.H.) of air and frequency of sound. For example, the attenuation due to air absorption for 1000 Hz O.B. SPL is approximately **1.5 dB per 1,000 feet for standard day conditions (i.e., no wind, 60 deg. F and 70% R.H.).

ANALYSIS METHODOLOGY (NOISE ATTRIBUTABLE TO A BLOWDOWN EVENT)

The noise resulting from a blowdown event was estimated by using the "inverse-square law" and included some attenuation due to atmospheric sound absorption. Consequently, the estimated noise of a blowdown event at the receptor (closest NSA) was calculated as follows:

SPL (receptor) = (Blowdown SPL at R1) – 20*log(R2/R1)– Atm. Atten.= **60 dBA** – 20*log (1800/300)–2 dB = **42 dBA**

Where: R1 = Distance of Specified Blowdown Noise Level Requirement (i.e., 300 ft.)
R2 = Distance of the Receptor from the Blowdown Silencer (1,800 ft.)

SOURCE OF SOUND DATA

The following describes the source of sound data for estimating the source sound levels and source PWLs used in the acoustical analysis for the compressor unit. Note that equipment noise levels utilized in the acoustical analysis (i.e., spreadsheet analysis) are generally higher than the sound level requirement for the equipment to insure that the design incorporates an acoustical "margin of safety."

(1) PWL values of the specific equipment inside the building (i.e., noise of the turbine and compressor) was calculated from sound data measured by H&K on a very similar type of gas compressor installation.

(2) Turbine exhaust PWL values for the Solar turbine were calculated from sound data provided by Solar (i.e., Solar Noise Prediction Manual) and sound data recently measured in the field by H&K on a similar type of turbine installation.

(3) The noise radiated from aboveground gas piping is primarily a result the noise generated by the gas compressors. Consequently, measurement of both near field and far field sound data on gas piping is presumed to be an accurate method of quantifying the noise associated with the new gas piping, and the estimated PWL values for gas piping used in the analysis were determined from near field and far field sound data by H&K on a similar type of compressor to that of the proposed compressor units.

(4) PWL values for the turbine LO cooler(s) and gas aftercooler(s) were designated to meet the design noise goal. Note that the estimated PWL for the cooler(s) utilized in the acoustical analysis assumes some noise associated with piping associated with the coolers. The noise level for the LO cooler and gas aftercooler used in the acoustical analysis is generally higher than the sound level requirement in order that the noise design analysis incorporates an acoustical "margin of safety." In addition, there can be other noise associated with the cooler that is not directly related to the operation of the cooler fans.

(5) PWL values for turbine air intake were calculated from sound data provided by Solar (i.e., Solar Noise Prediction Manual), although low-frequency SPLs were modified as a result of field acoustical tests by H&K.

Type of Equipment	Equipment Power Rating or Capacity	Est'd Number Required	Est'd A-Wt. Sound Level at 50 Ft.: Note (1)	Resulting A-Wt. PWL of Single Piece of Equip.	Assumed Max. No. Operating at One Time	Est'd Max. A-Wt. PWL or Sound Level of Equip.	
Diesel Generator	250 to 400 HP	1 to 2	65 - 70 dBA	102 dBA	1	102	
Bulldozer	250 to 700 HP	1 to 2	75 - 80 dBA	110 dBA	1	110	
Grader	450 to 600 HP	1 to 2	70 - 75 dBA	105 dBA	1	105	
Backhoe	130 to 210 HP	1 to 2	65 - 72 dBA	104 dBA	1	104	
Front End Loader	150 to 250 HP	1 to 2	65 - 70 dBA	102 dBA	1	102	
Truck Loaded	40 Ton	As needed	70 - 75 dBA	105 dBA	1	105	
	Est'd Total Maximum A-Wt. PWL (dBA) of All Construction Site Equipment					113	Calc'd
	Atten. (dB) due to Hemispherical Sound Propagation (1,800 Ft.): Note (2)					-63	Ldn
	Est'd Attenuation (in dB) due to Air Absorption and/or Foliage-Shielding: Note (3)					-5	Note (4)
	Est'd Sound Level (dBA) at Closest NSA (NSA #1) Considering a Maximum Number of Equipment Operating at One Time					45 dBA	43 dBA

Table G: **Wadsworth Compressor Station (CS-2): Est'd Sound Contribution at the Closest NSA (NSA #1, Residences approx. 1,800 Ft. West of Site Center) during Construction Activity at the Station. Sound Contribution assumes Operation of the "Loudest" Equipment during a Time Frame with the Largest Amount of Equipment Operating (e.g., Site Grading & Clearing/Grubbing)**

Note (1): Noise Emission Levels of construction equipment based on an EPA Report (meas'd sound data for a railroad construction project) and measured sound data in the field by H&K or other published sound data.

Note (2): Noise attenuation due to hemispherical sound propagation: Sound propagates outwards in all directions (i.e., length, width, height) from a point source, and the sound energy of a noise source decreases with increasing distance from the source. In the case of hemispherical sound propagation, the source is located on a flat continuous plane/surface (e.g., ground), and the sound radiates hemispherically from the source.

The following equation is the theoretical decrease of sound energy when determining the resulting SPL of a noise source at a specific distance ("r") of a receiver from a source sound power level (PWL):

Decrease in SPL ("hemispherical propagation") from a noise source = 20*log(r) – 2.3 dB, where "r" is distance of the receiver from the noise source. For example, if the distance "r" is 1,800 feet between the site and closest NSA, the "hemispherical propagation" = **20*log(1,800) – 2.3 dB = 63 dB**.

Note (3): Noise attenuation due to air absorption & foliage: Air absorbs sound energy, and the amount of absorption ("attenuation") is dependent on temperature and relative humidity (R.H.) of the air and the frequency of sound. For standard day conditions (i.e., no wind, 60 deg. F. and 70% R.H.), the attenuation due to air absorption for the medium frequency" (i.e., 1000 Hz O.B. SPL) is approximately **1.5 dB** per 1,000 feet. In addition, foliage such as forest/trees between the Station site and nearby NSAs can have a sound attenuation effect depending on the amount/thickness of the foliage.

Note (4): Calc'd Ldn is approx. 2 dB lower than A-wt. sound level since construction activities will occur only during daytime.

ANALYSIS METHODOLOGY AND SOURCE OF SOUND DATA (CONSTRUCTION ACTIVITIES)

The predicted sound level contributed by the construction-related activity (i.e., construction of the compressor station) was calculated from estimated A-wt. PWL of noise sources (i.e., construction equipment noise) that typically operate during the specific construction activity. The following summarizes the acoustical analysis procedure utilized for the construction activity at the site:

- Initially, the A-wt. PWL of noise sources associated with the construction activity were determined from published sound data and/or actual sound level measurements by H&K, and the total PWL of each noise source (equipment) was based on the anticipated number of equipment operating;

- Next, A-wt. PWL of all sources were logarithmically summed to provide the overall A-wt. PWL contributed by construction activity. It is assumed that the highest level of construction noise would occur during site earth work (i.e., time frame when the largest amount of equipment would operate);

- Finally, the estimated A-wt. sound level of the construction activity at the specific distance was determined by compensating for sound attenuation due to propagation (hemispherical radiation), atmospheric sound absorption and sound attenuation effect of foliage/forest***.

  The noise levels of construction equipment were based on an EPA Report (i.e., measured sound data from railroad construction equipment taken during the Northeast Corridor Improvement Project) that was summarized in a 1995 Report to the Federal Transit Administration as prepared by Harris Miller Miller & Hanson Inc. Also, construction equipment noise levels listed in an article in the Journal of Noise Control Engineering and sound data at a typical compressor station construction site, as measured by H&K, was utilized. The following list some references used by H&K to determine construction equipment noise emission levels:

  (1) "Transit Noise and Vibration Impact Assessment", dated April 1995, prepared by Harris Miller Miller & Hanson Inc. for the Office of Planning of the Federal Transit Administration.
  (2) Erich Thalheimer, "Construction Noise Control Program and Mitigation Strategy at the Central Artery/Tunnel Project", J of Noise Control Eng., 48 (5), pp. 157-165 (2000 Sep-Oct).
  (3) "Noise Control for Building Manufacturing Plant Equipment and Products", course handout notes for a noise course given by Hoover & Keith Inc.

  ***Discussion of noise attenuation due to foliage: Since there will be a substantial amount of trees between the Station and NSAs, the sound attenuation effect of foliage was included. The potential attenuation of foliage, based on our experience and an ISO Standard[1], the "medium-frequency" attenuation (i.e., 1000 Hz) due to forest/trees greater than 500 feet thick is approximately **10 dB**. Consequently, for this Station (i.e., distance of 1,800 feet from closest NSA), the "medium-frequency" air absorption attenuation would be approximately **3 dB**, (i.e., 1.5 dB x 1,800/1000 = 3 dB). Then, adding the attenuation due to foliage (approx. **2 dB**) to the air absorption attenuation, an overall attenuation of **5 dB** was utilized as the estimated attenuation due to air absorption and foliage.

End of Report

[1] ISO Standard 9613-1: 1993 (E), entitled "Acoustics – Attenuation of sound during propagation outdoors – Part 1: Calculation of the absorption of sound by the atmosphere, and Part 2: General method of calculation"

CLYDE COMPRESSOR STATION
(SANDUSKY COUNTY, OHIO)

RESULTS OF AN AMBIENT SOUND SURVEY AND ACOUSTICAL ANALYSIS OF THE NATURAL GAS COMPRESSOR STATION (CS-3) ASSOCIATED WITH THE NEXUS GAS TRANSMISSION PROJECT

H&K Report No. 3226

H&K Job No. 4875

Date of Report: June 9, 2015

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REPORT SUMMARY

This report provides the results of an acoustical analysis for the new **Clyde Compressor Station** (referred to as "Station" or "CS-3" in the report) associated with the proposed **NEXUS Gas Transmission Project** ("Project" or "NEXUS Project"). Also included are the results of the recent ambient sound survey at the proposed site of the Station. The intent of the acoustical analysis is to project the sound contribution of the Station during full load operation and determine noise control measures to insure that applicable sound criteria are not exceeded at the nearby noise-sensitive areas (NSAs). The purpose of the ambient sound survey was to identify and verify the nearby NSAs surrounding the Station and to quantify the current ambient sound environment at the nearby NSAs.

The following table summarizes the ambient sound level at the identified closest NSAs, the estimated sound level contribution of the Station at the closest NSAs if the Station was operated at full load and the total sound level contribution of the Station (i.e., sound level contribution of the Station plus the ambient noise level). The results provided in this table are referred to as the "Noise Quality Analysis" for the Station.

Noise Quality Analysis for the Clyde Compressor Station associated with the NEXUS Project

Closest NSA(s) and Type of NSA	Distance and Direction of NSA to Station Site Center	Ambient Ldn (via Meas'd Ld & Est'd Ln)	Est'd Sound Level (Ldn) of the Station at Full Load	Est'd "Total" Ldn (Station Noise + Ambient Noise)	Potential Noise Increase
NSA #1 (Residences)	1,450 ft. (NNW)	63.2 dBA	46.4 dBA	63.3 dBA	0.1 dB
NSA #2 (Residences)	810 ft. (SW)	51.8 dBA	52.7 dBA	55.3 dBA	3.5 dB
NSA #3 (Residence)	1,160 ft. (SE)	53.4 dBA	48.9 dBA	54.7 dBA	1.3 dB

The results of the acoustical analysis indicates that if the anticipated and/or recommended noise control measures are implemented successfully, the sound contribution of the proposed Station should be equal to or lower than **55 dBA** (L_{dn}) at the nearby NSAs, which is the FERC sound level requirement for this type of facility. In addition, the acoustical analyses indicate that the noise of construction activities and noise resulting from a unit blowdown event at the Station should have limited noise impact on the surrounding environment. Also, since Station noise sources that could cause perceptible vibration (e.g., turbine exhaust noise) will be adequately mitigated, there should not be any perceptible increase in vibration at any NSA during Station operation.

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1.0 INTRODUCTION

In this report, **Hoover & Keith Inc.** (H&K) presents the results of an acoustical analysis for the new **Clyde Compressor Station** (referred to as "Station" or "CS-3" in the report) associated with the proposed **NEXUS Gas Transmission Project** ("Project" or "NEXUS Project"). Also included are the results of the recent ambient sound survey at the proposed site of the Station. The following summarizes the purpose of the ambient sound survey and Station acoustical analysis:

(1) Quantify the existing acoustic environment (i.e., measure the typical ambient sound levels) and verify the current noise-sensitive areas (NSAs) around the Station, such as residences, hospitals and schools;

(2) Estimate the sound level contribution of the Station at the nearby NSAs and estimate the "total" Station sound level contribution (i.e., Station noise plus the ambient sound level);

(3) Determine noise mitigation measures to insure that applicable sound level criteria are not exceeded after installation and full load operation of the Station; and

(4) Project the noise at the nearby NSAs resulting from construction activities at the Station, and estimate the noise contribution due to a unit blowdown event at the Station.

2.0 SOUND CRITERIA

Federal: It is anticipated that certificate conditions of the Office of Energy Projects (OEP) of the Federal Energy Regulatory Commission (FERC) will require that the sound level attributable to a new natural gas compressor station during full load operation not exceed a day-night average sound level (i.e., L_{dn}) of **55 dBA** at any nearby NSA. In addition, the operation of the Station should not result in a perceptible increase in vibration at any nearby NSA. The L_{dn} is an energy average of the measured daytime L_{eq} (L_d) and measured nighttime L_{eq} (L_n) plus **10 dB**. The **10-dB** adjustment to the L_n is intended to compensate for nighttime sensitivity. For a steady sound source that operates continuously over a 24-hour period and controls the environmental sound level, the L_{dn} is approximately **6.4 dB** above the measured L_{eq}. Consequently, an L_{dn} of **55 dBA** corresponds to a L_{eq} of **48.6 dBA**. If both the L_d and L_n are measured and/or estimated, then the L_{dn} is calculated using the following formula:

$$L_{\mathrm{dn}} = 10\log_{10}\left(\frac{15}{24}10^{L_{\mathrm{d}}/10} + \frac{9}{24}10^{(L_{\mathrm{n}}+10)/10}\right)$$

State of Ohio: The State of Ohio or the Ohio EPA does not have regulations related to acceptable noise levels. We understand that sometimes noise level regulations are covered under local ordinances or city codes (e.g., public nuisance and limit excessive noise between certain hours).

County/Township: No applicable county or township noise regulations have been identified, although local noise regulations, if required, will be addressed during the permitting process.

3.0 SITE/FACILITY DESCRIPTION

Figure 1 (**Appendix**, p. 10) provides an area layout around the Station that shows the NSAs within 1 mile of the Station and other areas of interest. **Figure 2** (**Appendix**, p. 11) provides an area layout around the Station that shows the identified closest NSAs around the Station, reported sound measurement positions near the identified closest NSAs and a conceptual layout of equipment/buildings at the Station. The Station will be located in Sandusky County, Ohio, approximately 5 miles northeast of Clyde, OH, and Interstate 80 (also referred to as "Interstate 90") is located relatively close to the Station. There are a few NSAs (e.g., primarily residences) located within 1 mile of the Station, and the closest NSAs are residences located approximately 810 feet southwest (SW) of the Station site (along Pickle Street).

The proposed Station will consist of one (1) Solar Titan 250 gas turbine-driven centrifugal gas compressor unit [i.e., 30,000 horsepower (HP) rating (ISO)]. We understand that the turbine and compressor for the compressor unit will be installed inside an insulated metal building (i.e., Compressor Building). The following describes the anticipated auxiliary equipment and other notable items associated with the Station compressor unit:

- Outdoor lube oil cooler ("LO cooler");
- Turbine exhaust system designed with an adequate muffler system;
- Turbine air intake filter system designed with in-duct silencer;
- Gas piping and associated piping components, and most gas piping will be buried;
- Gas aftercooler (i.e., air-cooled heat exchanger) that serves the compressor unit; and
- Gas blowdown silencer associated with a unit blowdown.

There will also be two (2) types of gas blowdown events: (1) gas blowdown that occurs when a compressor is stopped and gas between the suction/discharge valves and compressor is vented to the atmosphere ("unit blowdown") via a blowdown silencer, and (2) emergency shutdown ("ESD") that will only occur at required Department of Transportation (DOT) test intervals or in an emergency situation (e.g., gas leak or fire). The unit blowdown will be a "maintenance" type of unit blowdown which can occur when the compressor unit is stopped and gas between the suction/discharge valves and compressor unit is vented to the atmosphere through a silencer. During the period of commissioning and testing, it is estimated that a unit blowdown could occur 2 to 4 times/day and typically only during the daytime. During normal operation of the Station (i.e., after the commissioning period), a unit blowdown event occurs infrequently (e.g., 1 to 3 times/month). In addition, a unit blowdown event only occurs for a short time frame (e.g., unit blowdown event would persist for approximately 1 to 5 minutes). There also can be an emergency shutdown ("ESD") that will only occur only during an emergency situation (e.g., gas leak or fire), which rarely occurs, noting that some natural gas facilities operate for years without having an ESD, and the gas blowdown related to an ESD may be vented via a blowdown silencer. Note that for required DOT test intervals of the ESD operations (e.g., once or twice a year), it is not necessary to vent/blowdown the pipeline gas to atmosphere.

4.0 MEASUREMENT METHODOLOGY, MEASUREMENT LOCATIONS AND CONDITIONS

Current ambient sound levels were measured near three (3) of the identified surrounding closest NSAs (i.e., "NSA #1", "NSA #2" & "NSA #3"). The following provides a description of the identified NSAs and the reported sound measurement positions ("Pos."):

Pos. 1: Near NSA #1: Residences located 1,450 feet north-northwest (NNW) of the Station site center (i.e., anticipated location of the Compressor Building);
Pos. 2: Near NSA #2 (closest NSA): Residences located 810 feet SW of the Station site center;
Pos. 3: Near NSA #3: Residence located 1,160 feet southeast (SE) of the Station site center.

The sound survey was conducted by Garrett Porter of H&K during the daytime of Feb. 4, 2015. During the site ambient sound survey, the temperature was 36 degrees F, the wind was from the west and there were overcast sky conditions. At the reported sound measurement locations, the A-wt. equivalent sound levels (i.e., L_{eq}) and the unweighted octave-band (O.B.) sound pressure levels (SPLs) were measured at approximately 5 feet above ground. The sound measurements attempted to exclude "extraneous sound" such as the noise contribution of occasional vehicle passing by the measurement position and/or other intermittent sources. The acoustical measurement system consisted of a Rion NA-27 Sound Level Meter (a Type 1 SLM per ANSI S1.4 & S1.11) equipped with microphone, covered with a windscreen. The SLM was calibrated with a microphone calibrator (calibrated within 1 year of the test date).

5.0 MEASUREMENT RESULTS AND OBSERVATIONS

Table A (**Appendix**, p. 12) summarizes the measured daytime L_{eq} (L_d) and the estimated nighttime L_{eq} (L_n) at the NSA sound measurement locations along with the average of the measured L_d since several samples of the ambient sound level were measured. **Table A** also includes the resulting ambient L_{dn} as calculated from the measured L_d and estimated L_n. Meteorological conditions that occurred during the sound survey are summarized in **Table B** (**Appendix**, p. 12). The measured daytime sound levels (L_d) and related unweighted O.B. SPLs at the reported sound measurement positions are provided in **Table C** (**Appendix**, p. 12).

The following **Table 1** summarizes the measured ambient L_d and estimated ambient L_n at the closest NSAs along with the resulting ambient L_{dn} at the closest NSAs, as calculated from the measured ambient L_d and estimated L_n.

Meas. Pos.	Description of the Identified Closest NSAs, as related to the Sound Measurement Location	Meas'd Ambient Ld	Est'd Ambient Ln	Resulting Ambient Ldn
Pos. 1	NSA #1: Residences 1,450 feet NNW of the Station site	62.4 dBA	54.4 dBA	63.2 dBA
Pos. 2	NSA #2: Residences 810 feet SW of the Station site	49.2 dBA	44.2 dBA	51.8 dBA
Pos. 3	NSA #3: Residences 1,160 feet SE of the Station site	52.5 dBA	44.5 dBA	53.4 dBA

Table 1: Summary of the Measured Ld, Estimated Ln and Resulting Ambient Ldn at the Identified NSAs

It is our opinion that the measured sound level data adequately quantifies the existing ambient sound level for the meteorological conditions that occurred during the sound survey. At the reported sound measurement positions near the closest NSAs, the ambient A-wt. sound level was primarily a result of the noise of distant vehicle traffic along Interstate 80/90 ("I-80/90"). The ambient L_n were not measured but were estimated based on our site observations to provide a more accurate representation of the ambient L_{dn} (i.e., ambient nighttime levels could be lower than the measured daytime levels since there should be less traffic noise along I-80/90).

6.0 ACOUSTICAL ANALYSIS (COMPRESSOR STATION)

6.1 Sound Level Contribution of the Station

The acoustical analysis considers the noise produced by equipment for the Station compressor unit that could impact the sound contribution at any NSA. The predicted sound contribution of the Station were performed only for the closest NSAs (i.e., NSA #1, NSA #2 & NSA #3) since the Station sound contribution at other nearby NSAs should be equal to or less than the Station sound level at these closest NSAs. A description of the acoustical analysis methodology and source of sound data for the analysis is provided in the **Appendix** (pp. 15–16). The following sound sources were considered significant and included in the Station acoustical analysis:

- Noise generated by the turbine/compressor that penetrates the Compressor Building;
- Noise of the turbine exhaust radiated from the turbine exhaust stack;
- Noise radiated from aboveground/outdoor gas piping and associated components;
- Noise of the outdoor LO cooler and associated outdoor piping;
- Noise generated by the turbine air intake system, and
- Noise of the gas aftercooler and associated aboveground piping.

Table D (**Appendix**, p. 13) shows the spreadsheet analysis of the estimated A-wt. sound level and unweighted O.B. SPLs at the closest NSA (i.e., NSA #2) contributed by the Station compressor unit during full load operation for standard day propagating conditions (i.e., no wind, 60 deg. F., 70% R.H.). Included in **Table D** is the estimated "total" sound level contribution of the Station at NSA #1 (i.e., sound level contribution of the Station plus the ambient sound level).

Table E (**Appendix**, p. 14) provides the estimated A-wt. sound level and unweighted O.B. SPLs of the Station at the next closest NSA ("NSA #3") based on the acoustical analysis at NSA #2, along with the estimated total sound level contribution of the Station at NSA #3 (i.e., sound level contribution of the Station plus the ambient sound level).

Table F (**Appendix**, p. 14) provides the estimated A-wt. sound level and unweighted O.B. SPLs of the Station at NSA #1 based on the acoustical analysis at NSA #2, along with the estimated total sound level contribution of the Station at NSA #3 (i.e., sound level contribution of the Station plus the ambient sound level).

The following **Table 2** summarizes the calculated sound level contribution of the Station at the closest NSAs assuming full load operation of all equipment associated with the Station, noting that the estimated A-wt. sound level was used to calculate the representative L_{dn}.

Operating Condition and associated NSA	Est'd A-Wt. Sound Level of Station	Calc'd Ldn (via Est'd A-Wt. Level)
Est'd sound contribution of Station during full load operation at NSA #1	40.0 dBA	46.4 dBA
Est'd sound contribution of Station during full load operation at NSA #2	46.3 dBA	52.7 dBA
Est'd sound contribution of Station during full load operation at NSA #3	42.5 dBA	48.9 dBA

Table 2: Estimated Sound Contribution of the Station during Full Load Operation at the Closest NSAs

6.2 Sound Contribution of a Unit Blowdown Event at the Station

The noise level of the unit blowdown event via a blowdown silencer will be specified to meet an A-wt. sound level of **60 dBA** at a distance of 300 feet. If this sound requirement is achieved, the noise of a unit blowdown will be approximately **47 dBA** (i.e., L_{dn} of approximately **53 to 54 dBA**) at the closest NSA, located approximately 900 feet from the unit blowdown silencer, which would be lower than **55 dBA** (L_{dn}). Consequently, although the noise of a unit blowdown event could be slightly audible at the nearby NSAs, it is not expected to present a noise impact, noting also that a unit blowdown event occurs infrequently for a short time frame (e.g., 1 to 5 minute period). A description of the acoustical analysis methodology and source of sound data related to blowdown noise are provided in the **Appendix** (p. 16)

7.0 ACOUSTICAL ANALYSIS (SITE CONSTRUCTION ACTIVITIES)

The acoustical analysis of the construction-related activities at the site of the Station considers the noise produced by any significant sound sources associated with the primary construction equipment that could impact the sound contribution at the nearby NSAs. The predicted sound contribution of construction equipment/activities was performed only for the closest NSA (i.e., NSA #2). Construction of the Station will consist of earth work (e.g., site grading, clearing and grubbing) and construction of the Station buildings, and it is assumed that the highest level of construction noise would occur during site earth work (i.e., time frame when the largest amount of construction equipment would operate).

Table G (**Appendix**, p. 17) shows the calculation of the estimated maximum A-wt. sound level at the closest NSA contributed by the construction activities at the Station for standard day propagating conditions. A description of the methodology and source of sound data for the construction noise analysis are provided in the **Appendix** (p. 18). The analysis indicates that the maximum A-wt. noise level of construction activities at the closest NSA would be equal to or less than **54 dBA** (i.e., L_{dn} of **52 dBA**, since nighttime construction activities are not anticipated).

8.0 NOISE CONTROL MEASURES (COMPRESSOR STATION)

The following section provides the recommended noise control measures and equipment sound level requirements along with other assumptions that may affect the noise of the Station.

8.1 Building enclosing the Turbine/Compressor

We understand that the turbine and compressor will be installed inside an acoustically-insulated metal building (i.e., Compressor Building). The following describes specific sound requirements and other items related to the components of the Compressor Building.

- As a minimum, walls/roof should be constructed with an exterior skin of 22–gauge metal, and building interior surfaces should be covered with 6–inch thick "high-density" mineral wool (i.e., 6.0-8.0 pcf uniform density) covered with a perforated liner; Note that "low-density" insulation (e.g., 0.6 to 0.75 pcf density) should **not** be substituted for the high-density material although low-density insulation could be employed in addition to the high-density insulation;

- No windows or louvers should be installed in the building walls although a minimum number of skylights could be installed in the building roof although not anticipated;

- Each large access door system (i.e., "roll-up door") should consist of an insulated-type door (e.g., 18-ga. exterior facing, 24-ga. backskin with insulation core); personnel entry doors should be a **STC-36 sound rating**, even if glazing is employed and should be self-closing and should seal well when closed;

- It is anticipated that the building air ventilation system will be designed with air supply fans mounted in the building walls along with roof-mounted air exhaust vents or a roof ridge vent to exhaust the air (i.e., wall louvers should not be employed). Assuming this type of air ventilation system, the sound level for each wall air-supply fan should not exceed **50 dBA** at **50 feet**, which will require that each fan employ an exterior dissipative-type silencer (e.g., 3-ft. length) and an acoustically-lined weatherhood.

8.2 Turbine Exhaust System

The turbine exhaust system for compressor unit should include a silencer system that provides the following dynamic sound insertion loss ("DIL") values at the rated turbine operating conditions.

DIL Values for the Exhaust Silencer System in dB per Octave-Band (O.B.) Center Freq. (Hz)

31.5	63	125	250	500	1000	2000	4000	8000
5	16	25	35	45	45	45	35	30

To meet these recommended DIL values and minimize the impact of the turbine exhaust noise at surrounding residences, a "2–stage" exhaust silencer system should be implemented. One (1) of

the 2-stage silencers should be employed horizontally in the exhaust ducting located inside the Compressor Building for the compressor unit (i.e., "1st stage silencer"), and the other silencer system could be integrated into the vertical outdoor exhaust stack (i.e., "2nd stage silencer") or in the horizontal exhaust ducting located outside the Compressor Building. If a CO converter is employed, which is anticipated, it is assumed that a CO converter system would be inserted upstream of the 1st stage silencer, inside the Compressor Building.

8.3 Outdoor Aboveground Gas Piping

The analysis indicates that noise control measures, such as acoustical pipe insulation, will be required for outdoor aboveground gas piping to meet applicable sound criteria. The following items associated with the gas piping and piping components should be addressed:

- Acoustical pipe insulation should be employed for aboveground suction and discharge gas piping. Acoustical pipe insulation should consist of a minimum 3-inch thick fiberglass or mineral wool (6.0-8.0 pcf density) that is covered with a mass-filled vinyl jacket (e.g., composite of 1.0 psf mass-filled vinyl laminated to 0.020-inch thick aluminum). All exposed pipe supports for the insulated gas piping should be covered with acoustical insulation;

- Outdoor valves should be covered with acoustical blanket material. Filter–separator(s) and associated aboveground gas piping should not have to be covered with any type of acoustical material. It is also recommended that the suction pipe strainer for the compressor units be removed soon after the Station is placed in service, if feasible.

8.4 Lube Oil Cooler

Lube oil cooler ("LO cooler") should not exceed **60 dBA** at **50 feet** from the cooler perimeter at the full rated operating conditions (i.e., equivalent to a PWL of **92–93 dBA**), and a "custom" Solar LO cooler may be required to meet the recommended sound level requirement.

8.5 Turbine Air Intake System

The turbine air intake system for the compressor unit should be designed with at least one (1) in-duct silencer (e.g., 7-ft. length "special" silencer or combination of 2 Solar "standard" silencers), and at least one of the silencers (i.e., if 2 separate silencers are employed) should be installed in the intake ductwork located inside the Compressor Building. As a minimum, the air intake silencer system should provide the following DIL values at the rated operating conditions of the turbine-driven compressor unit.

DIL Values in dB per O.B. Center Frequency for the Turbine Air Intake System

31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
4	10	20	35	45	55	60	60	55

8.6 Gas Aftercooler

The sound level generated by the multi-fan gas cooler that serves the compressor unit should not exceed **62 dBA** at **50 feet** at the full rated operating conditions (i.e., all fans operating at maximum design speed). To meet this sound level requirement, the gas aftercooler will need to be designed with "low-noise" fans that operate at relatively low tip speeds (e.g., fans operating at below 7,200 fpm tip speeds). In addition, aboveground inlet pipe risers and inlet header for the gas cooler should be covered with acoustical pipe insulation but the outlet pipe risers should not have to be covered with acoustical pipe insulation.

8.7 Unit Blowdown Silencer

The unit blowdown silencer should attenuate the unsilenced blowdown noise to a noise level equal to or less than **60 dBA** at 300 feet from the outlet of the silencer, which includes the noise radiated from the shell of the silencer during the blowdown event.

9.0 SUMMARY AND FINAL COMMENT

The following **Table 3** summarizes the ambient sound level at the closest NSAs, the estimated sound level contribution of the Station at the closest NSAs during full load Station operation and the "total" sound level contribution of the Station (i.e., sound level contribution of Station during operation plus the ambient sound level). The results provided in this table are referred to as the "Noise Quality Analysis" for the Station.

Closest NSA(s) and Type of NSA	Distance and Direction of NSA to Station Site Center	Ambient Ldn (via Meas'd Ld & Est'd Ln)	Est'd Sound Level (Ldn) of the Station at Full Load	Est'd "Total" Ldn (Station Noise + Ambient Noise)	Potential Noise Increase
NSA #1 (Residences)	1,450 ft. (NNW)	63.2 dBA	46.4 dBA	63.3 dBA	0.1 dB
NSA #2 (Residences)	810 ft. (SW)	51.8 dBA	52.7 dBA	55.3 dBA	3.5 dB
NSA #3 (Residence)	1,160 ft. (SE)	53.4 dBA	48.9 dBA	54.7 dBA	1.3 dB

Table 3: Noise Quality Analysis for the Clyde Compressor Station associated with NEXUS Project

The results of the acoustical analysis indicates that if the noise control measures are employed successfully, the sound contribution of the Station should be equal to or lower than **55 dBA** (L_{dn}) at the nearby NSAs, which is the FERC sound level requirement for this type of facility. In addition, the acoustical analyses indicate that the noise of construction activities and noise resulting from a unit blowdown event at the Station should have limited noise impact on the surrounding environment. Also, since Station noise sources that could cause perceptible vibration (e.g., turbine exhaust noise) will be adequately mitigated, there should not be any perceptible increase in vibration at any NSA during Station operation.

APPENDIX

- **FIGURE 1: GENERAL AREA LAYOUT AROUND THE STATION SHOWING THE NSAs LOCATED WITHIN 1 MILE OF THE STATION AND OTHER AREAS OF INTEREST**
- **FIGURE 2: AREA LAYOUT SHOWING IDENTIFIED CLOSEST NSAs, REPORTED SOUND MEASUREMENT POSITIONS NEAR THE CLOSEST NSAs, AND CONCEPTUAL LAYOUT OF THE STATION SHOWING THE EQUIPMENT, BUILDINGS AND STATION FENCELINE**
- **SUMMARY OF THE MEASURED AMBIENT SOUND DATA**
- **ACOUSTICAL ANALYSIS (COMPRESSOR STATION)**
- **ANALYSIS METHODOLOGY (NOISE ATTRIBUTABLE TO THE STATION AND A BLOWDOWN EVENT) AND THE SOURCE OF SOUND DATA**
- **ACOUSTICAL ANALYSIS (CONSTRUCTION ACTIVITIES)**
- **DESCRIPTION OF THE ANALYSES METHODOLOGY (CONSTRUCTION ACTIVITIES) AND THE SOURCE OF SOUND DATA**

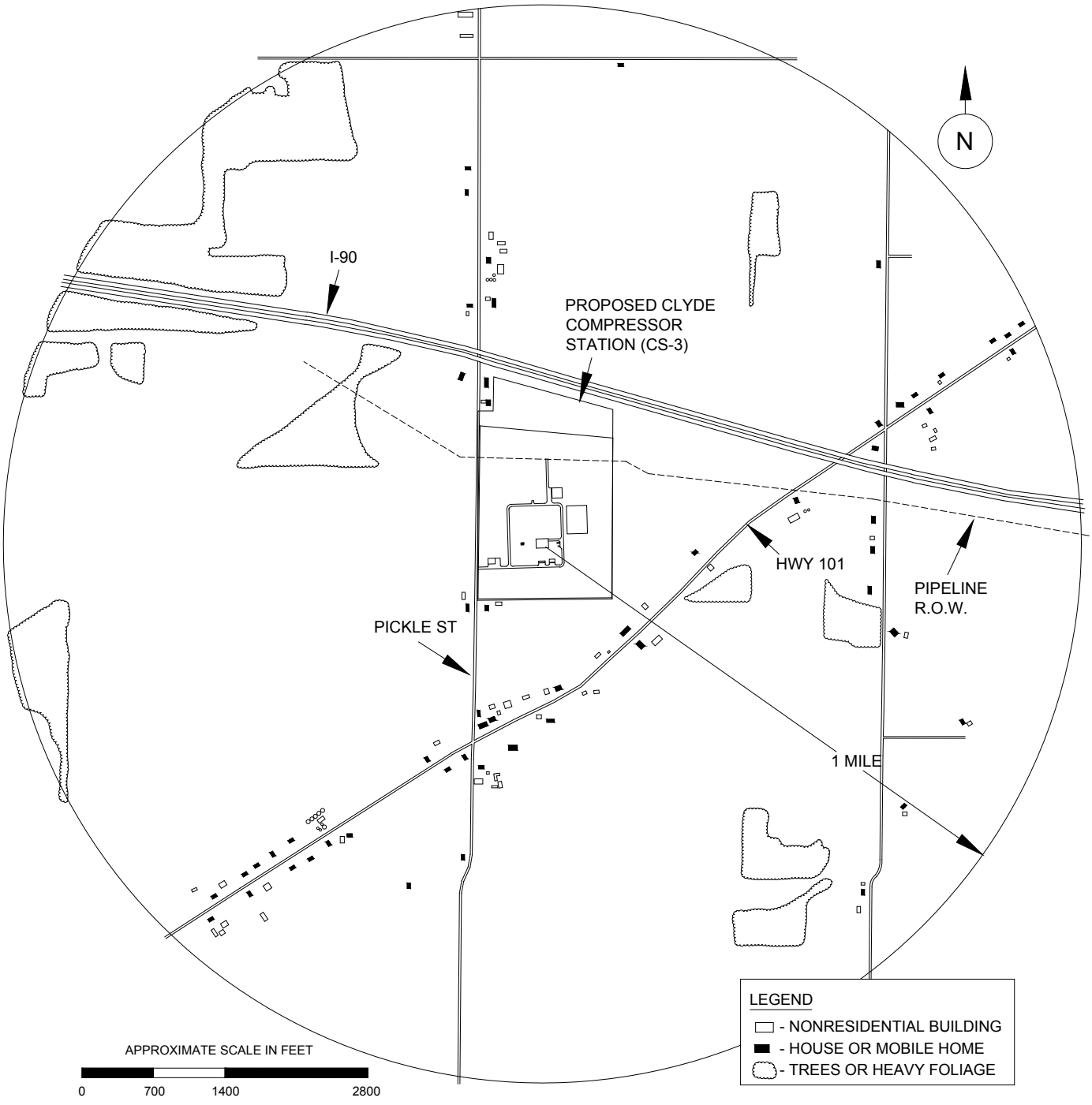

Figure 1: NEXUS Clyde Compressor Station (CS-3): General Area Layout showing the NSAs within 1 Mile of the Station Site and Other Areas of Interest.

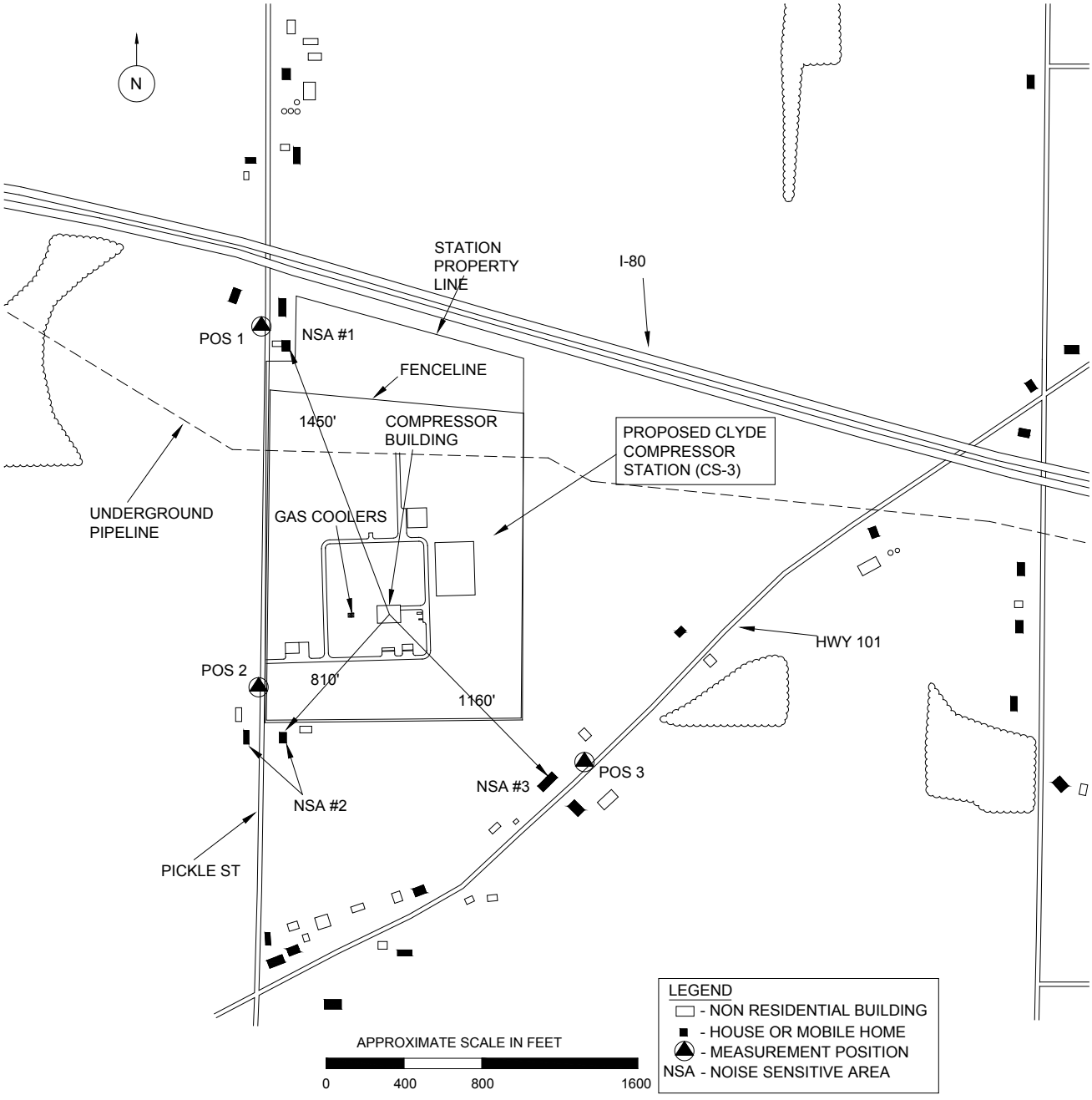

Figure 2: NEXUS Clyde Compressor Station (CS-3): Layout showing the Surrounding NSAs, Chosen Sound Measurement Positions near the Closest NSAs and Conceptual Layout of Station Equipment and Buildings.

Measurement Set		Meas'd/Calc'd A-Wt. Levels (dBA)				
Meas. Pos. & NSA	Time/Date of Test	Day-time Leq(Ld)	Avg'd of Ld	Night time Leq(Ln)	Calc'd Ldn Note (2)	Notes/Observations
Pos. 1 (NSA #1)	1:14 PM (2/4/15)	64.4				Primary noise during tests: Noise of vehicle traffic
Residences approx.	1:15 PM (2/4/15)	60.7	**62.4**	**54.4**	**63.2**	along Interstate 80 ("I-80").
1,450 ft. NNW of the	1:16 PM (2/4/15)	62.0		Note (1)	Note (2)	
Station Site Center						
Pos. 2 (NSA #2)	1:24 PM (2/4/15)	49.2				Primary noise during tests: Noise of vehicle traffic
Residences approx.	1:25 PM (2/4/15)	48.5	**49.2**	**44.2**	**51.8**	along I-80.
810 ft. SW of the	1:27 PM (2/4/15)	49.8		Note (1)	Note (2)	
Station Site Center						
Pos. 3 (NSA #3)	1:33 PM (2/4/15)	52.8				Primary noise during tests: Noise of vehicle traffic
Residence approx.	1:34 PM (2/4/15)	52.3	**52.5**	**44.5**	**53.4**	along I-80 and Hwy. 101.
1,160 ft. SE of the	1:35 PM (2/4/15)	52.5		Note (1)	Note (2)	
Station Site Center						

Table A: **Clyde Compressor Station (CS-3): Summary of Ambient Daytime Sound Levels (i.e., Ld) at the Closest NSAs, as Meas'd on Feb. 4, 2015, Est'd Nighttime Levels (Ln) and Resulting Ldn.**

Note (1): Nightime sound levels (Ln) were not measured but since there should be less noise during night, the Ln was estimated to provide a representative ambient Ldn (e.g., 3 to 8 dB subtracted from the daytime levels).

Note (2): Ldn calculated by adding 6.4 dB to the measured Ld. If both the Ld and Ln are measured and/or estimated, the Ldn is calculated using the following formula:

$$L_{\mathrm{dn}} = 10\log_{10}\left(\frac{15}{24}10^{L_{\mathrm{d}}/10} + \frac{9}{24}10^{(L_{\mathrm{n}}+10)/10}\right)$$

Measurement Set		Temp.	R.H.	Wind	Wind	Peak	
Meas. Pos.	Time Frame/Date of Tests	(°F)	(%)	Direction	Speed	Wind	Sky Conditions
Pos. 1 - 3	1:00 PM to 2:30 PM (2/4/15)	36	74	From the west	2-5 mph	5 mph	Overcast

Table B: **Clyde Compressor Station (CS-3): Summary of the Meteorological Conditions during Ambent Sound Survey on Feb. 4, 2015.**

Measurement Set		Unweighted Sound Pressure Level (SPL) in dB per O.B. Frequency (in Hz)									A-Wt.
Meas. Pos. & NSA	Time/Date of Test	31.5	63	125	250	500	1000	2000	4000	8000	Level
Pos. 1 (NSA #1)	1:14 PM (2/4/15)	69.4	64.8	59.3	59.3	62.6	61.1	54.4	45.2	32.1	64.4
Residences approx.	1:15 PM (2/4/15)	70.5	62.9	56.6	55.8	58.4	57.6	51.4	42.5	30.3	60.7
1,450 ft. NNW of the	1:16 PM (2/4/15)	72.3	64.4	57.9	57.8	60.5	58.7	51.4	41.7	29.8	62.0
Station Site Center	**Avg. A-Wt. & SPL**	**70.7**	**64.0**	**57.9**	**57.6**	**60.5**	**59.1**	**52.4**	**43.1**	**30.7**	**62.4**
Pos. 2 (NSA #2)	1:24 PM (2/4/15)	68.9	58.1	47.9	44.8	47.5	46.1	36.7	27.8	25.2	49.2
Residences approx.	1:25 PM (2/4/15)	70.1	58.6	49.4	44.9	47.4	44.8	34.5	25.1	23.0	48.5
810 ft. SW of the	1:27 PM (2/4/15)	70.7	60.1	49.8	44.5	48.0	46.7	36.5	31.1	27.3	49.8
Station Site Center	**Avg. A-Wt. & SPL**	**69.9**	**58.9**	**49.0**	**44.7**	**47.6**	**45.9**	**35.9**	**28.0**	**25.2**	**49.2**
Pos. 3 (NSA #3)	1:33 PM (2/4/15)	61.8	51.3	47.1	45.5	51.7	49.9	39.3	27.0	25.6	52.8
Residence approx.	1:34 PM (2/4/15)	61.2	49.8	46.3	44.5	50.0	50.2	38.1	25.7	22.9	52.3
1,160 ft. SE of the	1:35 PM (2/4/15)	58.9	49.6	47.9	46.7	50.9	49.5	41.7	28.0	24.1	52.5
Station Site Center	**Avg. A-Wt. & SPL**	**60.6**	**50.2**	**47.1**	**45.6**	**50.9**	**49.9**	**39.7**	**26.9**	**24.2**	**52.5**

Table C: **Clyde Compressor Station (CS-3): Measured Ambient Ld and Unweighted Octave-Band ("O.B.") SPLs at the Closest NSAs, as Measured on Feb. 4, 2015.**

Source No. & Dist (Ft)	Noise Sources and Other Conditions/Factors associated with Acoustical Analysis	Unwighted PWL or SPL in dB per O.B. Center Frequency (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
1)	PWL of Turbine/Compressor inside Building	108	112	114	116	118	115	115	120	118	125	
	Atten. of Additional Noise Control (Building)	-6	-10	-18	-25	-30	-35	-40	-45	-45		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	0	0	-1	-2	-3		
810	Hemispherical Radiation	-56	-56	-56	-56	-56	-56	-56	-56	-56		
810	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	-1	-1	-2	-6	-11		
810	Source Sound Level Contribution	46	46	40	35	32	23	16	11	3	32	
2)	PWL of Unsilenced Titan 250 Exhaust (1 Unit)	126	130	128	131	135	130	122	112	102	135	
	Atten. Of Noise Control (Exhaust Muffler)	-5	-16	-25	-40	-45	-45	-45	-35	-25		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	0	0	0	0	0		
810	Hemispherical Radiation	-56	-56	-56	-56	-56	-56	-56	-56	-56		
810	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	-1	-1	-2	-6	-11		
810	Source Sound Level Contribution	65	58	47	35	34	28	19	15	10	37	
3)	PWL of the LO Cooler (1 Unit)	105	98	92	90	88	86	85	82	75	92	
	Atten. of Additional Noise Control	0	0	0	0	0	0	0	0	0		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	0	0	-1	-2	-3		
810	Hemispherical Radiation	-56	-56	-56	-56	-56	-56	-56	-56	-56		
810	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	-1	-1	-2	-6	-11		
810	Source Sound Level Contribution	49	42	36	34	32	29	26	18	5	34	
4)	PWL of Outdoor Piping/Components	95	95	98	92	92	105	114	112	105	118	
	Atten. of Noise Control (Acoustical Insulation)	2	2	0	-2	-8	-10	-14	-15	-15		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	0	0	-1	-2	-3		
810	Hemispherical Radiation	-56	-56	-56	-56	-56	-56	-56	-56	-56		
810	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-2	-1	-1	-2	-6	-11		
810	Source Sound Level Contribution	41	41	42	32	28	38	41	33	20	44	
5)	PWL of Unsilenced Titan 250 Intake (1 Unit)	116	120	128	129	130	132	135	174	166	175	
	Est'd Attenuation of Intake Silencer System	-2	-6	-15	-20	-25	-30	-40	-60	-50		
	Est'd Attenuation of Air Intake Filter	-1	-4	-6	-15	-20	-25	-28	-30	-30		
810	Hemispherical Radiation	-56	-56	-56	-56	-56	-56	-56	-56	-56		
810	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	-1	-1	-2	-6	-11		
810	Source Sound Level Contribution	57	54	51	38	29	20	9	22	19	37	
6)	PWL of Outdoor Gas Aftercooler(s)	115	108	95	92	88	85	82	80	78	92	
	Atten. of Additional Noise Control	0	0	0	0	0	0	0	0	0		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	0	0	-1	-2	-3		
750	Hemispherical Radiation	-55	-55	-55	-55	-55	-55	-55	-55	-55		
750	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	-1	-1	-2	-6	-10		Calc'd
750	Source Sound Level Contribution	60	53	40	36	32	29	24	17	10	35	Ldn
Est'd Total Sound Contribution of Sources at NSA #2		**67**	**61**	**53**	**43**	**39**	**39**	**41**	**34**	**23**	**46.3**	**52.7**

Ambient Sound Level (Ldn) at the NSA	**51.8**
Sound Contribution of Station (Ldn) plus Ambient Sound Level (Ldn)	55.3
Potential Increase above Ambient Sound Level (dB)	**3.5**

Table D: Clyde Compressor Station (CS-3): Est'd Sound Contribution of the Station at NSA #2 (i.e., Residences located approx. 810 Ft. SW of the Site Center) assuming Operation of One (1) Solar Titan 250 Turbine-Driven Compressor Unit. In addition, Estimated Increase above the Ambient Sound Level.

NOTE: Muffler DIL & Equipment PWL values on this spreadsheet should <u>not</u> be used as the specified values. Refer to "Noise Control Measures" section in report or other company specifications for actual specified values.

Dist (Ft.)	Noise Sources and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL in dB per O.B. Center Frequency (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Est'd SPLs of Station at 810 Ft. (RE: Table D)	67	61	53	43	39	39	41	34	23	46.3	
1160	Hemisph Radiation [20*log(1160/810)=3.1 dB]	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1		Calc'd
1160	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-1	-3	-5		Ldn
Est'd Total Sound Contribution of Station at NSA #3		**64**	**57**	**50**	**40**	**36**	**36**	**37**	**28**	**15**	**42.5**	**48.9**

Ambient Sound Level (Ldn) at the NSA	**53.4**
Sound Contribution of Station (Ldn) plus Ambient Sound Level (Ldn)	54.7
Potential Increase above Ambient Sound Level (dB)	**1.3**

Table E: Clyde Compressor Station (CS-3): Est'd Sound Contribution of the Station at NSA #3 (i.e., Residence located approx. 1,160 Ft. SE of the Site Center) assuming Operation of One (1) Solar Titan 250 Turbine-Driven Compressor Unit. In addition, Estimated Increase above the Ambient Sound Level.

Dist (Ft.)	Noise Sources and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL in dB per O.B. Center Frequency (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Est'd SPLs of Station at 810 Ft. (RE: Table D)	67	61	53	43	39	39	41	34	23	46.3	
1450	Hemisph Radiation [20*log(1450/810)=5.1 dB]	-5.1	-5.1	-5.1	-5.1	-5.1	-5.1	-5.1	-5.1	-5.1		Calc'd
1450	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-2	-5	-9		Ldn
Est'd Total Sound Contribution of Station at NSA #1		**62**	**55**	**48**	**38**	**34**	**33**	**34**	**24**	**9**	**40.0**	**46.4**

Ambient Sound Level (Ldn) at the NSA	**63.2**
Sound Contribution of Station (Ldn) plus Ambient Sound Level (Ldn)	63.3
Potential Increase above Ambient Sound Level (dB)	**0.1**

Table F: Clyde Compressor Station (CS-3): Est'd Sound Contribution of the Station at NSA #1 (i.e., Residences located approx. 1,450 Ft. NNW of the Site Center) assuming Operation of One (1) Solar Titan 250 Turbine-Driven Compressor Unit. In addition, Estimated Increase above the Ambient Sound Level.

DESCRIPTION OF THE ANALYSIS METHODOLOGY AND THE SOURCE OF SOUND DATA USED FOR THE ANALYSIS OF THE STATION COMPRESSOR UNIT

ANALYSIS METHODOLOGY

In general, the predicted sound level contributed by the Station compressor unit was calculated as a function of frequency from estimated unweighted octave-band (O.B.) sound power levels (PWLs) for each significant sound source associated with the compressor unit(s). The following summarizes the analysis procedure for the analysis of the Station compressor unit(s):

- Initially, unweighted O.B. PWLs of the significant noise sources associated with the compressor unit(s) were determined from actual sound level measurements performed by H&K at similar type of gas compressor facilities and/or equipment manufacturer's sound data;

- Then, expected noise reduction (NR) or attenuation in dB per O.B. frequency due to any noise control measures, hemispherical sound propagation (discussed in more detail below*) and atmospheric sound absorption (discussed in more detail below**) were subtracted from the unweighted O.B. PWLs to obtain the unweighted O.B. SPLs of each noise source. Since sound shielding by buildings can influence the sound level contributed at the NSAs, we also included the sound shielding due to buildings, if appropriate. The sound attenuation effect due to vegetation or land contour were typically not considered in the analyses since there appears there could be limited amount of vegetation (e.g., trees) or hills between the site and the nearby NSAs;

- Finally, the resulting estimated O.B. SPLs for all noise sources associated with the compressor units (with noise control and other sound attenuation effects) were logarithmically summed, and the total O.B. SPLs for all noise sources were corrected for A-weighting to provide the estimated overall A-wt. sound level contributed by the compressor unit at the closest NSA to the compressor unit. The predicted sound contribution of the Station at the closest NSA was utilized to estimate the noise contribution of the Station at the other NSAs more distant that the closest NSA.

*Attenuation due to hemispherical sound propagation: Sound propagates outwards in all directions (i.e., length, width, height) from a point source, and the sound energy of a noise source decreases with increasing distance from the source. In the case of hemispherical sound propagation, the source is located on a flat continuous plane/surface (e.g., ground), and the sound radiates hemispherically (i.e., outward, over and above the surface) from the source. The following equation is the theoretical decrease of sound energy when determining the resulting SPLs of a noise source at a specific distance ("r") of a receiver from a source PWL values:

> Decrease in SPL ("hemispherical propagation") from a noise source = **20*log(r) – 2.3 dB**
> where "r" is distance of the receiver from the noise source.

Attenuation due to air absorption: Air absorbs sound energy, and the amount of absorption ("attenuation") is dependent on the temperature and relative humidity (R.H.) of air and frequency of sound. For example, the attenuation due to air absorption for 1000 Hz O.B. SPL is approximately **1.5 dB per 1,000 feet for standard day conditions (i.e., no wind, 60 deg. F. and 70% or 50% R.H.).

ANALYSIS METHODOLOGY (NOISE ATTRIBUTABLE TO A BLOWDOWN EVENT)

The noise resulting from a blowdown event was estimated by using the "inverse-square law" and included some attenuation due to atmospheric sound absorption. Consequently, the estimated noise of a blowdown event at the receptor (closest NSA) was calculated as follows:

SPL (receptor) = (Blowdown SPL at R1) – 20*log(R2/R1)– Atm. Atten.= **60 dBA** – 20*log (900/300)–3 dB = **47 dBA**

Where: R1 = Distance of Specified Blowdown Noise Level Requirement (i.e., 300 ft.)
R2 = Distance of the Receptor from the Blowdown Silencer (900 ft.)

SOURCE OF SOUND DATA

The following describes the source of sound data for estimating the source sound levels and source PWLs used in the acoustical analysis for the compressor unit. Note that equipment noise levels utilized in the acoustical analysis (i.e., spreadsheet analysis) are generally higher than the sound level requirement for the equipment to insure that the design incorporates an acoustical "margin of safety."

(1) PWL values of the specific equipment inside the building (i.e., noise of the turbine and compressor) was calculated from sound data measured by H&K on a very similar type of gas compressor installation.

(2) Turbine exhaust PWL values for the Solar turbine were calculated from sound data provided by Solar (i.e., Solar Noise Prediction Manual) and sound data recently measured in the field by H&K on a similar type of turbine installation.

(3) The noise radiated from aboveground gas piping is primarily a result the noise generated by the gas compressors. Consequently, measurement of both near field and far field sound data on gas piping is presumed to be an accurate method of quantifying the noise associated with the new gas piping, and the estimated PWL values for gas piping used in the analysis were determined from near field and far field sound data by H&K on a similar type of compressor to that of the proposed compressor units.

(4) PWL values for the turbine LO cooler(s) and gas aftercooler(s) were designated to meet the design noise goal. Note that the estimated PWL for the cooler(s) utilized in the acoustical analysis assumes some noise associated with piping associated with the coolers. The noise level for the LO cooler and gas aftercooler used in the acoustical analysis is generally higher than the sound level requirement in order that the noise design analysis incorporates an acoustical "margin of safety." In addition, there can be other noise associated with the cooler that is not directly related to the operation of the cooler fans.

(5) PWL values for turbine air intake were calculated from sound data provided by Solar (i.e., Solar Noise Prediction Manual), although low-frequency SPLs were modified as a result of field acoustical tests by H&K.

Type of Equipment	Equipment Power Rating or Capacity	Est'd Number Required	Est'd A-Wt. Sound Level at 50 Ft.: Note (1)	Resulting A-Wt. PWL of Single Piece of Equip.	Assumed Max. No. Operating at One Time	Est'd Max. A-Wt. PWL or Sound Level of Equip.	
Diesel Generator	250 to 400 HP	1 to 2	65 - 70 dBA	102 dBA	1	102	
Bulldozer	250 to 700 HP	1 to 2	75 - 80 dBA	110 dBA	1	110	
Grader	450 to 600 HP	1 to 2	70 - 75 dBA	105 dBA	1	105	
Backhoe	130 to 210 HP	1 to 2	65 - 72 dBA	104 dBA	1	104	
Front End Loader	150 to 250 HP	1 to 2	65 - 70 dBA	102 dBA	1	102	
Truck Loaded	40 Ton	As needed	70 - 75 dBA	105 dBA	1	105	
	Est'd Total Maximum A-Wt. PWL (dBA) of All Construction Site Equipment					113	Calc'd
	Atten. (dB) due to Hemispherical Sound Propagation (810 Ft.): Note (2)					-56	Ldn
	Est'd Attenuation (in dB) due to Air Absorption and/or Foliage-Shielding: Note (3)					-3	Note (4)
	Est'd Sound Level (dBA) at Closest NSA (NSA #1) Considering a Maximum Number of Equipment Operating at One Time					54 dBA	52 dBA

Table G: **Clyde Compressor Station (CS-3): Est'd Sound Contribution at the Closest NSA (NSA #2, Residence approx. 810 Ft. SW of Site Center) during Construction Activity at the Station. Sound Contribution assumes Operation of the "Loudest" Equipment during a Time Frame with the Largest Amount of Equipment Operating (e.g., Site Grading & Clearing/Grubbing)**

Note (1): Noise Emission Levels of construction equipment based on an EPA Report (meas'd sound data for a railroad construction project) and measured sound data in the field by H&K or other published sound data.

Note (2): Noise attenuation due to hemispherical sound propagation: Sound propagates outwards in all directions (i.e., length, width, height) from a point source, and the sound energy of a noise source decreases with increasing distance from the source. In the case of hemispherical sound propagation, the source is located on a flat continuous plane/surface (e.g., ground), and the sound radiates hemispherically from the source.

The following equation is the theoretical decrease of sound energy when determining the resulting SPL of a noise source at a specific distance ("r") of a receiver from a source sound power level (PWL):

Decrease in SPL ("hemispherical propagation") from a noise source = 20*log(r) – 2.3 dB, where "r" is distance of the receiver from the noise source. For example, if the distance "r" is 810 feet between the site and closest NSA, the "hemispherical propagation" = **20*log(810) – 2.3 dB = 56 dB**.

Note (3): Noise attenuation due to air absorption & foliage: Air absorbs sound energy, and the amount of absorption ("attenuation") is dependent on temperature and relative humidity (R.H.) of the air and the frequency of sound. For standard day conditions (i.e., no wind, 60 deg. F. and 70% R.H.), the attenuation due to air absorption for the medium frequency" (i.e., 1000 Hz O.B. SPL) is approximately **1.5 dB** per 1,000 feet. In addition, foliage such as forest/trees between the Station site and nearby NSAs can have a sound attenuation effect depending on the amount/thickness of the foliage.

Note (4): Calc'd Ldn is approx. 2 dB lower than A-wt. sound level since construction activities will occur only during daytime.

ANALYSIS METHODOLOGY AND SOURCE OF SOUND DATA (CONSTRUCTION ACTIVITIES)

The predicted sound level contributed by the construction-related activity (i.e., construction of the compressor station) was calculated from estimated A-wt. PWL of noise sources (i.e., construction equipment noise) that typically operate during the specific construction activity. The following summarizes the acoustical analysis procedure utilized for the construction activity at the site:

- Initially, the A-wt. PWL of noise sources associated with the construction activity were determined from published sound data and/or actual sound level measurements by H&K, and the total PWL of each noise source (equipment) was based on the anticipated number of equipment operating;

- Next, A-wt. PWL of all sources were logarithmically summed to provide the overall A-wt. PWL contributed by construction activity. It is assumed that the highest level of construction noise would occur during site earth work (i.e., time frame when the largest amount of equipment would operate);

- Finally, the estimated A-wt. sound level of the construction activity at the specific distance was determined by compensating for sound attenuation due to propagation (hemispherical radiation), atmospheric sound absorption and sound attenuation effect of foliage/forest***.

  The noise levels of construction equipment were based on an EPA Report (i.e., measured sound data from railroad construction equipment taken during the Northeast Corridor Improvement Project) that was summarized in a 1995 Report to the Federal Transit Administration as prepared by Harris Miller Miller & Hanson Inc. Also, construction equipment noise levels listed in an article in the Journal of Noise Control Engineering and sound data at a typical compressor station construction site, as measured by H&K, was utilized. The following list some references used by H&K to determine construction equipment noise emission levels:

  (1) "Transit Noise and Vibration Impact Assessment", dated April 1995, prepared by Harris Miller Miller & Hanson Inc. for the Office of Planning of the Federal Transit Administration.
  (2) Erich Thalheimer, "Construction Noise Control Program and Mitigation Strategy at the Central Artery/Tunnel Project", J of Noise Control Eng., 48 (5), pp. 157-165 (2000 Sep-Oct).
  (3) "Noise Control for Building Manufacturing Plant Equipment and Products", course handout notes for a noise course given by Hoover & Keith Inc.

  ***Discussion of noise attenuation due to foliage: Since there will be a substantial amount of trees between the Station and NSAs, the sound attenuation effect of foliage was included. The potential attenuation of foliage, based on our experience and an ISO Standard[1], the "medium-frequency" attenuation (i.e., 1000 Hz) due to forest/trees greater than 500 feet thick is approximately **10 dB**. Consequently, for this Station (i.e., distance of 810 feet from closest NSA), the "medium-frequency" air absorption attenuation would be approximately **1 dB**, (i.e., 1.5 dB x 810/1000 = 1 dB). Then, adding the attenuation due to foliage (approx. **2 dB**) to the air absorption attenuation, an overall attenuation of **3 dB** was utilized as the estimated attenuation due to air absorption and foliage.

End of Report

[1] ISO Standard 9613-1: 1993 (E), entitled "Acoustics – Attenuation of sound during propagation outdoors – Part 1: Calculation of the absorption of sound by the atmosphere, and Part 2: General method of calculation"

WATERVILLE COMPRESSOR STATION
(LUCAS COUNTY, OHIO)

RESULTS OF AN AMBIENT SOUND SURVEY AND ACOUSTICAL ANALYSIS OF THE NATURAL GAS COMPRESSOR STATION (CS-4) ASSOCIATED WITH THE NEXUS GAS TRANSMISSION PROJECT

H&K Report No. 3227

H&K Job No. 4875

Date of Report: June 9, 2015

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REPORT SUMMARY

This report provides the results of an acoustical analysis for the new **Waterville Compressor Station** (referred to as "Station" or "CS-4" in the report) associated with the proposed **NEXUS Gas Transmission Project** ("Project" or "NEXUS Project"). Also included are the results of the recent ambient sound survey at the proposed site of the Station. The intent of the acoustical analysis is to project the sound contribution of the Station during full load operation and determine noise control measures to insure that applicable sound criteria are not exceeded at the nearby noise-sensitive areas ("NSAs"). The purpose of the ambient sound survey was to identify and verify the nearby NSAs surrounding the Station and to quantify the current ambient sound environment at the nearby NSAs.

The following table summarizes the ambient sound level at the identified closest NSAs, the estimated sound level contribution of the Station at the closest NSAs if the Station was operated at full load and the total sound level contribution of the Station (i.e., sound level contribution of the Station plus the ambient noise level). The results provided in this table are referred to as the "Noise Quality Analysis" for the Station.

Noise Quality Analysis for the Waterville Compressor Station associated with the NEXUS Project

Closest NSA(s) and Type of NSA	Distance and Direction of NSA to Station Site Center	Ambient Ldn (via Meas'd Ld & Est'd Ln)	Est'd Sound Level (Ldn) of the Station at Full Load	Est'd "Total" Ldn (Station Noise + Ambient Noise)	Potential Noise Increase
NSA #1 (Residence)	1,390 ft. (east)	60.6 dBA	48.0 dBA	60.8 dBA	0.2 dB
NSA #2 (Residence)	1,990 ft. (north)	48.6 dBA	43.8 dBA	49.9 dBA	1.3 dB
NSA #3 (Residence)	3,790 ft. (west)	41.5 dBA	36.0 dBA	42.6 dBA	1.1 dB
NSA #4 (Residence)	1,660 ft. (SE)	60.6 dBA	46.0 dBA	60.7 dBA	0.1 dB

The results of the acoustical analysis indicates that if the anticipated and/or recommended noise control measures are implemented successfully, the sound contribution of the proposed Station should be equal to or lower than **55 dBA** (L_{dn}) at the nearby NSAs, which is the FERC sound level requirement for this type of facility. In addition, the acoustical analyses indicate that the noise of construction activities and noise resulting from a unit blowdown event at the Station should have limited noise impact on the surrounding environment. Also, since Station noise sources that could cause perceptible vibration (e.g., turbine exhaust noise) will be adequately mitigated, there should not be any perceptible increase in vibration at any NSA during Station operation.

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1.0 INTRODUCTION

In this report, **Hoover & Keith Inc.** (H&K) presents the results of an acoustical analysis for the new **Waterville Compressor Station** (referred to as "Station" or "CS-4") associated with the proposed **NEXUS Gas Transmission Project** ("Project" or "NEXUS Project"). Also included are the results of the recent ambient sound survey at the proposed site of the Station. The following summarizes the purpose of the ambient sound survey and Station acoustical analysis:

(1) Quantify the existing acoustic environment (i.e., measure the typical ambient sound levels) and verify the current noise-sensitive areas (NSAs) around the Station, such as residences, hospitals and schools;

(2) Estimate the sound level contribution of the Station at the nearby NSAs and estimate the "total" Station sound level contribution (i.e., Station noise plus the ambient sound level);

(3) Determine noise mitigation measures to insure that applicable sound level criteria are not exceeded after installation and full load operation of the Station; and

(4) Project the noise at the nearby NSAs resulting from construction activities at the Station, and estimate the noise contribution due to a unit blowdown event at the Station.

2.0 SOUND CRITERIA

Federal: It is anticipated that certificate conditions of the Office of Energy Projects (OEP) of the Federal Energy Regulatory Commission (FERC) will require that the sound level attributable to a new natural gas compressor station during full load operation not exceed a day-night average sound level (i.e., L_{dn}) of **55 dBA** at any nearby NSA. In addition, the operation of the Station should not result in a perceptible increase in vibration at any nearby NSA. The L_{dn} is an energy average of the measured daytime L_{eq} (L_d) and measured nighttime L_{eq} (L_n) plus **10 dB**. The **10-dB** adjustment to the L_n is intended to compensate for nighttime sensitivity. For a steady sound source that operates continuously over a 24-hour period and controls the environmental sound level, the L_{dn} is approximately **6.4 dB** above the measured L_{eq}. Consequently, an L_{dn} of **55 dBA** corresponds to a L_{eq} of **48.6 dBA**. If both the L_d and L_n are measured and/or estimated, then the L_{dn} is calculated using the following formula:

$$L_{\mathrm{dn}} = 10\log_{10}\left(\frac{15}{24}10^{L_{\mathrm{d}}/10} + \frac{9}{24}10^{(L_{\mathrm{n}}+10)/10}\right)$$

State of Ohio: The State of Ohio or the Ohio EPA does not have regulations related to acceptable noise levels. We understand that sometimes noise level regulations are covered under local ordinances or city codes (e.g., public nuisance and limit excessive noise between certain hours).

County/Township: No applicable county or township noise regulations have been identified, although any local noise regulations, if required, will be addressed during the permitting process.

3.0 SITE/FACILITY DESCRIPTION

Figure 1 (**Appendix**, p. 11) provides an area layout around the Station that shows the NSAs within 1 mile of the Station and other areas of interest. **Figure 2** (**Appendix**, p. 12) provides an area layout around the Station that shows the identified NSAs around the Station, reported sound measurement positions near the identified closest NSAs and a conceptual layout of equipment and buildings at the Station. The Station will be located in Lucas County, Ohio, near Waterville, OH and 2.5 miles southeast of Whitehouse, OH. There are a few NSAs (e.g., primarily residences) located within 1 mile of the Station, and the closest NSA is a residence located 1,390 feet east of the Station site (along Noward Road).

The proposed Station will consist of one (1) Solar Titan 250 gas turbine-driven centrifugal gas compressor unit [i.e., 30,000 horsepower (HP) rating (ISO)]. We understand that the turbine and compressor for the compressor unit will be installed inside an insulated metal building (i.e., Compressor Building). The following describes the anticipated auxiliary equipment and other notable items associated with the Station compressor unit:

- Outdoor lube oil cooler (“LO cooler”);
- Turbine exhaust system designed with an adequate muffler system;
- Turbine air intake filter system designed with in-duct silencer;
- Gas piping and associated piping components, and most gas piping will be buried;
- Gas aftercooler (i.e., air-cooled heat exchanger) that serves the compressor unit; and
- Gas blowdown silencer associated with a unit blowdown.

There will also be two (2) types of gas blowdown events: (1) gas blowdown that occurs when a compressor is stopped and gas between the suction/discharge valves and compressor is vented to the atmosphere (“unit blowdown”) via a blowdown silencer, and (2) emergency shutdown (“ESD”) that will only occur at required Department of Transportation (DOT) test intervals or in an emergency situation (e.g., gas leak or fire). The unit blowdown will be a “maintenance” type of unit blowdown which can occur when the compressor unit is stopped and gas between the suction/discharge valves and compressor unit is vented to the atmosphere through a silencer. During the period of commissioning and testing, it is estimated that a unit blowdown could occur 2 to 4 times/day and typically only during the daytime. During normal operation of the Station (i.e., after the commissioning period), a unit blowdown event occurs infrequently (e.g., 1 to 3 times/month). In addition, a unit blowdown event only occurs for a short time frame (e.g., unit blowdown event would persist for approximately 1 to 5 minutes). There also can be an emergency shutdown (“ESD”) that will only occur only during an emergency situation (e.g., gas leak or fire), which rarely occurs, noting that some natural gas facilities operate for years without having an ESD, and the gas blowdown related to an ESD may be vented via a blowdown silencer. Note that for required DOT test intervals of the ESD operations (e.g., once or twice a year), it is not necessary to vent/blowdown the pipeline gas to atmosphere.

4.0 MEASUREMENT METHODOLOGY, MEASUREMENT LOCATIONS AND CONDITIONS

Current ambient sound levels were measured near three (3) of the identified surrounding closest NSAs (i.e., "NSA #1", "NSA #2" & "NSA #3"). The following provides a description of the identified NSAs and the reported sound measurement positions ("Pos."):

Pos. 1: Near NSA #1 (closest NSA): Residence located 1,390 feet east of the Station site center (i.e., anticipated location of the Compressor Building);
Pos. 2: Near NSA #2: Residence located 1,990 feet north of the Station site center;
Pos. 3: Near NSA #3: Residence located 3,790 feet west of the Station site center; and
NSA #4: Residence located 1,660 feet southeast (SE) of the Station site, and in our opinion, the ambient sound level measured at Meas. Pos. 1 is representative of the ambient sound level at NSA #4.

The sound survey was conducted by Garrett Porter of H&K during the daytime of Feb. 5, 2015. During the site ambient sound survey, the temperature was 6 degrees F, the wind was from the south and there were clear sky conditions. At the reported sound measurement locations, the A-wt. equivalent sound levels (i.e., L_{eq}) and the unweighted octave-band (O.B.) sound pressure levels (SPLs) were measured at approximately 5 feet above ground. The sound measurements attempted to exclude "extraneous sound" such as the noise contribution of occasional vehicle passing by the measurement position and/or other intermittent sources. The acoustical measurement system consisted of a Rion NA-27 Sound Level Meter (a Type 1 SLM per ANSI S1.4 & S1.11) equipped with microphone, covered with a windscreen. The SLM was calibrated with a microphone calibrator (calibrated within 1 year of the test date).

5.0 MEASUREMENT RESULTS AND OBSERVATIONS

Table A (**Appendix**, p. 13) summarizes the measured daytime L_{eq} (L_d) and the estimated nighttime L_{eq} (L_n) at the NSA sound measurement locations along with the average of the measured L_d since several samples of the ambient sound level were measured. **Table A** also includes the resulting ambient L_{dn} as calculated from the measured L_d and estimated L_n. Meteorological conditions that occurred during the sound survey are summarized in **Table B** (**Appendix**, p. 13). The measured daytime sound levels (L_d) and related unweighted O.B. SPLs at the reported sound measurement positions are provided in **Table C** (**Appendix**, p. 13).

The following **Table 1** summarizes the measured ambient L_d and estimated ambient L_n at the closest NSAs along with the resulting ambient L_{dn} at the closest NSAs, as calculated from the measured ambient L_d and estimated L_n.

Meas. Pos.	Description of the Identified Closest NSAs, as related to the Sound Measurement Location	Meas'd Ambient Ld	Est'd Ambient Ln	Resulting Ambient Ldn
Pos. 1	NSA #1: Residences 1,390 feet east of the Station site; NSA #4 (1,660 ft. SE of the Station)	59.7 dBA	51.7 dBA	60.6 dBA
Pos. 2	NSA #2: Residences 1,990 feet north of the Station site	44.7 dBA	41.7 dBA	48.6 dBA
Pos. 3	NSA #3: Residences 3,790 feet west of the Station site	37.5 dBA	34.5 dBA	41.5 dBA

Table 1: Summary of the Measured Ld, Estimated Ln and Resulting Ambient Ldn at the Identified NSAs

It is our opinion that the measured sound level data adequately quantifies the existing ambient sound level for the meteorological conditions that occurred during the sound survey. The ambient L_n were not measured but were estimated based on our site observations to provide a more accurate representation of the ambient L_{dn} (i.e., ambient nighttime levels could be lower than the measured daytime levels). At the reported sound measurement location near all of the identified NSAs, noise sources that contributed to the ambient A-wt. sound level included primarily the noise of distant vehicle traffic along Highway 24.

6.0 ACOUSTICAL ANALYSIS (COMPRESSOR STATION)

6.1 Sound Level Contribution of the Station

The acoustical analysis considers the noise produced by equipment for the Station compressor unit that could impact the sound contribution at any NSA. The predicted sound contribution of the Station were performed only for the closest NSAs (i.e., NSA #1, NSA #2, NSA #3 & NSA #4) since the Station sound contribution at other nearby NSAs should be equal to or less than the Station sound level at these closest NSAs. A description of the acoustical analysis methodology and source of sound data for the analysis is provided in the **Appendix** (pp. 16–17). The following sound sources were considered significant and included in the Station acoustical analysis:

- Noise generated by the turbine/compressor that penetrates the Compressor Building;
- Noise of the turbine exhaust radiated from the turbine exhaust stack;
- Noise radiated from aboveground/outdoor gas piping and associated components;
- Noise of the outdoor LO cooler and associated outdoor piping;
- Noise generated by the turbine air intake system, and
- Noise of the gas aftercooler and associated aboveground piping.

Table D (**Appendix**, p. 14) shows the spreadsheet analysis of the estimated A-wt. sound level and unweighted O.B. SPLs at the closest NSA (i.e., NSA #1) contributed by the Station compressor unit during full load operation for standard day propagating conditions (i.e., no wind, 60 deg. F., 70% R.H.). Included in **Table D** is the estimated "total" sound level contribution of the Station at NSA #1 (i.e., sound level contribution of the Station plus the ambient sound level).

Table E (**Appendix**, p. 15) provides the estimated A-wt. sound level and unweighted O.B. SPLs of the Station at NSA #2 based on the acoustical analysis at NSA #1, along with the estimated total sound level contribution of the Station at NSA #2 (i.e., sound level contribution of the Station plus the ambient sound level).

Table F (**Appendix**, p. 15) provides the estimated A-wt. sound level and unweighted O.B. SPLs of the Station at NSA #3 based on the acoustical analysis at NSA #1, along with the estimated total sound level contribution of the Station at NSA #3 (i.e., sound level contribution of the Station plus the ambient sound level).

Table G (**Appendix**, p. 15) provides the estimated A-wt. sound level and unweighted O.B. SPLs of the Station at NSA #4 based on the acoustical analysis at NSA #1, along with the estimated total sound level contribution of the Station at NSA #4 (i.e., sound level contribution of the Station plus the ambient sound level).

The following **Table 2** summarizes the calculated sound level contribution of the Station at the closest NSAs assuming full load operation of all equipment associated with the Station, noting that the estimated A-wt. sound level was used to calculate the representative L_{dn}.

Operating Condition and associated NSA	Est'd A-Wt. Sound Level of Station	Calc'd Ldn (via Est'd A-Wt. Level)
Est'd sound contribution of Station during full load operation at NSA #1	41.6 dBA	48.0 dBA
Est'd sound contribution of Station during full load operation at NSA #2	37.4 dBA	43.8 dBA
Est'd sound contribution of Station during full load operation at NSA #3	29.6 dBA	36.0 dBA
Est'd sound contribution of Station during full load operation at NSA #4	39.6 dBA	46.0 dBA

Table 2: Estimated Sound Contribution of the Station during Full Load Operation at the Closest NSAs

6.2 Sound Contribution of a Unit Blowdown Event at the Station

The noise level of the unit blowdown event via a blowdown silencer will be specified to meet an A-wt. sound level of **60 dBA** at a distance of 300 feet. If this sound requirement is achieved, the noise of a unit blowdown will be approximately **43 dBA** (i.e., L_{dn} of approximately **49 to 50 dBA**) at the closest NSA, located approximately 1,390 feet from the unit blowdown silencer, which would be lower than **55 dBA** (L_{dn}). Consequently, although the noise of a unit blowdown event could be slightly audible at the nearby NSAs, it is not expected to present a noise impact, noting also that a unit blowdown event occurs infrequently for a short time frame (e.g., 1 to 5 minute period). A description of the acoustical analysis methodology and source of sound data related to blowdown noise are provided in the **Appendix** (p. 17)

7.0 ACOUSTICAL ANALYSIS (SITE CONSTRUCTION ACTIVITIES)

The acoustical analysis of the construction-related activities at the site of the Station considers the noise produced by any significant sound sources associated with the primary construction equipment that could impact the sound contribution at the nearby NSAs. The predicted sound contribution of construction equipment/activities was performed only for the closest NSA (i.e., NSA #1). Construction of the Station will consist of earth work (e.g., site grading, clearing and grubbing) and construction of the Station buildings, and it is assumed that the highest level of construction noise would occur during site earth work (i.e., time frame when the largest amount of construction equipment would operate).

Table H (**Appendix**, p. 18) shows the calculation of the estimated maximum A-wt. sound level at the closest NSA contributed by the construction activities at the Station for standard day propagating conditions. A description of the methodology and source of sound data for the construction noise analysis are provided in the **Appendix** (p. 19). The analysis indicates that the maximum A-wt. noise level of construction activities at the closest NSA would be equal to or less than **47 dBA** (i.e., L_{dn} of approximately **45 dBA**, since nighttime construction activities are not anticipated).

8.0 NOISE CONTROL MEASURES (COMPRESSOR STATION)

The following section provides the recommended noise control measures and equipment sound level requirements along with other assumptions that may affect the noise of the Station.

8.1 Building enclosing the Turbine/Compressor

We understand that the turbine and compressor will be installed inside an acoustically-insulated metal building (i.e., Compressor Building). The following describes specific sound requirements and other items related to the components of the Compressor Building.

- As a minimum, walls/roof should be constructed with an exterior skin of 22–gauge metal, and building interior surfaces should be covered with 6–inch thick “high-density” mineral wool (i.e., 6.0-8.0 pcf uniform density) covered with a perforated liner; Note that “low-density” insulation (e.g., 0.6 to 0.75 pcf density) should **not** be substituted for the high-density material although low-density insulation could be employed in addition to the high-density insulation;

- No windows or louvers should be installed in the building walls although a minimum number of skylights could be installed in the building roof although not anticipated;

- Each large access door system (i.e., “roll-up door”) should consist of an insulated-type door (e.g., 18-ga. exterior facing, 24-ga. backskin with insulation core); personnel entry doors

should be a **STC-36 sound rating**, even if glazing is employed and should be self-closing and should seal well when closed;

- It is anticipated that the building air ventilation system will be designed with air supply fans mounted in the building walls along with roof-mounted air exhaust vents or a roof ridge vent to exhaust the air (i.e., wall louvers should not be employed). Assuming this type of air ventilation system, the sound level for each wall air-supply fan should not exceed **50 dBA** at **50 feet**, which will require that each fan employ an exterior dissipative-type silencer (e.g., 3-ft. length) and an acoustically-lined weatherhood.

8.2 Turbine Exhaust System

The turbine exhaust system for each turbine-driven compressor unit should include a silencer system that provides the following dynamic sound insertion loss ("DIL") values at the rated turbine operating conditions.

DIL Values for the Exhaust Silencer System in dB per Octave-Band (O.B.) Center Freq. (Hz)

31.5	63	125	250	500	1000	2000	4000	8000
5	16	25	35	45	45	45	35	30

To meet these recommended DIL values and minimize the impact of the turbine exhaust noise at surrounding residences, a "2–stage" exhaust silencer system should be implemented. One (1) of the 2-stage silencers should be employed horizontally in the exhaust ducting located inside the Compressor Building for the compressor unit (i.e., "1st stage silencer"), and the other silencer system could be integrated into the vertical outdoor exhaust stack (i.e., "2nd stage silencer") or in the horizontal exhaust ducting located outside the Compressor Building. If a CO converter is employed, which is anticipated, it is assumed that a CO converter system would be inserted upstream of the 1st stage silencer, inside the Compressor Building.

8.3 Outdoor Aboveground Gas Piping

The analysis indicates that noise control measures, such as acoustical pipe insulation, will be required for outdoor aboveground gas piping to meet applicable sound criteria. The following items associated with the gas piping and piping components should be addressed:

- Acoustical pipe insulation should be employed for aboveground suction and discharge gas piping. Acoustical pipe insulation should consist of a minimum 3-inch thick fiberglass or mineral wool (6.0-8.0 pcf density) that is covered with a mass-filled vinyl jacket (e.g., composite of 1.0 psf mass-filled vinyl laminated to 0.020-inch thick aluminum). All exposed pipe supports for the insulated gas piping should be covered with acoustical insulation;

- Outdoor valves should not have to be covered with acoustical blanket material. Filter–separator(s) and associated aboveground gas piping should not have to be covered with any

type of acoustical material. It is also recommended that the suction pipe strainer for the compressor units be removed soon after the Station is placed in service, if feasible.

8.4 Lube Oil Cooler

Lube oil cooler ("LO cooler") should not exceed **60 dBA** at **50 feet** from the cooler perimeter at the full rated operating conditions (i.e., equivalent to a PWL of **92–93 dBA**), and a "custom" Solar LO cooler may be required to meet the recommended sound level requirement.

8.5 Turbine Air Intake System

The turbine air intake system for the compressor unit should be designed with at least one (1) in-duct silencer (e.g., 7-ft. length "special" silencer or combination of 2 Solar "standard" silencers), and at least one of the silencers (i.e., if 2 separate silencers are employed) should be installed in the intake ductwork located inside the Compressor Building. As a minimum, the air intake silencer system should provide the following DIL values at the rated operating conditions of the turbine-driven compressor unit, noting that only one (1) "standard" Solar air intake silencer may not be capable of meeting these DIL values although the use of two (2) "standard" Solar air intake silencers (per Solar's "Noise Prediction Guidelines") should be capable of meeting the DIL values.

DIL Values in dB per O.B. Center Frequency for the Turbine Air Intake System

31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
3	8	18	30	45	55	60	60	55

8.6 Gas Aftercooler

The sound level generated by the multi-fan gas cooler that serves the compressor unit should not exceed **62 dBA** at **50 feet** at the full rated operating conditions (i.e., all fans operating at maximum design speed). To meet this sound level requirement, the gas aftercooler will need to be designed with "low-noise" fans that operate at relatively low tip speeds (e.g., fans operating at below 7,200 fpm tip speeds). In addition, aboveground inlet pipe risers and inlet header for the gas cooler should be covered with acoustical pipe insulation but the outlet pipe risers should not have to be covered with acoustical pipe insulation.

8.7 Unit Blowdown Silencer

The unit blowdown silencer should attenuate the unsilenced blowdown noise to a noise level equal to or less than **60 dBA** at 300 feet from the outlet of the silencer, which includes the noise radiated from the shell of the silencer during the blowdown event.

9.0 SUMMARY AND FINAL COMMENT

The following **Table 3** summarizes the ambient sound level at the closest NSAs, the estimated sound level contribution of the Station at the closest NSAs during full load Station operation and the "total" sound level contribution of the Station (i.e., sound level contribution of Station during operation plus the ambient sound level). The results provided in this table are referred to as the "Noise Quality Analysis" for the Station.

Closest NSA(s) and Type of NSA	Distance and Direction of NSA to Station Site Center	Ambient Ldn (via Meas'd Ld & Est'd Ln)	Est'd Sound Level (Ldn) of the Station at Full Load	Est'd "Total" Ldn (Station Noise + Ambient Noise)	Potential Noise Increase
NSA #1 (Residence)	1,390 ft. (east)	60.6 dBA	48.0 dBA	60.8 dBA	0.2 dB
NSA #2 (Residence)	1,990 ft. (north)	48.6 dBA	43.8 dBA	49.9 dBA	1.3 dB
NSA #3 (Residence)	3,790 ft. (west)	41.5 dBA	36.0 dBA	42.6 dBA	1.1 dB
NSA #4 (Residence)	1,660 ft. (SE)	60.6 dBA	46.0 dBA	60.7 dBA	0.1 dB

Table 3: Noise Quality Analysis for the Waterville Compressor Station associated with NEXUS Project

The results of the acoustical analysis indicates that if the noise control measures are employed successfully, the sound contribution of the Station should be equal to or lower than **55 dBA** (L_{dn}) at the nearby NSAs, which is the FERC sound level requirement for this type of facility. In addition, the acoustical analyses indicate that the noise of construction activities and noise resulting from a unit blowdown event at the Station should have limited noise impact on the surrounding environment. Also, since Station noise sources that could cause perceptible vibration (e.g., turbine exhaust noise) will be adequately mitigated, there should not be any perceptible increase in vibration at any NSA during Station operation.

APPENDIX

- **FIGURE 1: GENERAL AREA LAYOUT AROUND THE STATION SHOWING THE NSAs LOCATED WITHIN 1 MILE OF THE STATION AND OTHER AREAS OF INTEREST**
- **FIGURE 2: LAYOUT SHOWING IDENTIFIED CLOSEST NSAs SURROUNDING THE STATION, REPORTED SOUND MEASUREMENT POSITIONS NEAR THE CLOSEST NSAs, AND CONCEPTUAL LAYOUT OF STATION EQUIPMENT AND BUILDINGS**
- **SUMMARY OF THE MEASURED AMBIENT SOUND DATA**
- **ACOUSTICAL ANALYSIS (COMPRESSOR STATION)**
- **ANALYSIS METHODOLOGY (NOISE ATTRIBUTABLE TO THE STATION AND A BLOWDOWN EVENT) AND THE SOURCE OF SOUND DATA**
- **ACOUSTICAL ANALYSIS (CONSTRUCTION ACTIVITIES)**
- **DESCRIPTION OF THE ANALYSES METHODOLOGY (CONSTRUCTION ACTIVITIES) AND THE SOURCE OF SOUND DATA**

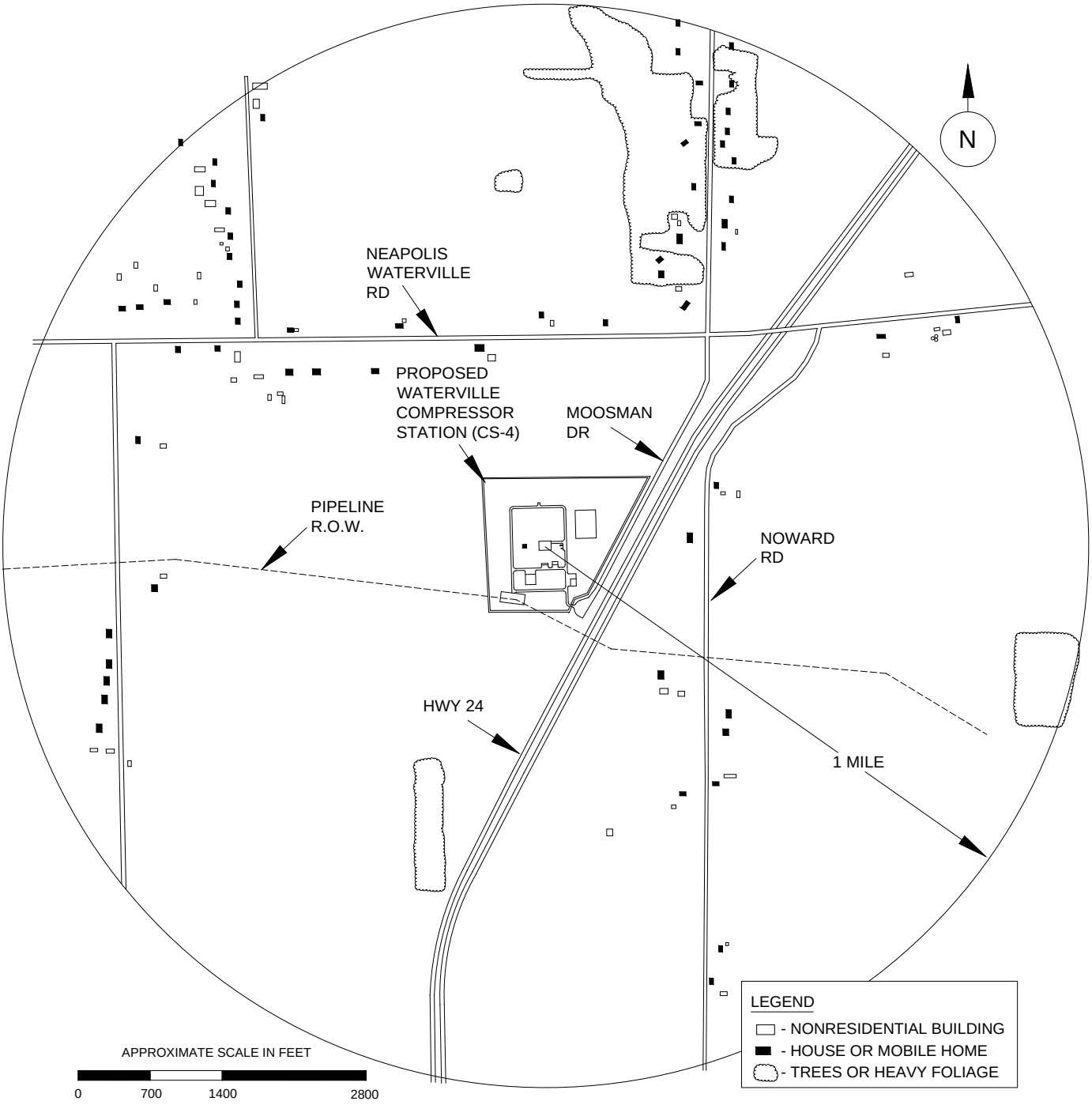

Figure 1: NEXUS Waterville Compressor Station (CS-4): General Area Layout showing the NSAs within 1 Mile of the Station Site and Other Areas of Interest.

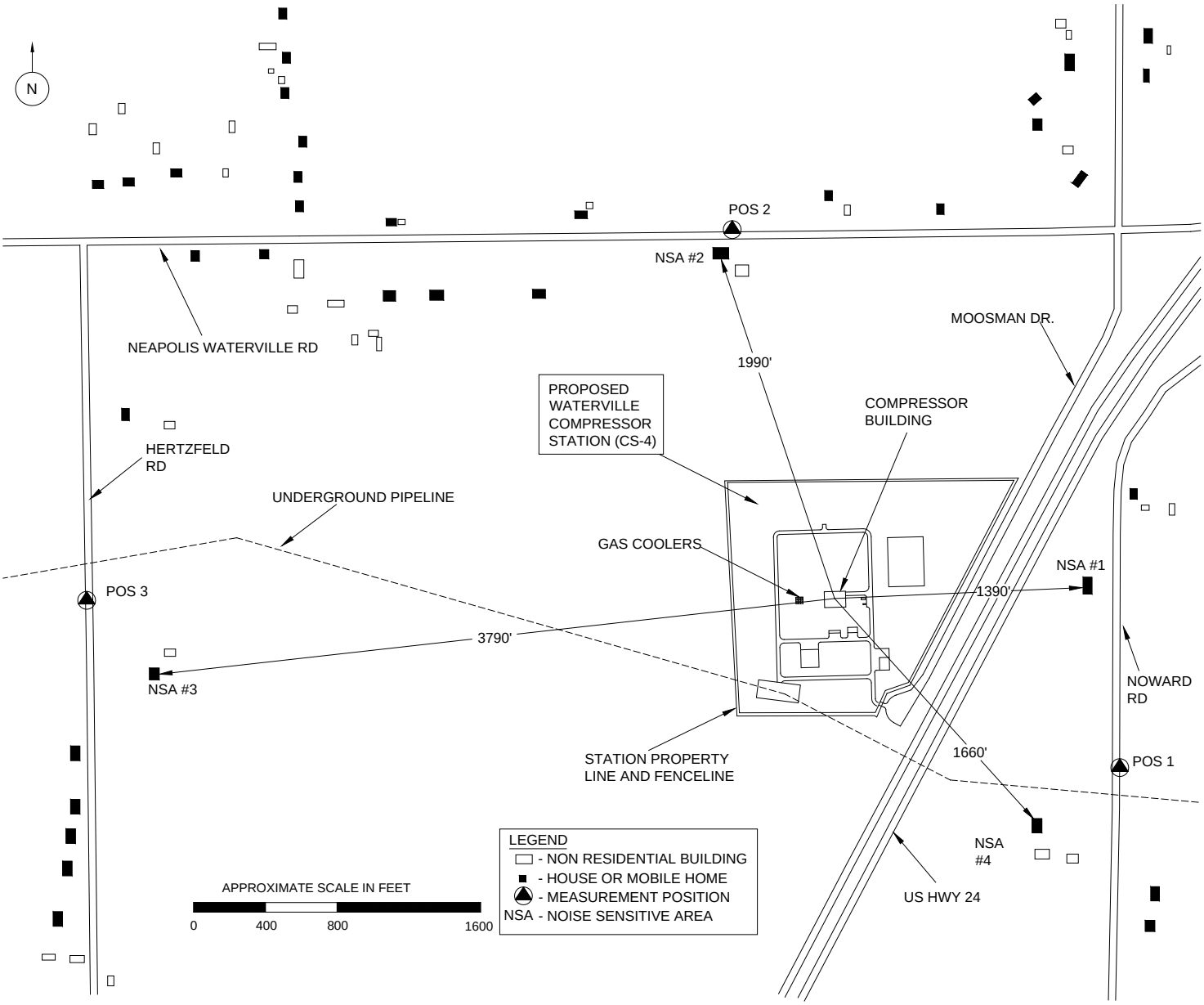

Figure 2: NEXUS Waterville Compressor Station (CS-4): Area Layout showing the Surrounding Closest NSAs, Chosen Sound Measurement Positions near the Closest NSAs and Conceptual Layout of Station Equipment and Buildings.

Measurement Set		Meas'd/Calc'd A-Wt. Levels (dBA)				
		Day-time	Avg'd of	Night time	Calc'd Ldn	
Meas. Pos. & NSA	Time/Date of Test	Leq(Ld)	Ld	Leq(Ln)	Note (2)	Notes/Observations
Pos. 1 (NSA #1)	10:32 AM (2/5/15)	59.6				Primary noise during tests: noise of vehicle traffic
Residence approx.	10:33 AM (2/5/15)	61.1	**59.7**	**51.7**	**60.6**	along US Hwy. 24.
1,390 ft. east of the	10:34 AM (2/5/15)	58.4		Note (1)	Note (2)	Ambient levels at identified NSA #4 should be similar to
Station Site Center						the ambient levels at Pos. 1 (NSA #1).
Pos. 2 (NSA #2)	10:42 AM (2/5/15)	46.4				Primary noise during tests: noise of vehicle traffic
Residence approx.	10:45 AM (2/5/15)	44.9	**44.7**	**41.7**	**48.6**	along US Hwy. 24.
1,990 ft. north of the	10:46 AM (2/5/15)	42.6		Note (1)	Note (2)	
Station Site Center						
Pos. 3 (NSA #3)	10:52 AM (2/5/15)	39.6				Primary noise during tests: noise of vehicle traffic
Residence approx.	10:53 AM (2/5/15)	36.6	**37.5**	**34.5**	**41.5**	along US Hwy. 24 and at times, the sound of birds.
3,790 ft. west of the	10:54 AM (2/5/15)	36.4		Note (1)	Note (2)	
Station Site Center						

Table A: Waterville Compressor Station (CS-4): Summary of Ambient Daytime Sound Levels (Ld) at the Closest NSAs, as Meas'd on Feb. 5, 2015, Est'd Nighttime Levels (Ln) and Resulting Ldn.

Note (1): Nightime sound levels (Ln) were not measured but since there should be less noise during night, the Ln was estimated to provide a representative ambient Ldn (e.g., 3 to 8 dB subtracted from the daytime levels).

Note (2): Ldn calculated by adding 6.4 dB to the measured Ld. If both the Ld and Ln are measured and/or estimated, the Ldn is calculated using the following formula:

$$L_{\mathrm{dn}} = 10\log_{10}\left(\frac{15}{24}10^{L_{\mathrm{d}}/10} + \frac{9}{24}10^{(L_{\mathrm{n}}+10)/10}\right)$$

Measurement Set		Temp.	R.H.	Wind	Wind	Peak	
Meas. Pos.	Time Frame/Date of Tests	(°F)	(%)	Direction	Speed	Wind	Sky Conditions
Pos. 1 - 3	10:00 AM to 11:30 AM (2/5/15)	6	58	From the south	0 mph	1 mph	Clear Skies

Table B: Waterville Compressor Station (CS-4): Summary of the Meteorological Conditions during Ambent Sound Survey on Feb. 5, 2015.

Measurement Set		Unweighted Sound Pressure Level (SPL) in dB per O.B. Frequency (in Hz)									A-Wt.
Meas. Pos. & NSA	Time/Date of Test	31.5	63	125	250	500	1000	2000	4000	8000	Level
Pos. 1 (NSA #1)	10:32 AM (2/5/15)	65.3	50.7	47.4	49.1	57.4	57.5	45.9	35.3	27.6	59.6
Residence approx.	10:33 AM (2/5/15)	64.4	49.6	46.2	48.2	58.1	59.4	48.1	35.8	26.6	61.1
1,390 ft. east of the	10:34 AM (2/5/15)	63.2	49.9	52.4	49.0	54.9	56.8	45.4	34.5	26.6	58.4
Station Site Center	**Avg. A-Wt. & SPL**	**64.3**	**50.1**	**48.7**	**48.8**	**56.8**	**57.9**	**46.5**	**35.2**	**26.9**	**59.7**
Pos. 2 (NSA #2)	10:42 AM (2/5/15)	55.9	44.8	43.3	45.0	42.8	43.2	37.2	31.8	26.0	46.4
Residence approx.	10:45 AM (2/5/15)	54.4	46.0	47.3	44.2	44.9	39.9	27.7	21.8	19.8	44.9
1,990 ft. north of the	10:46 AM (2/5/15)	54.4	45.5	45.3	41.6	43.2	36.5	24.8	21.4	19.8	42.6
Station Site Center	**Avg. A-Wt. & SPL**	**54.9**	**45.4**	**45.3**	**43.6**	**43.6**	**39.9**	**29.9**	**25.0**	**21.9**	**44.7**
Pos. 3 (NSA #3)	10:52 AM (2/5/15)	51.2	47.7	47.6	42.7	37.8	31.8	24.5	20.9	19.0	39.6
Residence approx.	10:53 AM (2/5/15)	51.7	46.7	45.3	39.0	33.6	30.2	23.3	18.4	16.5	36.6
3,790 ft. west of the	10:54 AM (2/5/15)	52.2	47.4	45.8	38.9	33.7	28.4	22.6	19.8	17.2	36.4
Station Site Center	**Avg. A-Wt. & SPL**	**51.7**	**47.3**	**46.2**	**40.2**	**35.0**	**30.1**	**23.5**	**19.7**	**17.6**	**37.5**

Table C: Waterville Compressor Station (CS-4): Measured Ambient Ld and Unweighted Octave-Band ("O.B.") SPLs at the Closest NSAs, as Measured on Feb. 5, 2015.

Source No. & Dist (Ft)	Noise Sources and Other Conditions/Factors associated with Acoustical Analysis	Unwighted PWL or SPL in dB per O.B. Center Frequency (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
1)	PWL of Turbine/Compressor inside Building	108	112	114	116	118	115	115	120	118	125	
	Atten. of Additional Noise Control (Building)	-6	-10	-18	-25	-30	-35	-40	-45	-45		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	0	0	-1	-2	-3		
1390	Hemispherical Radiation	-61	-61	-61	-61	-61	-61	-61	-61	-61		
1390	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-1	-1	-2	-4	-11	-19		
1390	Source Sound Level Contribution	41	41	35	30	26	17	9	2	0	27	
2)	PWL of Unsilenced Titan 250 Exhaust (1 Unit)	126	130	128	131	135	130	122	112	102	135	
	Atten. Of Noise Control (Exhaust Muffler)	-5	-16	-25	-40	-45	-45	-45	-35	-25		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	0	0	0	0	0		
1390	Hemispherical Radiation	-61	-61	-61	-61	-61	-61	-61	-61	-61		
7	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	0	0	0	0		
1390	Source Sound Level Contribution	60	53	42	30	29	24	16	16	16	33	
3)	PWL of the LO Cooler (1 Unit)	105	98	92	90	88	86	85	82	75	92	
	Atten. of Additional Noise Control	0	0	0	0	0	0	0	0	0		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	0	0	-1	-2	-3		
1390	Hemispherical Radiation	-61	-61	-61	-61	-61	-61	-61	-61	-61		
1390	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-1	-1	-2	-4	-11	-19		
1390	Source Sound Level Contribution	44	37	31	29	26	23	19	9	0	28	
4)	PWL of Outdoor Piping/Components	95	95	98	92	92	105	114	112	105	118	
	Atten. of Noise Control (Acoustical Insulation)	2	2	0	-2	-8	-10	-12	-15	-15		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	0	0	-1	-2	-3		
1390	Hemispherical Radiation	-61	-61	-61	-61	-61	-61	-61	-61	-61		
1390	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-2	-1	-2	-4	-11	-19		
1390	Source Sound Level Contribution	36	36	37	27	22	32	37	24	7	39	
5)	PWL of Unsilenced Titan 250 Intake (1 Unit)	116	120	128	129	130	132	135	174	166	175	
	Est'd Attenuation of Intake Silencer System	-2	-6	-15	-20	-25	-30	-40	-60	-50		
	Est'd Attenuation of Air Intake Filter	-1	-4	-6	-15	-20	-25	-28	-30	-30		
1390	Hemispherical Radiation	-61	-61	-61	-61	-61	-61	-61	-61	-61		
1390	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-1	-1	-2	-4	-11	-19		
1390	Source Sound Level Contribution	52	49	46	33	23	14	2	13	6	32	
6)	PWL of Outdoor Gas Aftercooler	115	108	96	94	90	90	88	85	82	95	
	Atten. of Additional Noise Control	0	0	0	0	0	0	0	0	0		
	Misc. Atten. (Foliage, Shielding, Ground Effect)	0	0	0	0	0	0	-1	-2	-3		
1500	Hemispherical Radiation	-61	-61	-61	-61	-61	-61	-61	-61	-61		
1500	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-1	-1	-2	-5	-11	-21		Calc'd
1500	Source Sound Level Contribution	54	47	34	32	28	27	21	10	0	31	Ldn
Est'd Total Sound Contribution of Sources at NSA #1		**62**	**56**	**49**	**38**	**34**	**34**	**37**	**25**	**17**	**41.6**	**48.0**

Ambient Sound Level (Ldn) at the NSA	**60.6**
Sound Contribution of Station (Ldn) plus Ambient Sound Level (Ldn)	60.8
Potential Increase above Ambient Sound Level (dB)	**0.2**

Table D: Waterville Compressor Station (CS-4): Est'd Sound Contribution of the Station at NSA #1 (i.e., Residence located approx. 1,390 Ft. East of the Site Center) assuming Operation of One (1) Solar Titan 250 Turbine-Driven Compressor Unit. In addition, Estimated Increase above the Ambient Sound Level.

NOTE: Muffler DIL & Equipment PWL values on this spreadsheet should <u>not</u> be used as the specified values. Refer to "Noise Control Measures" section in report or other company specifications for actual specified values.

Dist (Ft.)	Noise Sources and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL in dB per O.B. Center Frequency (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Est'd SPLs of Station at 1,390 Ft. (RE: Table D)	62	56	49	38	34	34	37	25	17	41.6	
1990	Hemisph Radiation [20*log(1990/1390)=3.1 dB]	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1		Calc'd
1990	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-2	-5	-8		Ldn
Est'd Total Sound Contribution of Station at NSA #3		**59**	**53**	**45**	**35**	**31**	**30**	**32**	**17**	**6**	**37.4**	**43.8**

Ambient Sound Level (Ldn) at the NSA	**48.6**
Sound Contribution of Station (Ldn) plus Ambient Sound Level (Ldn)	49.9
Potential Increase above Ambient Sound Level (dB)	**1.3**

Table E: Waterville Compressor Station (CS-4): Est'd Sound Contribution of the Station at NSA #2 (i.e., Residence located approx. 1,990 Ft. North of the Site Center) assuming Operation of One (1) Solar Titan 250 Turbine-Driven Compressor Unit. In addition, Estimated Increase above the Ambient Sound Level.

Dist (Ft.)	Noise Sources and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL in dB per O.B. Center Frequency (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Est'd SPLs of Station at 1,390 Ft. (RE: Table D)	62	56	49	38	34	34	37	25	17	41.6	
3790	Hemisph Radiation [20*log(3790/1390)=8.7 dB]	-8.7	-8.7	-8.7	-8.7	-8.7	-8.7	-8.7	-8.7	-8.7		Calc'd
3790	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-1	-2	-4	-7	-18	-33		Ldn
Est'd Total Sound Contribution of Station at NSA #3		**53**	**47**	**39**	**29**	**24**	**22**	**21**	**0**	**0**	**29.6**	**36.0**

Ambient Sound Level (Ldn) at the NSA	**41.5**
Sound Contribution of Station (Ldn) plus Ambient Sound Level (Ldn)	42.6
Potential Increase above Ambient Sound Level (dB)	**1.1**

Table F: Waterville Compressor Station (CS-4): Est'd Sound Contribution of the Station at NSA #3 (i.e., Residence located approx. 3,790 Ft. West of the Site Center) assuming Operation of One (1) Solar Titan 250 Turbine-Driven Compressor Unit. In addition, Estimated Increase above the Ambient Sound Level.

Source No. & Dist (Ft)	Noise Sources and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL in dB per O.B. Center Frequency (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Est'd SPLs of Station at 1,390 Ft. (RE: Table D)	62	56	49	38	34	34	37	25	17	41.6	
1660	Hemisph Radiation [20*log(1660/1390)=1.5 dB]	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5		Calc'd
1660	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	0	-1	-2	-4		Ldn
Est'd Total Sound Contribution of Station at NSA #4		**60**	**54**	**47**	**37**	**33**	**32**	**35**	**22**	**12**	**39.6**	**46.0**

Ambient Sound Level (Ldn) at the NSA	**60.6**
Sound Contribution of Station (Ldn) plus Ambient Sound Level (Ldn)	60.7
Potential Increase above Ambient Sound Level (dB)	**0.1**

Table G: Waterville Compressor Station (CS-4): Est'd Sound Contribution of the Station at NSA #4 (i.e., Residence located approx. 1,660 Ft. SE of the Site Center) assuming Operation of One (1) Solar Titan 250 Turbine-Driven Compressor Unit. In addition, Estimated Increase above the Ambient Sound Level.

DESCRIPTION OF THE ANALYSIS METHODOLOGY AND THE SOURCE OF SOUND DATA USED FOR THE ANALYSIS OF THE STATION COMPRESSOR UNIT

ANALYSIS METHODOLOGY

In general, the predicted sound level contributed by the Station compressor unit was calculated as a function of frequency from estimated unweighted octave-band (O.B.) sound power levels (PWLs) for each significant sound source associated with the compressor unit(s). The following summarizes the analysis procedure for the analysis of the Station compressor unit(s):

- Initially, unweighted O.B. PWLs of the significant noise sources associated with the compressor unit(s) were determined from actual sound level measurements performed by H&K at similar type of gas compressor facilities and/or equipment manufacturer's sound data;

- Then, expected noise reduction (NR) or attenuation in dB per O.B. frequency due to any noise control measures, hemispherical sound propagation (discussed in more detail below*) and atmospheric sound absorption (discussed in more detail below**) were subtracted from the unweighted O.B. PWLs to obtain the unweighted O.B. SPLs of each noise source. Since sound shielding by buildings can influence the sound level contributed at the NSAs, we also included the sound shielding due to buildings, if appropriate. The sound attenuation effect due to vegetation or land contour were typically not considered in the analyses since there appears there could be limited amount of vegetation (e.g., trees) or hills between the site and the nearby NSAs;

- Finally, the resulting estimated O.B. SPLs for all noise sources associated with the compressor units (with noise control and other sound attenuation effects) were logarithmically summed, and the total O.B. SPLs for all noise sources were corrected for A-weighting to provide the estimated overall A-wt. sound level contributed by the compressor unit at the closest NSA to the compressor unit. The predicted sound contribution of the Station at the closest NSA was utilized to estimate the noise contribution of the Station at the other NSAs more distant that the closest NSA.

*Attenuation due to hemispherical sound propagation: Sound propagates outwards in all directions (i.e., length, width, height) from a point source, and the sound energy of a noise source decreases with increasing distance from the source. In the case of hemispherical sound propagation, the source is located on a flat continuous plane/surface (e.g., ground), and the sound radiates hemispherically (i.e., outward, over and above the surface) from the source. The following equation is the theoretical decrease of sound energy when determining the resulting SPLs of a noise source at a specific distance ("r") of a receiver from a source PWL values:

> Decrease in SPL ("hemispherical propagation") from a noise source = **20*log(r) – 2.3 dB**
> where "r" is distance of the receiver from the noise source.

Attenuation due to air absorption: Air absorbs sound energy, and the amount of absorption ("attenuation") is dependent on the temperature and relative humidity (R.H.) of air and frequency of sound. For example, the attenuation due to air absorption for 1000 Hz O.B. SPL is approximately **1.5 dB per 1,000 feet for standard day conditions (i.e., no wind, 60 deg. F and 70% R.H.).

ANALYSIS METHODOLOGY (NOISE ATTRIBUTABLE TO A BLOWDOWN EVENT)

The noise resulting from a blowdown event was estimated by using the "inverse-square law" and included some attenuation due to atmospheric sound absorption. Consequently, the estimated noise of a blowdown event at the receptor (closest NSA) was calculated as follows:

SPL (receptor) = (Blowdown SPL at R1) – 20*log(R2/R1)– Atm. Atten.= **60 dBA** – 20*log (1390/300)–4 dB = **43 dBA**

Where: R1 = Distance of Specified Blowdown Noise Level Requirement (i.e., 300 ft.)
R2 = Distance of the Receptor from the Blowdown Silencer (1,390 ft.)

SOURCE OF SOUND DATA

The following describes the source of sound data for estimating the source sound levels and source PWLs used in the acoustical analysis for the compressor unit. Note that equipment noise levels utilized in the acoustical analysis (i.e., spreadsheet analysis) are generally higher than the sound level requirement for the equipment to insure that the design incorporates an acoustical "margin of safety."

(1) PWL values of the specific equipment inside the building (i.e., noise of the turbine and compressor) was calculated from sound data measured by H&K on a very similar type of gas compressor installation.

(2) Turbine exhaust PWL values for the Solar turbine were calculated from sound data provided by Solar (i.e., Solar Noise Prediction Manual) and sound data recently measured in the field by H&K on a similar type of turbine installation.

(3) The noise radiated from aboveground gas piping is primarily a result the noise generated by the gas compressors. Consequently, measurement of both near field and far field sound data on gas piping is presumed to be an accurate method of quantifying the noise associated with the new gas piping, and the estimated PWL values for gas piping used in the analysis were determined from near field and far field sound data by H&K on a similar type of compressor to that of the proposed compressor units.

(4) PWL values for the turbine LO cooler(s) and gas aftercooler(s) were designated to meet the design noise goal. Note that the estimated PWL for the cooler(s) utilized in the acoustical analysis assumes some noise associated with piping associated with the coolers. The noise level for the LO cooler and gas aftercooler used in the acoustical analysis is generally higher than the sound level requirement in order that the noise design analysis incorporates an acoustical "margin of safety." In addition, there can be other noise associated with the cooler that is not directly related to the operation of the cooler fans.

(5) PWL values for turbine air intake were calculated from sound data provided by Solar (i.e., Solar Noise Prediction Manual), although low-frequency SPLs were modified as a result of field acoustical tests by H&K.

Type of Equipment	Equipment Power Rating or Capacity	Est'd Number Required	Est'd A-Wt. Sound Level at 50 Ft.: Note (1)	Resulting A-Wt. PWL of Single Piece of Equip.	Assumed Max. No. Operating at One Time	Est'd Max. A-Wt. PWL or Sound Level of Equip.	
Diesel Generator	250 to 400 HP	1 to 2	65 - 70 dBA	102 dBA	1	102	
Bulldozer	250 to 700 HP	1 to 2	75 - 80 dBA	110 dBA	1	110	
Grader	450 to 600 HP	1 to 2	70 - 75 dBA	105 dBA	1	105	
Backhoe	130 to 210 HP	1 to 2	65 - 72 dBA	104 dBA	1	104	
Front End Loader	150 to 250 HP	1 to 2	65 - 70 dBA	102 dBA	1	102	
Truck Loaded	40 Ton	As needed	70 - 75 dBA	105 dBA	1	105	
	Est'd Total Maximum A-Wt. PWL (dBA) of All Construction Site Equipment					113	Calc'd
	Atten. (dB) due to Hemispherical Sound Propagation (1,390 Ft.): Note (2)					-61	Ldn
	Est'd Attenuation (in dB) due to Air Absorption and/or Foliage-Shielding: Note (3)					-5	Note (4)
	Est'd Sound Level (dBA) at Closest NSA (NSA #1) Considering a Maximum Number of Equipment Operating at One Time					47 dBA	45 dBA

Table H: **Waterville Compressor Station (CS-4): Est'd Sound Contribution at the Closest NSA (NSA #1, Residences approx. 1,390 Ft. East of Site Center) during Construction Activity at the Station. Sound Contribution assumes Operation of the "Loudest" Equipment during a Time Frame with the Largest Amount of Equipment Operating (e.g., Site Grading & Clearing/Grubbing)**

Note (1): Noise Emission Levels of construction equipment based on an EPA Report (meas'd sound data for a railroad construction project) and measured sound data in the field by H&K or other published sound data.

Note (2): Noise attenuation due to hemispherical sound propagation: Sound propagates outwards in all directions (i.e., length, width, height) from a point source, and the sound energy of a noise source decreases with increasing distance from the source. In the case of hemispherical sound propagation, the source is located on a flat continuous plane/surface (e.g., ground), and the sound radiates hemispherically from the source.

The following equation is the theoretical decrease of sound energy when determining the resulting SPL of a noise source at a specific distance (“r”) of a receiver from a source sound power level (PWL):

Decrease in SPL (“hemispherical propagation”) from a noise source = 20*log(r) – 2.3 dB, where “r” is distance of the receiver from the noise source. For example, if the distance "r" is 1,390 feet between the site and closest NSA, the “hemispherical propagation” = **20*log(1,390) – 2.3 dB = 61 dB**.

Note (3): Noise attenuation due to air absorption & foliage: Air absorbs sound energy, and the amount of absorption ("attenuation") is dependent on temperature and relative humidity (R.H.) of the air and the frequency of sound. For standard day conditions (i.e., no wind, 60 deg. F. and 70% R.H.), the attenuation due to air absorption for the medium frequency” (i.e., 1000 Hz O.B. SPL) is approximately **1.5 dB** per 1,000 feet. In addition, foliage such as forest/trees between the Station site and nearby NSAs can have a sound attenuation effect depending on the amount/thickness of the foliage.

Note (4): Calc'd Ldn is approx. 2 dB lower than A-wt. sound level since construction activities will occur only during daytime.

ANALYSIS METHODOLOGY AND SOURCE OF SOUND DATA (CONSTRUCTION ACTIVITIES)

The predicted sound level contributed by the construction-related activity (i.e., construction of the compressor station) was calculated from estimated A-wt. PWL of noise sources (i.e., construction equipment noise) that typically operate during the specific construction activity. The following summarizes the acoustical analysis procedure utilized for the construction activity at the site:

- Initially, the A-wt. PWL of noise sources associated with the construction activity were determined from published sound data and/or actual sound level measurements by H&K, and the total PWL of each noise source (equipment) was based on the anticipated number of equipment operating;

- Next, A-wt. PWL of all sources were logarithmically summed to provide the overall A-wt. PWL contributed by construction activity. It is assumed that the highest level of construction noise would occur during site earth work (i.e., time frame when the largest amount of equipment would operate);

- Finally, the estimated A-wt. sound level of the construction activity at the specific distance was determined by compensating for sound attenuation due to propagation (hemispherical radiation), atmospheric sound absorption and sound attenuation effect of foliage/forest***.

  The noise levels of construction equipment were based on an EPA Report (i.e., measured sound data from railroad construction equipment taken during the Northeast Corridor Improvement Project) that was summarized in a 1995 Report to the Federal Transit Administration as prepared by Harris Miller Miller & Hanson Inc. Also, construction equipment noise levels listed in an article in the Journal of Noise Control Engineering and sound data at a typical compressor station construction site, as measured by H&K, was utilized. The following list some references used by H&K to determine construction equipment noise emission levels:

  (1) "Transit Noise and Vibration Impact Assessment", dated April 1995, prepared by Harris Miller Miller & Hanson Inc. for the Office of Planning of the Federal Transit Administration.
  (2) Erich Thalheimer, "Construction Noise Control Program and Mitigation Strategy at the Central Artery/Tunnel Project", J of Noise Control Eng., 48 (5), pp. 157-165 (2000 Sep-Oct).
  (3) "Noise Control for Building Manufacturing Plant Equipment and Products", course handout notes for a noise course given by Hoover & Keith Inc.

  ***Discussion of noise attenuation due to foliage: Since there will be a substantial amount of trees between the Station and NSAs, the sound attenuation effect of foliage was included. The potential attenuation of foliage, based on our experience and an ISO Standard[1], the "medium-frequency" attenuation (i.e., 1000 Hz) due to forest/trees greater than 500 feet thick is approximately **10 dB**. Consequently, for this Station (i.e., distance of 1,390 feet from closest NSA), the "medium-frequency" air absorption attenuation would be approximately **2 dB**, (i.e., 1.5 dB x 1,390/1000 = 2 dB). Then, adding the attenuation due to foliage (approx. **3 dB**) to the air absorption attenuation, an overall attenuation of **5 dB** was utilized as the estimated attenuation due to air absorption and foliage.

End of Report

[1] ISO Standard 9613-1: 1993 (E), entitled "Acoustics – Attenuation of sound during propagation outdoors – Part 1: Calculation of the absorption of sound by the atmosphere, and Part 2: General method of calculation"

APPENDIX 9F

Acoustical Assessment of the M&R Stations Associated with the NEXUS Project

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H&K Job No. 4875

Subject: **Updated Acoustical Assessment of the Meter/Regulator Stations ("M&R Stations") associated with the Proposed NEXUS Gas Transmission Project [Columbiana County (OH), Erie County (OH), Washtenaw County (MI)]**

Prepared for: **Fluor Enterprises, Inc.** (Fluor)
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Sugar Land, TX 77478

Project Applicant: **NEXUS Gas Transmission, LLC** ("NEXUS")

H&K Report No. 3317
Date of Report: October 9, 2015
Submitted by: Paul D. Kiteck, P.E.**, Hoover & Keith Inc.** (H&K)

1.0 INTRODUCTION

The following report provides the results of an updated acoustical assessment (i.e., noise impact analysis) of the natural gas meter/regulator stations ("M&R stations") associated with the proposed **NEXUS Gas Transmission Project** ("Project" or "NEXUS Project"). This updated acoustical assessment was necessary since another M&R station has been added to the Project (initial Project M&R station acoustical assessment was documented in H&K Report No. 3228[1]).

The purpose of the acoustical assessment is to estimate the sound contribution of each Project M&R station at the nearby noise-sensitive areas (NSAs), such as residences, hospitals or schools, and if necessary, provide noise control measures to meet applicable sound level criteria. In addition, ambient sound surveys were conducted to document the noise environment around the Project M&R station sites and verify nearby NSAs around the site of each Project M&R station.

2.0 DESCRIPTION OF THE M&R STATIONS

There are currently five (5) planned M&R stations associated with the Project. For the acoustical assessment in the report, a noise impact analysis was conducted for all M&R stations since all M&R stations have NSAs within ½ mile of the M&R station. The M&R stations will be installed to measure and regulate the gas flow and pressure to and/or from the respective natural gas transmission pipelines. Each M&R station will consist of meter runs with gas flow meters (i.e., metering skid), "regulator runs" designed with flow-control valves ("FCVs") employed for gas flow-control and gas pressure regulation (i.e., regulator skid), isolation block valves and associated

[1] H&K Report No. 3228, dated May 29, 2015, entitled "Acoustical Assessment of M&R Stations…NEXUS Project", submitted with the FERC Pre-File (Draft) Application of the Project.

instrumentation. The following **Table A** summarizes the currently planned M&R stations associated with the Project, general location (i.e., state, county and closest town), observed closest NSA(s) to each M&R station, and distance and direction of the closest NSA. **Table A** also includes the referenced drawing (i.e., "Figure") for each M&R station.

Project M&R Stations	County/State and Other Related Location Information	Brief Description of M&R Station Design, Equipment and Purpose	Closest NSA and Type of NSA	Distance & Direction of Closest NSA	Reference Drawing (Figure)
NEXUS/Tennessee Gas Pipeline ("TGP") M&R Station (MR01)	Columbiana County, OH Near Kensington, OH	Regulator skid and metering skid; receives natural gas from TGP	Residences	850 ft. (west)	Figure 1 (p. 7)
NEXUS/Kensington M&R Station (MR02) and NEXUS/Texas Eastern M&R Station (MR03)	Columbiana County, OH Near Kensington, OH	Two (2) M&Rs at this location; both M&Rs include a regulator skid and a metering skid; receives natural gas from KPP and from TX Eastern Pipeline	Residences	700 ft. (NE)	Figure 2 (p. 8)
NEXUS/Willow Run M&R Station (MR04)	Washtenaw County, MI; Ypsilanti Township, MI	Regulator skid and metering skid; delivers gas to specific customers	Residences	300 ft. (east)	Figure 3 (p. 9)
NEXUS/Dominion East Ohio M&R Station (MR05)	Erie County, OH; Near Bloomingville, OH	Regulator skid and metering skid; delivers gas to DOE Pipeline	Residence	270 ft. (west)	Figure 4 (p. 10)

Table A: Summary of the Project M&R Stations along with Distance/Direction of the Closest NSA(s) to each M&R Station and Ambient Sound Level (per recent Sound Surveys).

3.0 SOUND CRITERIA/GUIDELINES, TYPICAL METRICS AND TERMINOLOGY

For the reader's information, a summary of applicable acoustical terminology and description of metrics used to measure/regulate environmental noise is provided at the end of report (p. 14).

Federal (FERC) Sound Level Guideline/Criterion: The Office of Energy Projects (OEP) of the Federal Energy Regulatory Commission (FERC) require that the sound level attributable to the natural gas compressor station should not exceed a day-night average A-weighted (A-wt.) sound level (expressed as "dBA") of **55 dBA** (i.e., Ldn) at any nearby NSA. The FERC may impose a sound guideline/requirement for an M&R station, and a sound level contribution of **55 dBA** (Ldn) at any nearby NSA is typically used as a "benchmark sound guideline/criterion" for assessing the noise contributed by an M&R station. For an essentially steady sound source that operates continuously over a 24-hour period and controls the environmental sound level, the Ldn is approximately **6.4 dB** above the measured Leq. Consequently, an Ldn of **55 dBA** corresponds to a Leq (e.g., Ld) of **48.6 dBA**. If both the Ld and Ln are measured and/or estimated, then the Ldn is calculated using the following formula:

$$L_{\mathrm{dn}} = 10\log_{10}\left(\frac{15}{24}10^{L_{\mathrm{d}}/10} + \frac{9}{24}10^{(L_{\mathrm{n}}+10)/10}\right)$$

State of Ohio: The State of Ohio or the Ohio EPA does not have regulations related to acceptable noise levels. We understand that sometimes noise level regulations are covered under local ordinances or city codes (e.g., public nuisance and limit excessive noise between certain hours).

Columbiana County (OH) and Townships in the County: Columbiana County Code of Ordinances includes "nuisance-type" of noise and vibration requirements for facilities in "Light Industrial Districts", and in summary, states that facilities should not be offensive to the occupants of adjacent premises or the community at large by reason of noise/vibration disturbances. No applicable local/township noise regulations have been identified, although any local noise regulations, if required, will be addressed during the local permitting process.

Erie County (OH) and Townships in the County: No applicable county or township noise regulations have been identified, although any local noise regulations, if required, will be addressed during the local permitting process.

State of Michigan: Under the State of Michigan Public Service Commission (MPSC) requirements, the noise attributable to an oil or gas surface facility is regulated under Michigan's Oil and Gas Regulations, Rule 324.1015 *Nuisance noise* and Rule 324.1016 *Construction standards for noise abatement at compressors associated with surface facilities*. Note that that MPSC regulations may not be applicable to an interstate natural gas pipeline project. In summary, Rule 324.1015 *Nuisance noise* stipulates that:

- A person shall not cause a *nuisance noise* in the production, handling, or use of oil, gas, or brine or in the handling of any product associated with the production or use of oil, gas or brine. As stipulated in the rule, *"nuisance noise"* means any noise from a well or its associated surface facilities that causes injurious effects to human health or safety or the unreasonable interference with the comfortable enjoyment of life or property;

- Noise attributable to a surface facility must not exceed **45 dBA** at a distance of 1,320 feet;

- The State of Michigan *Supervisor of Wells* is authorized to use administrative controls to require that the surface facility *permittee* measure sound levels at nearby *noise-sensitive areas* and at a distance of 1,320 feet, if the *Supervisor of Wells* receives 1 or more complaints of noise. The State of Michigan *Supervisor of Wells* is authorized to require appropriate noise control measures for a surface facility *permittee* after all applicable information is considered. The State of Michigan *Supervisor of Wells* is authorized to require appropriate noise control measures even if the **45 dBA** noise level at 1,320 feet from the facility is not exceeded (clarification from the MI Dept. of Environmental Quality);

- Rule 324.1016, in summary, stipulates minimum construction standards for noise abatement at surface facilities.

In summary, the State of Michigan requirements stipulate that the noise due to *compressors associated with surface facilities* must not exceed **45 dBA** at 1,320 feet. However, the State regulations also stipulate that appropriate noise control measures can be authorized even if the **45 dBA** noise level at 1,320 feet from the facility is not exceeded. A practical interpretation of

this additional stipulation is that if a noise impact is assumed to exist by the State, that they can request additional noise control measures

Ypsilanti (MI) Charter Township Noise Ordinance: The Ypsilanti Charter Township ordinance requirements at the property line (75 decibels daytime/70 decibels nighttime) are specific for land zoned as industrial; however, the existing zoning of the new Willow Run M&R Station may not be zoned industrial. If the land is not zoned industrial, it appears that the property line requirements are reduced to 60 decibels. Please note that we are assuming that decibels imply "dBA".

4.0 AMBIENT SOUND DATA AND MEASUREMENT METHODOLOGY

Ambient sound measurements and verification of NSAs at the M&R station sites were performed by Garrett Porter of H&K during site sound surveys in February, 2015 and July, 2015. Ambient sound levels were measured near the closest NSA(s) within ½ mile of each M&R station with NSAs within ½ mile of each M&R station, noting that each Project M&R station has NSAs within ½ mile of the M&R station site. The daytime A-weighted (A-wt.) equivalent sound level ("Leq") and unweighted octave-band (O.B.) sound pressure levels (SPLs) were measured. Sound measurements attempted to exclude extraneous sound such as a vehicle passing immediately by the sound measurement position. The acoustical measurement system consisted of a Rion Model NA-27 Sound Level Meter (a Type 1 "SLM" per ANSI S1.4 & S1.11) equipped with a Rion Model UC-53A microphone with a windscreen.

The following **Table B** provides a summary of the measured ambient daytime Leq (i.e., Ld) and estimated nighttime Leq (i.e., Ln) at the closest NSA(s) to each respective M&R station along with the resulting ambient Ldn, as calculated from the measured Ld and the estimated Ln.

Project M&R Stations	Closest NSA and Type of NSA	Distance/Direction of Closest NSA	Measured Ambient Ld	Estimated Ambient Ln	Resulting Ambient Ldn
Tennessee Gas Pipeline ("TGP") M&R Station	Residences	850 ft. (west)	38.6 dBA	38.6 dBA	45.0 dBA
Kensington M&R Station and Texas Eastern M&R Station	Residences	700 ft. (NE)	58.6 dBA	51.6 dBA	60.0 dBA
Willow Run M&R Station	Residences	300 ft. (east)	52.2 dBA	46.2 dBA	54.2 dBA
Dominion East Ohio M&R Station	Residence	270 ft. (west)	54.8 dBA	48.8 dBA	56.7 dBA

Table B: Summary of the Measured Ld, Estimated Ln and Resulting Ambient Ldn at the Closest NSA(s) to Each Respective Project M&R Station.

It is our opinion that the measured sound level data adequately quantifies the existing ambient sound level for the meteorological conditions that occurred during the sound survey. The ambient L_n were not measured but were estimated based on site observations to provide a more accurate representation of the "long-term average" ambient Ldn (i.e., ambient nighttime levels could be lower than the measured daytime sound levels).

5.0 ACOUSTICAL ASSESSMENT

5.1 General Description of the Acoustical Assessment

In general, the noise generated by an M&R station is typically related to the noise generated by the FCVs (i.e., valve-generated noise) that is radiated from the aboveground gas piping, and the level of piping noise is directly related to the pressure drop ("PD") and gas flow across the FCVs for the regulator runs. In addition, there could be some noise generated by other site equipment (e.g., metering piping). For the assessment of the potential noise emitted by each Project M&R station, we have evaluated the operating condition that could generate the highest amount of noise (i.e., so-called "worst case" condition). The predicted sound contribution was performed only for the closest NSA(s) since the sound contribution at other more distant NSAs should be less than the sound contribution at the closest NSA(s). A description of the acoustical analysis methodology and source of sound data is provided at the end of the report (pp. 13–14).

5.2 Calculation of the Sound Contribution of each Respective M&R Station

The calculation (i.e., spreadsheet analysis) of the A-wt. sound level contribution and unweighted O.B. SPLs of each respective M&R station at the closest NSA is provided on **Table 1** (p. 11), **Table 2** (p. 11), **Table 3** (p. 12) and **Table 4** (p. 12) assuming "worst case" operating conditions (i.e., maximum gas flow and PD across the FCVs), and the analysis assumed that the gas piping run(s) employ a FCV designed to meet **90 dBA** at 1 meter for the "worst-case" operating conditions and other noise control measures (i.e., enclosure covering the regulator skid and covering the metering skid). To reduce computation, it is assumed that if the noise of the M&R station at more distant NSAs will be equal to or less than the resulting M&R station noise at the closest NSA(s).

The following **Table C** summarizes the estimated sound level contribution (i.e., Ldn; as calculated from the estimated A-wt. sound level) for each M&R station at the closest NSA(s) assuming "worst-case" operating conditions, and **Table C** includes the ambient sound level [i.e., ambient Ldn calculated from the measured daytime Leq (i.e., Ld) and estimated nighttime Leq (i.e., Ln)]. The presented results in **Table C** assume the operating conditions that could generate the maximum amount of noise (i.e., maximum gas flow and PD across the FCVs). In addition, **Table C** includes the potential increase above the existing ambient sound level during operation of the M&R station along with the reference analysis table (i.e., spreadsheet acoustical analysis) for each respective M&R station.

Project M&R Stations	Closest NSA and Type of NSA	Distance & Direction of Closest NSA	Ambient Ldn	Calc'd Ldn of M&R Station (via Est'd A-Wt. Level)	Level (Ldn) of M&R Station plus Ambient Level (Ldn)	Increase Above Ambient	Reference Table
TGP M&R Station	Residences	850 ft. (west)	45.0 dBA	32.0 dBA	45.2 dBA	0.2 dB	Table 1 (p. 11)
Kensington M&R and Texas Eastern M&R	Residences	700 ft. (NE)	60.0 dBA	35.5 dBA	60.0 dBA	0.0 dB	Table 2 (p.11)
Willow Run M&R Station	Residences	300 ft. (east)	54.2 dBA	42.9 dBA	54.5 dBA	0.3 dB	Table 3 (p. 12)
Dominion East Ohio M&R Station	Residence	270 ft. (west)	56.7 dBA	43.1 dBA	56.9 dBA	0.2 dB	Table 4 (p. 12)

Table C: Summary of the Estimated Sound Level of the M&R Stations at the Closest NSA(s) during "Worst Case" Operation (i.e., Operating Conditions that Generate Maximum Noise).

It is assumed that valve-generated noise will not be notably higher than predicted by the valve manufacturers (e.g., within +/- **5 dB** of the estimated noise levels by the valve manufacturer).

6.0 EQUIPMENT SOUND REQUIREMENTS AND FINAL COMMENT

It is recommended and assumed that the FCVs associated with each M&R station be designed to achieve a maximum **90 dBA** for the full range of operating conditions (i.e., A-wt. sound level generated at 3 feet from the gas piping; downstream of the FCV). In addition, to reduce pipe/valve–radiated noise, we understand that the regulator skid and metering skid will be covered with an enclosure, and it is recommended that the enclosure be an "off-skid" type of acoustically-designed building.

The results of the acoustical assessment indicate that the noise attributable to each respective M&R station associated with the **NEXUS Project** should be lower than an L_{dn} of **55 dBA** at the nearby NSAs if the anticipated noise control measures are employed successfully (i.e., low-noise FCVs and enclosure for the regulator skid and metering skid). It is also expected that the M&R station noise levels will meet any applicable state, county and/or local noise requirements.

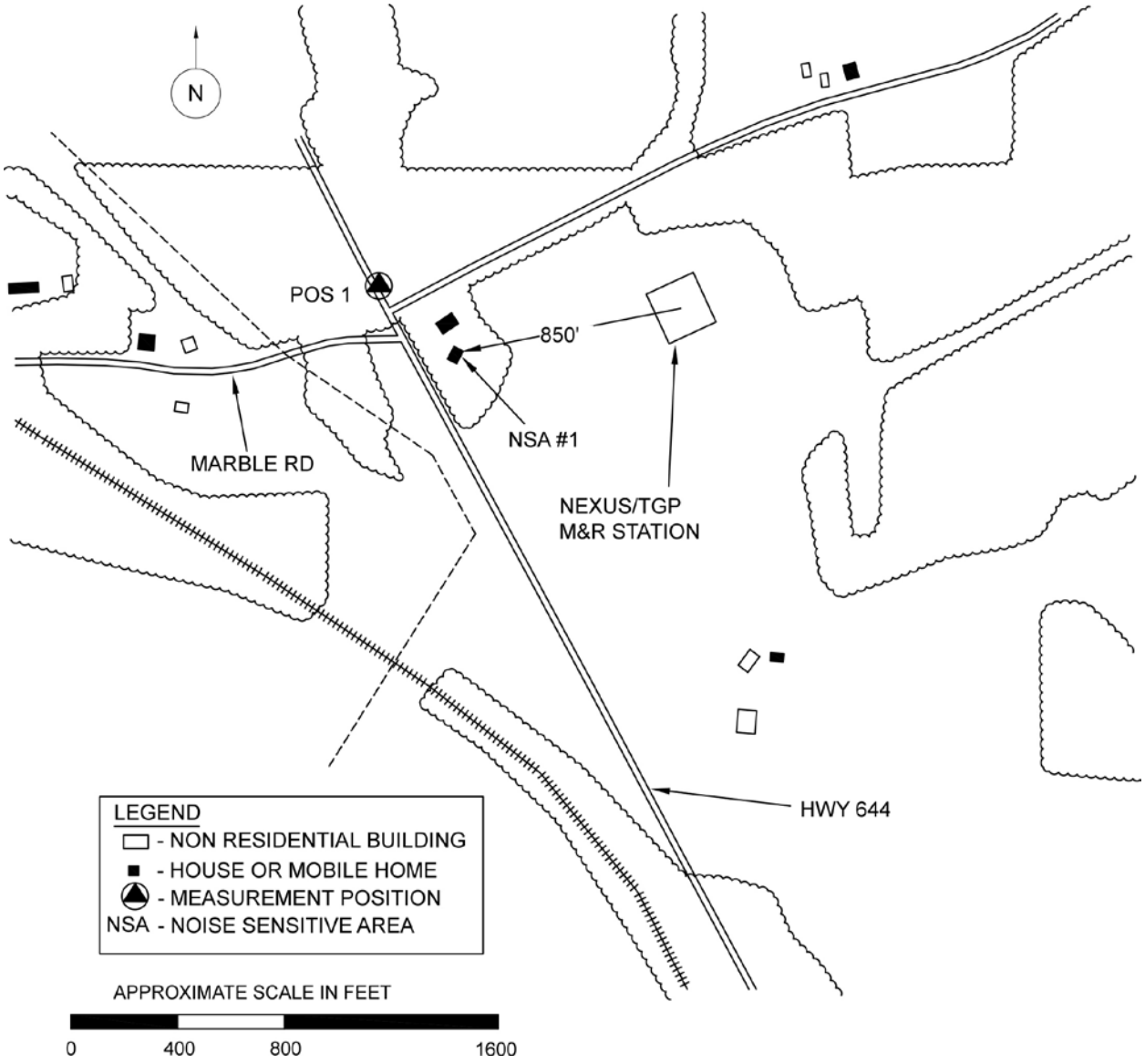

Figure 1: NEXUS Project (TGP M&R Station): Area Layout showing Location of the Nearby NSAs and NSA Sound Measurement Position(s) near the Closest NSA(s).

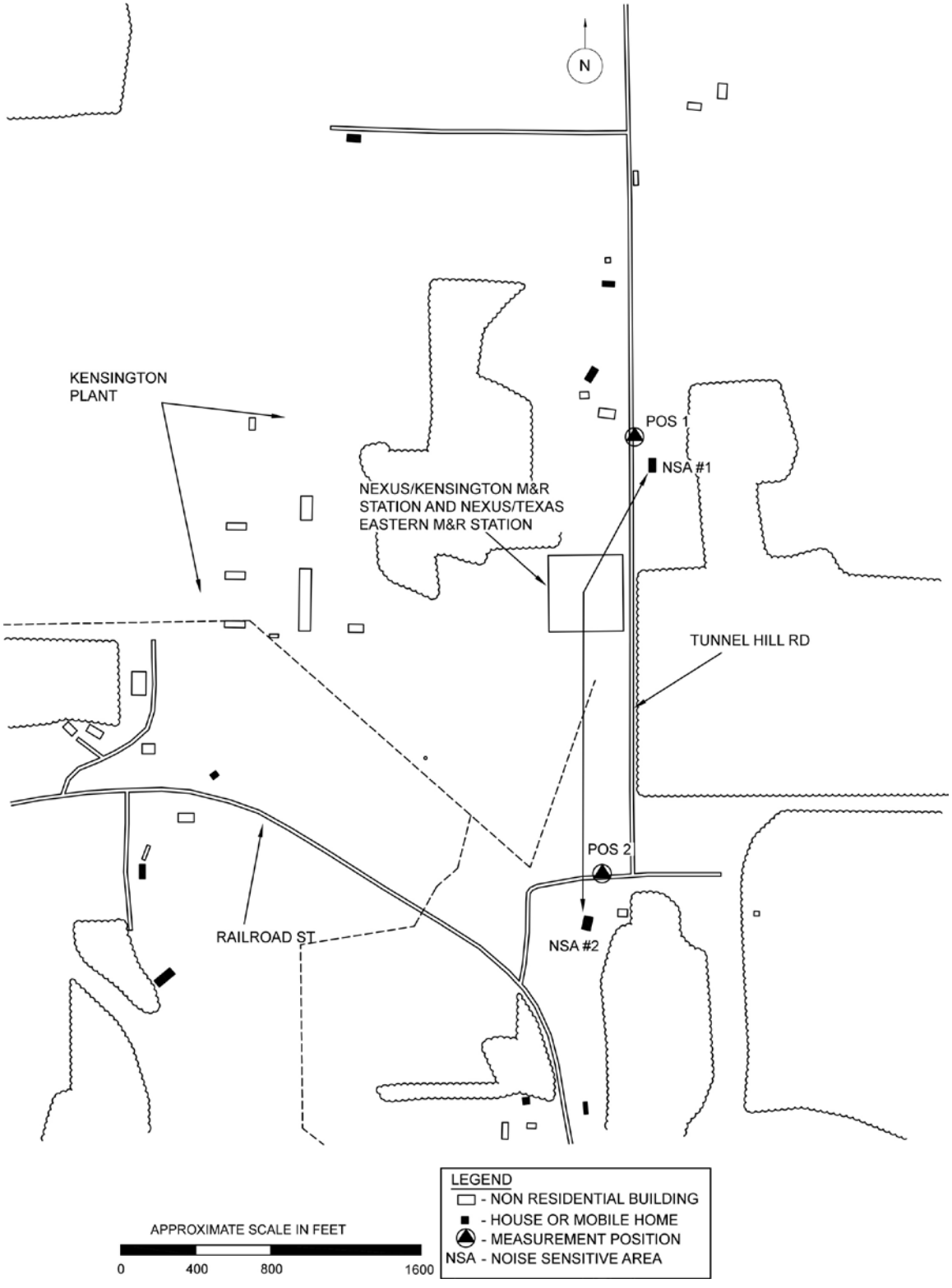

Figure 2: NEXUS Project (Kensington M&R Station and Texas Eastern M&R Station): Area Layout showing Location of the nearby NSAs and Sound Measurement Positions near the Closest NSA(s).

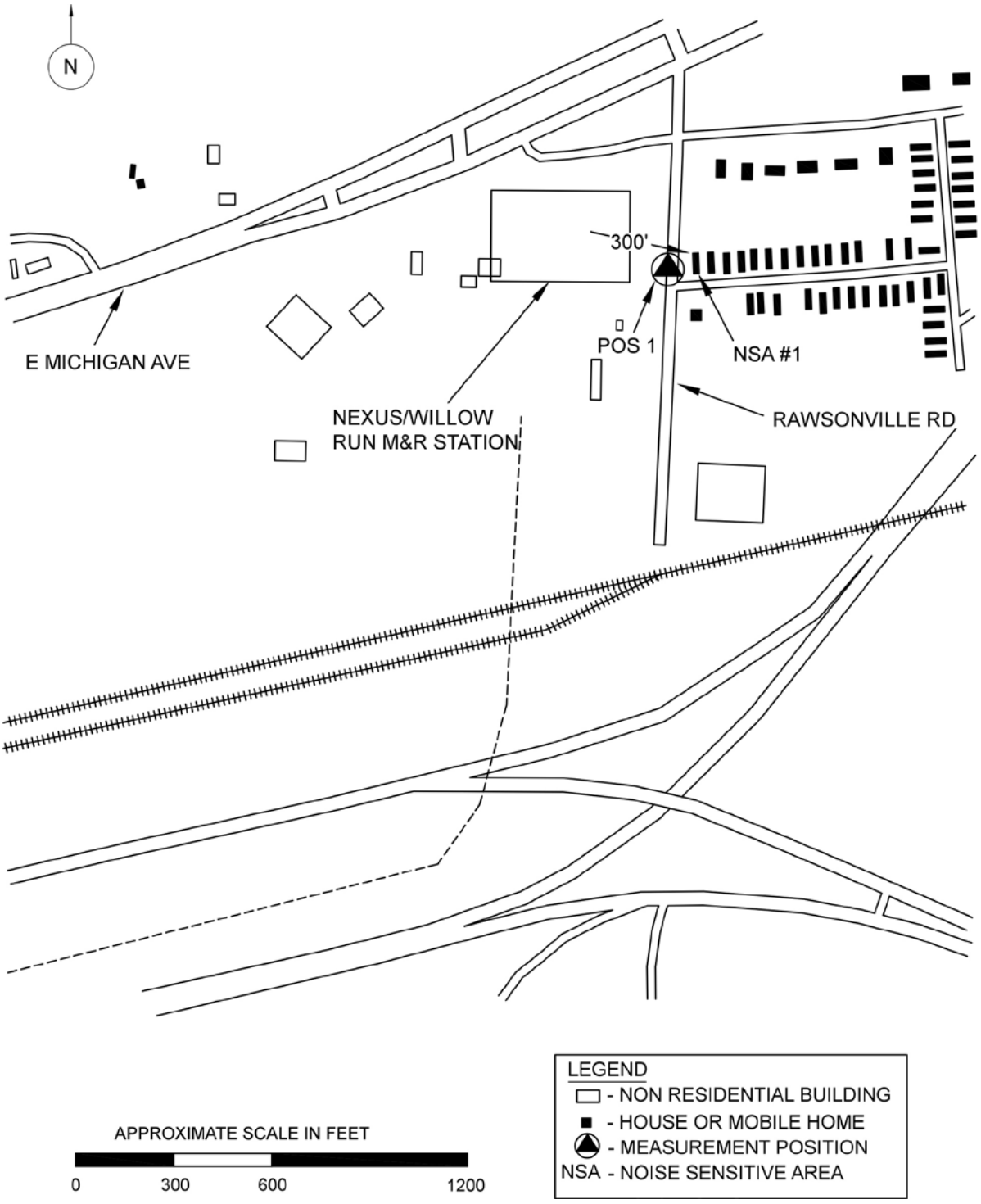

Figure 3: NEXUS Project (Willow Run M&R Station): Area Layout showing Location of the Nearby NSAs and NSA Sound Measurement Position(s) near the Closest NSA(s).

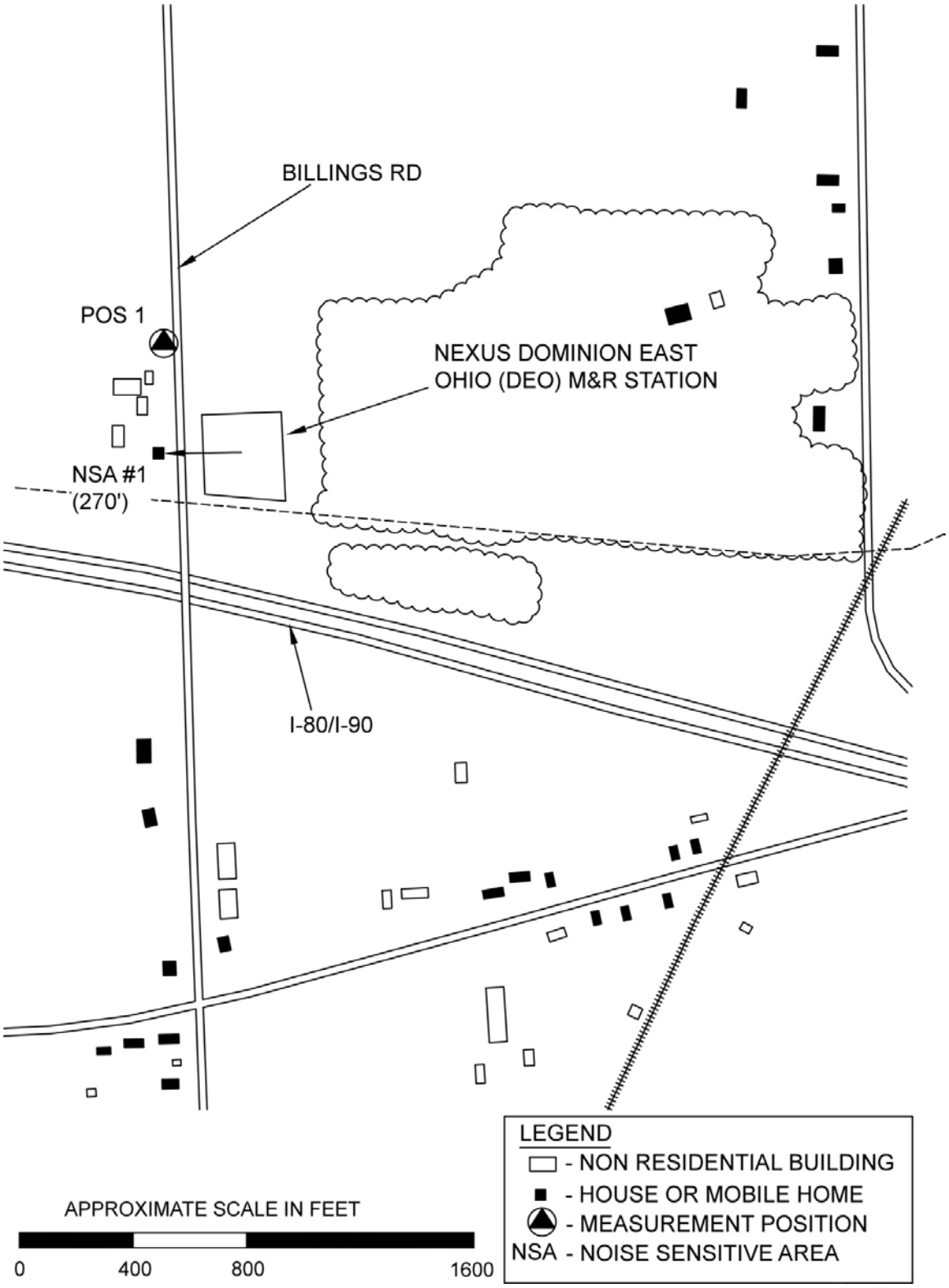

Figure 4: NEXUS Project (Dominion East Ohio M&R Station): Area Layout showing Location of nearby NSA; NSA Sound Measurement Position(s) near the Closest NSA.

Source PWL and SPL and Other Factors related to the Sound Level Contribution of the Facility during Operation		Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
Source 1	PWL for Regulator Run(s) on Flow Control Skid	84	81	81	84	94	101	101	96	91	106	
Source 2	PWL of Misc. Equipment/Piping & Metering Skid	80	80	82	84	87	92	92	88	85	97	
	Total PWL of Facility Sources (Sources 1 & 2)	**102**	**98**	**85**	**87**	**95**	**102**	**102**	**97**	**92**	**106**	
	Atten. Of Noise Control (Enclosure for Each Skid)	-2	-6	-10	-12	-16	-20	-22	-25	-25		
	Misc. Atten. (Foliage, Land Contour, Obstructions)	0	0	0	0	0	-1	-2	-3	-3		Calc'd
850	Hemispherical Radiation: Note (1)	-56	-56	-56	-56	-56	-56	-56	-56	-56		Ldn
850	Attn. Due to Atm. Absorption (60 Deg, 70% RH)	0	0	0	0	-1	-2	-3	-7	-12		Note (4)
Est'd Sound Contribution at Closest NSA: Note (2)		**44**	**36**	**18**	**18**	**22**	**23**	**18**	**6**	**0**	**25.6**	**32.0**

Ambient Sound Level (dBA): Note (3)	**45.0**
Est'd Total Sound Level during Operation of M&R Station	**45.2**
Potential Increase above the Ambient Level (dB)	**0.2**

Table 1: NEXUS Gas Transmission Project (NEXUS/TGP M&R Station): Est'd Sound Level Contribution due to the M&R Station at the Closest NSA (i.e., Residences approx. 850 ft. West of the M&R Station Site) assuming Operating Conditions that could generate the "Maximum" Noise Contribution (Maximum Flow Conditions).

Notes: (1) Hemispherical Sound Radiation = 20*log(r) - 2.3 dB (where "r"=distance to source in ft.);
(2) SPL = PWL - (Hemispherical Sound Radiation) - (Atten. Due to Noise Control) - (Atm. Absorption) - (Misc. Attenuation);
(3) Ambient sound level measured by H&K during a 2015 ambient sound survey;
(4) Ldn calculated by adding 6.4 dB to the estimated A-wt. sound level (Leq).

Source PWL and SPL and Other Factors related to the Sound Level Contribution of the Facility during Operation		Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
Source 1	PWL: Regulator Runs on 2 Flow Control Skids	87	84	84	87	97	104	104	99	94	109	
Source 2	PWL of Misc. Equipment/Piping & Metering Skid	80	80	82	84	87	92	92	88	85	97	
	Total PWL of Facility Sources (Sources 1 & 2)	**88**	**85**	**86**	**89**	**97**	**104**	**104**	**99**	**95**	**109**	
	Atten. Of Noise Control (Enclosure for Each Skid)	-2	-6	-10	-12	-16	-20	-22	-25	-25		
	Misc. Atten. (Foliage, Land Contour, Obstructions)	0	0	0	0	-1	-2	-3	-4	-4		Calc'd
700	Hemispherical Radiation: Note (1)	-55	-55	-55	-55	-55	-55	-55	-55	-55		Ldn
700	Attn. Due to Atm. Absorption (60 Deg, 70% RH)	0	0	0	0	-1	-1	-3	-6	-10		Note (4)
Est'd Sound Contribution at Closest NSA: Note (2)		**31**	**25**	**21**	**22**	**25**	**26**	**22**	**10**	**1**	**29.1**	**35.5**

Ambient Sound Level (dBA): Note (3)	**60.0**
Est'd Total Sound Level during Operation of M&R Station	**60.0**
Potential Increase above the Ambient Level (dB)	**0.0**

Table 2: NEXUS Gas Transmission Project (NEXUS/Kensington M&R Station; NEXUS/Texas Eastern M&R Station): Est'd Sound Level Contribution due to the M&R Stations at Closest NSA (i.e., Residence 700 ft. NE of M&R Stations) during Operating Conditions that could generate "Maximum" Noise Contribution (Maximum Flow Conditions).

Source PWL and SPL and Other Factors related to the Sound Level Contribution of the Facility during Operation		Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
Source 1	PWL for Regulator Run(s) on Flow Control Skid	84	81	81	84	94	101	101	96	91	106	
Source 2	PWL of Misc. Equipment/Piping & Metering Skid	80	80	82	84	87	92	92	88	85	97	
	Total PWL of Facility Sources (Sources 1 & 2)	**85**	**84**	**85**	**87**	**95**	**102**	**102**	**97**	**92**	**106**	
	Atten. Of Noise Control (Enclosure for Each Skid)	-2	-6	-10	-12	-16	-20	-22	-25	-25		
	Misc. Atten. (Foliage, Land Contour, Obstructions)	0	0	0	0	0	0	-1	-2	-3		Calc'd
300	Hemispherical Radiation: Note (1)	-47	-47	-47	-47	-47	-47	-47	-47	-47		Ldn
300	Attn. Due to Atm. Absorption (60 Deg, 70% RH)	0	0	0	0	0	-1	-1	-2	-4		Note (4)
Est'd Sound Contribution at Closest NSA: Note (2)		**36**	**30**	**27**	**28**	**31**	**34**	**30**	**20**	**13**	**36.5**	**42.9**

Ambient Sound Level (dBA): Note (3)	**54.2**
Est'd Total Sound Level during Operation of M&R Station	**54.5**
Potential Increase above the Ambient Level (dB)	**0.3**

Table 3: NEXUS Gas Transmission Project (NEXUS/Willow Run M&R Station): Est'd Sound Level Contribution due to the M&R Station at the Closest NSA (i.e., Residences approx. 300 ft. East of the M&R Station Site) assuming Operating Conditions that could generate the "Maximum" Noise Contribution (Maximum Flow Conditions).

Source PWL and SPL Contributions at the Respective NSA Due to the Operation of the Facility		Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
Source 1	PWL for Regulator Run(s) on Flow Control Skid	84	81	81	84	94	101	101	96	91	106	
Source 2	PWL of Misc. Equipment/Piping & Metering Skid	80	80	82	84	87	92	92	88	85	97	
	Total PWL of Facility Sources (Sources 1 & 2)	**85**	**84**	**85**	**87**	**95**	**102**	**102**	**97**	**92**	**106**	
	Atten. Of Noise Control (Building for Reg. Skid)	-2	-6	-10	-12	-16	-20	-22	-25	-25		
	Misc. Atten. (Foliage, Land Contour, Obstructions)	0	0	0	0	0	-1	-2	-3	-3		
270	Hemispherical Radiation: Note (1)	-46	-46	-46	-46	-46	-46	-46	-46	-46		Calc'd
270	Attn. Due to Atm. Absorption (60 Deg, 70% RH)	0	0	0	0	0	-1	-1	-2	-4		Ldn
Est'd Sound Contribution at Closest NSA: Note (2)		**37**	**31**	**28**	**29**	**32**	**34**	**30**	**20**	**14**	**36.7**	**43.1**

Ambient Sound Level (dBA): Note (3)	**56.7**
Est'd Total Sound Level during Operation of M&R Station	**56.9**
Potential Increase above the Ambient Level (dB)	**0.2**

Table 4: NEXUS Gas Transmission Project (NEXUS/Dominion East Ohio M&R Station): Est'd Sound Level Contribution due to the M&R Station at the Closest NSA (i.e., Residences approx. 270 ft. West of the M&R Station Site) assuming Operating Conditions that could generate the "Maximum" Noise Contribution (Maximum Flow Conditions).

Description of Acoustical Assessment Methodology and Source of Sound Data

In general, the predicted sound level contributed by a new M&R station was calculated as a function of frequency from estimated unweighted octave-band (O.B.) sound power levels (PWLs) for the M&R station, in which the PWL values were designated to meet the design noise goal (i.e., source of sound data). The following summarizes the acoustical analysis procedure:

- Initially, unweighted O.B. PWL values of the significant noise sources were determined from equipment manufacturer's sound data and/or actual sound measurements performed by H&K at similar type of natural gas compressor facilities (i.e., M&R station);

- Then, expected noise reduction (NR) or attenuation in dB per O.B. frequency due to any noise control measures, hemispherical sound propagation (discussed in more detail below*) and atmospheric sound absorption (discussed in more detail below**) were subtracted from the unweighted O.B. PWLs to obtain the unweighted O.B. SPLs of each noise source. Since sound shielding by buildings can influence the sound level contributed at the NSAs, we also included the sound shielding due to buildings, if appropriate. Sound attenuation effect due to foliage/trees was also considered in the analysis, if applicable, since there could be some sound attenuation due to foliage/trees;

- Finally, the resulting estimated unweighted O.B. SPLs for all noise sources associated with the new M&R station (with any noise control and other sound attenuation effects) were logarithmically summed, and the total O.B. SPLs for all noise sources were corrected for A-weighting to provide the estimated overall A-wt. sound level contributed by the M&R stations at the closest NSA. If necessary, the predicted sound contribution of the new M&R stations at the closest NSA was utilized to estimate the noise contribution at the other nearby NSAs that are more distant that the closest NSA.

*Attenuation due to hemispherical sound propagation: Sound propagates outwards in all directions (i.e., length, width, height) from a point source, and the sound energy of a noise source decreases with increasing distance from the source. In the case of hemispherical sound propagation, the source is located on a flat continuous plane/surface (e.g., ground), and the sound radiates hemispherically (i.e., outward, over and above the surface) from the sound source. The following equation is the theoretical decrease of sound energy when determining the resulting SPL values of a noise source at a specific distance ("r") of a receiver from the estimated PWL values:

> Decrease in SPL ("hemispherical propagation") from a noise source = **20*log(r) – 2.3 dB**
> where "r" is distance of the receiver from the noise source.

Attenuation due to air absorption: Air absorbs sound energy, and the amount of absorption ("attenuation") is dependent on the temperature and relative humidity (R.H.) of air and frequency of sound. For example, the attenuation due to air absorption for 1000 Hz O.B. SPL is approximately **1.5 dB per 1,000 feet for standard day conditions (i.e., no wind, 60 deg. F. and 70% R.H.).

Source of Sound Data

In general, the sound data for estimating the source sound levels and O.B. PWL values utilized in the acoustical analyses are based primarily on measured sound data by H&K at similar installations. For a gas pipeline facilities used solely to regulate gas flow and control gas pressure, the primary source of noise can be valve-generated noise radiated from gas piping, and the level of piping noise is directly related to the pressure drop across the flow-control/regulator valve(s). In addition, if necessary, we utilized the Fisher Sizing Computer Program to substantiate the calculation of valve/piping noise since the primary noise contributor at a typical M&R station is valve-generated noise. Note that the predicted noise level for an M&R station is generally higher than the sound level requirement for the station equipment and components to insure that the design incorporates an acoustical "margin of safety."

Summary of Typical Metrics and Acoustical Terminology

(1) Daytime Sound Level (L_d) & Nighttime Sound Level (L_n): L_d is the equivalent A-weighted sound level, in decibels, for a 15 hour time period, between 07:00 to 22:00 Hours (7:00 a.m. to 10:00 p.m.). L_n is the equivalent A-weighted sound level, in decibels, for a 9 hour time period, between 22:00 to 07:00 Hours (10:00 p.m. to 7:00 a.m.).

(2) Equivalent Sound Level (L_{eq}): The equivalent sound level (L_{eq}) can be considered an average sound level measured during a period of time, including any fluctuating sound levels during that period. In this report, the L_{eq} is equal to the level of a steady (in time) A-weighted sound level that would be equivalent to the sampled A-weighted sound level on an energy basis for a specified measurement interval. The concept of the measuring L_{eq} has been used broadly to relate individual and community reaction to aircraft and other environmental noises.

(3) Day-Night Average Sound Level (L_{dn}): The L_{dn} is an energy average of the measured daytime L_{eq} (L_d) and the measured nighttime L_{eq} (L_n) plus **10 dB**. The **10-dB** adjustment to the L_n is intended to compensate for nighttime sensitivity. As such, the L_{dn} is not a true measure of the sound level but represents a skewed average that correlates generally with past sound surveys which attempted to relate environmental sound levels with physiological reaction and physiological effects. For a steady sound source that operates continuously over a 24-hour period and controls the environmental sound level, an L_{dn} is approximately **6.4 dB** above the measured L_{eq}. Consequently, an L_{dn} of **55 dBA** corresponds to a L_{eq} of **48.6 dBA**. If both the L_d and L_n are measured, then the L_{dn} is calculated using the following formula:

$$L_{dn} = 10\log_{10}\left(\frac{15}{24}10^{L_d/10} + \frac{9}{24}10^{(L_n+10)/10}\right)$$

(4) Sound Power Level (L_W or PWL): Ten times the common logarithm of the ratio of the total acoustic power radiated by a sound source to a reference power. A reference power of a picowatt or 10^{-12} watt is conventionally used.

End of Report

APPENDIX 9G

Acoustical Assessment of the Planned HDDs for the Natural Gas Pipeline Systems Associated with the NEXUS Project

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H&K Job No. 4875

Subject: **Updated Acoustical Assessment of the Planned HDDs (Ohio and Michigan) for the Natural Gas Pipeline System associated with the NEXUS Project**

Prepared for: **Fluor Enterprises, Inc.** (Fluor)
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Project Applicant: **NEXUS Gas Transmission, LLC** (NEXUS)

H&K Report No. 3310
Date of Report: November 3, 2015
Submitted by: Paul D. Kiteck, P.E.**, Hoover & Keith Inc.** (H&K)

1.0 INTRODUCTION

The following report by **Hoover & Keith Inc.** (H&K) provides the results of an updated acoustical assessment of the planned horizontal directional drilling (HDD) sites related to the construction of the natural gas pipeline associated with the proposed **NEXUS Gas Transmission Project** ("Project" or "NEXUS Project") for **NEXUS Gas Transmission, LLC**. The HDD construction technique (i.e., a "trenchless crossing" method) is an alternative to traditional open cut construction and is itself an environmental mitigative measure for avoiding foreign pipelines, utilities, highways and/or water bodies/wetlands. As an alternative method to an HDD trenchless crossing method, a direct pipe ("DP") trenchless crossing method can be employed although it appears that DP trenchless crossings will not be employed. For the reader's information, a summary of applicable acoustical terminology and typical metrics used to measure and regulate environmental noise is provided at the end of the report (pp. 37–38).

The purpose of the acoustical assessment is to estimate the sound contribution at nearby noise-sensitive areas (NSAs), such as residences, schools or hospitals, resulting from drilling operations at the HDD or DP sites with NSAs within 0.5 mile and present noise mitigation measures to minimize the noise impact of HDD activities if the acoustical assessment indicates that the noise attributable to HDD operations could exceed an equivalent day-night sound level (L_{dn}) of **55 dBA**. Consequently, **55 dBA** (L_{dn}) is considered as the sound criterion for Project HDD operations normally utilized by the Federal Energy Regulatory Commission (FERC), and this sound criterion assumes that HDD operations could be employed for a 24-hour workday.

2.0 DESCRIPTION OF THE HDD SITES

Currently, there will be seventeen (17) areas along the pipeline route for the Project that will require either an HDD type of trenchless crossing. Based on site visits to the HDDs, there are NSAs within 0.5 mile of the entry and exit site for all of the HDD crossings. Consequently, a noise impact assessment of all HDD entry and HDD exit sites is included. For reference, **Figures 1–17**

(pp. 7–23) provides an area layout around the respective HDD crossings, and these drawings show the NSAs within 0.5 mile of the HDD entry and/or exit site of each HDD crossing. The following **Table A** summarizes the currently planned/potential HDD sites (i.e., HDD segment) along the Project pipeline route. **Table A** also includes the observed nearby NSAs to the HDD entry/exit site along with the distance/direction of the nearby (closest) NSAs and observed obstructions, such as foliage/trees, between the HDD site and the respective NSA that could provide additional attenuation of the HDD noise during HDD activities.

Ref. No.	Identification & Brief Description/Location of HDD Crossing	Entry Exit Site	MP	Length of HDD (Ft.)	Closest NSA and Type of NSA	Distance & Direction of Closest NSA	Obstructions & Foliage between NSA & HDD Site	Reference Figure in Report
#1	Wetland B15-31 HDD	Entry	7.9	2,930.8	Residence	600 ft. (NW)	Significant foliage	Fig. 1 (p. 7)
	Columbiana County, OH	Exit	8.4		Residence	1,260 ft. (E)	Some foliage	Fig. 1 (p. 7)
#2	Nimisila Reservoir HDD	Entry	41.1	1,535.6	Residences	390 ft. (E)	Some foliage	Fig. 2 (p. 8)
	Summit County, OH	Exit	40.8		Residence	850 ft. (NW)	Significant foliage	Fig. 2 (p. 8)
#3	Tuscarawas River HDD	Entry	47.8	3,261.1	Residence	450 ft. (NW)	Some foliage	Fig. 3 (p. 9)
	Summit County, OH	Exit	48.4		Residence	830 ft. (NW)	Some foliage	Fig. 3 (p. 9)
#4	Wetland C15-44 HDD	Entry	71.1	1,627.9	Residence	1,670 ft. (WSW)	Some foliage	Fig. 4 (p. 10)
	Medina County, OH	Exit	71.4		Residence	1,690 ft. (NW)	Some foliage	Fig. 4 (p. 10)
#5	East Branch Black River HDD	Entry	86.9	1,868.6	Residence	1,010 ft. (W)	Significant foliage	Fig. 5 (p. 11)
	Lorain County, OH	Exit	86.5		Residence	1,550 ft. (SSE)	Limited foliage	Fig. 5 (p. 11)
#6	West Branch Black River HDD	Entry	92.5	1,669.1	Residence	630 ft. (NW)	Some foliage	Fig. 6 (p. 12)
	Lorain County, OH	Exit	92.2		Residence	410 ft. (S)	Significant foliage	Fig. 6 (p. 12)
#7	Vermilion River & Wetland C15-56	Entry	104.1	2,944.7	Residences	460 ft. (NW)	Some foliage	Fig. 7 (p. 13)
	HDD (Huron County, OH)	Exit	104.7		Residence	490 ft. (S)	Some foliage/road	Fig. 7 (p. 13)
#8	Interstate 80 HDD	Entry	110.3	1,431.7	Residence	860 ft. (E)	Limited foliage	Fig. 8 (p. 14)
	Erie County, OH	Exit	110.1		Residence	740 ft. (W)	Some foliage	Fig. 8 (p. 14)
#9	Huron River HDD	Entry	116.8	2,423.3	Residence	590 ft. (NE)	Some foliage	Fig. 9 (p. 15)
	Erie County, OH	Exit	117.3		Residence	630 ft. (E)	Significant foliage	Fig. 9 (p. 15)
#10	Sandusky River HDD	Entry	146.1	2,159.2	Residences	350 ft. (SW)	Limited foliage	Fig. 10 (p. 16)
	Sandusky County, OH	Exit	145.7		Residence	1,040 ft. (WNW)	Some foliage/river	Fig. 10 (p. 16)
#11	Portage River HDD	Entry	162.7	1,619.5	Residences	510 ft. (NE)	Some foliage	Fig. 11 (p. 17)
	Sandusky County, OH	Exit	162.3		Residence	400 ft. (SW)	Some foliage	Fig. 11 (p. 17)
#12	Findlay Road HDD	Entry	180.1	1,521.6	Residence	970 ft. (E)	Foliage/road	Fig. 12 (p. 18)
	Wood County, OH	Exit	179.8		Residences	360 ft. (SW)	Significant foliage	Fig. 12 (p. 18)
#13	Maumee River HDD	Entry	181.2	3,998.7	Residences	1,080 ft. (SW)	Some foliage	Fig. 13 (p. 19)
	Wood & Lucas County, OH	Exit	181.9		Residence	1,310 ft. (S)	Some foliage	Fig. 13 (p. 19)
#14	River Raisin HDD	Entry	215.0	1478.8	Residence	540 ft. (NW)	Some foliage/road	Fig. 14 (p. 20)
	Lenawee County, MI	Exit	215.3		Residence	1,080 ft. (S)	Significant foliage	Fig. 14 (p. 20)
#15	Saline River HDD	Entry	237.4	1315.0	Residence	460 ft. (NW)	Some foliage	Fig. 15 (p. 21)
	Washtenaw County, MI	Exit	237.7		Residence	720 ft. (S)	Significant foliage	Fig. 15 (p. 21)
#16	Hydro Park HDD	Entry	250.7	2279.7	Residences	1,300 ft. (NW)	Significant foliage	Fig. 16 (p. 22)
	Washtenaw County, MI	Exit	251.1		Residence	870 ft. (NE)	Foliage & road	Fig. 16 (p. 22)
#17	Interstate 94 HDD	Entry	251.5	1359.1	Residence	220 ft. (W)	Some foliage	Fig. 17 (p. 23)
	Washtenaw County, MI	Exit	251.8		Residences	250 ft. (NW)	Some foliage	Fig. 17 (p. 23)

Table A: Summary of the HDD Crossings for the Pipeline Route associated with the Project along with the Distance/Direction of the Closest NSA(s) to the Respective HDD Entry or Exit Site

3.0 AMBIENT SOUND SURVEYS AND SOUND MEASUREMENT METHODOLOGY

The measurement of the ambient sound levels and verification of NSAs around the potential HDD sites was performed by Garrett Porter of H&K in March 2015 and July 2015. Ambient daytime sound levels (Ld) were measured at the closest NSA(s) to each potential HDD site. The ambient nighttime levels (Ln) were not measured but were estimated based on site observations to provide a more accurate representation of the "long-term" ambient Ldn (i.e., Ln could be lower than the measured Ld). At each sound measurement location, the A-weighted (A-wt.) equivalent sound level (Leq) and associated ambient unweighted octave-band (O.B.) sound pressure levels (SPLs) were measured. The acoustical measurement system consisted of a Norsonic Model Nor140 Sound Level Meter (a Type 1 "SLM" per ANSI S1.4 & S1.11) equipped with a ½-inch condenser microphone with a windscreen. The SLM was calibrated with a microphone calibrator (calibrated within 1 year of the sound test date).

4.0 HDD EQUIPMENT AND ACOUSTICAL ASSESSMENT OF PROJECT HDDs

The spreadsheet analyses (i.e., acoustical calculations) of the estimated A-wt. sound level contributed by the HDD operations during peak operating conditions associated with the planned HDD sites at the closest NSA to either the HDD entry or HDD exit site are provided in **Tables 1–34** (pp. 24–35), and it is assumed that the HDD operations could be employed for a 24-hour workday. For reference, a description of the acoustical analysis methodology and the source of sound data are provided at the end of the report (pp. 36–37) along with a brief summary of acoustical metrics and terminology associated with this acoustical assessment.

The following denotes the typical equipment at the HDD entry site and most of the listed equipment are considered noise sources associated with the HDD operations:

- Drilling rig and associated engine-driven hydraulic power unit (i.e., significant noise source);
- Engine-driven mud pump(s) and engine-driven generator set(s);
- Mud mixing/cleaning equipment and associated fluid systems shale shakers;
- Crane, backhoe, frontloader, forklift and/or truck(s); and
- Frac tanks (i.e., water & drilling mud storage); engine-driven light plants (nighttime operation).

The following denotes the typical equipment at the HDD exit site and most of the listed equipment are considered noise sources, noting that the noise generated at the HDD exit site is significantly lower than the noise generated at the HDD entry site:

- Backhoe, sideboom, backhoe and/or trucks;
- Possibly one (1) engine-driven generator set; possibly "small" engine-driven pump; and
- Engine-driven light plants (used for nighttime operation).

The following **Table B** summarizes the estimated sound level (Ldn) of drilling operations, as calculated from estimated A-wt. sound level, at the closest NSA(s) to each respective HDD site with NSAs within 0.5 mile of either the HDD entry or HDD exit site. In addition, **Table B** denotes those sites in which the sound level criterion could be exceeded during the HDD operations.

Ref. No.	HDD Crossing	Entry or Exit Site	Closest NSA	Distance & Direction of NSA	Exceed Noise Criterion	Ambient Ldn (dBA)	Sound Level (Ldn) of HDD (dBA)	Ldn of HDD + Ambient (dBA)	Increase Above Ambient (dB)	Reference Noise Analysis Table
#1	Wetland B15-31 HDD	Entry	Residence	600 ft. (NW)	**Yes**	43.3	64.3	64.2	20.9	Table 1 (p. 24)
		Exit	Residence	1,260 ft. (E)	**No**	43.3	43.4	46.4	3.1	Table 2 (p. 24)
#2	Nimisila Reservoir	Entry	Residences	390 ft. (E)	**Yes**	41.6	68.3	68.3	26.7	Table 3 (p. 24)
	HDD	Exit	Residence	850 ft. (NW)	**No**	40.3	47.3	48.1	7.8	Table 4 (p. 25)
#3	Tuscarawas River	Entry	Residence	450 ft. (NW)	**Yes**	42.6	66.9	67.0	24.4	Table 5 (p. 25)
	HDD	Exit	Residence	830 ft. (NW)	**No**	43.3	49.4	50.4	7.1	Table 6 (p. 25)
#4	Wetland C15-44 HDD	Entry	Residence	1,670 ft. (WSW)	**No**	42.3	53.7	54.0	11.7	Table 7 (p. 26)
		Exit	Residence	1,690 ft. (NW)	**No**	49.7	40.4	50.2	0.5	Table 8 (p. 26)
#5	East Branch Black	Entry	Residence	1,010 ft. (W)	**Yes**	41.2	58.0	58.1	16.9	Table 9 (p. 26)
	River HDD	Exit	Residence	1,550 ft. (SSE)	**No**	40.2	45.1	46.3	6.1	Table 10 (p. 27)
#6	West Branch Black	Entry	Residence	630 ft. (NW)	**Yes**	43.6	63.7	63.7	20.1	Table 11 (p. 27)
	River HDD	Exit	Residence	410 ft. (S)	**No**	41.1	53.6	53.9	12.8	Table 12 (p. 27)
#7	Vermilion River HDD	Entry	Residences	460 ft. (NW)	**Yes**	43.0	66.7	66.8	23.8	Table 13 (p. 28)
		Exit	Residence	490 ft. (S)	**No**	44.6	52.7	53.3	8.7	Table 14 (p. 28)
#8	Interstate 80 HDD	Entry	Residence	860 ft. (E)	**Yes**	53.0	60.6	61.3	8.3	Table 15 (p. 28)
		Exit	Residence	740 ft. (W)	**No**	59.6	50.5	60.1	0.5	Table 16 (p. 29)
#9	Huron River HDD	Entry	Residence	590 ft. (NE)	**Yes**	55.8	64.3	64.9	9.1	Table 17 (p. 29)
		Exit	Residence	630 ft. (E)	**No**	56.4	50.3	57.3	0.9	Table 18 (p. 29)
#10	Sandusky River HDD	Entry	Residences	350 ft. (SW)	**Yes**	56.2	69.3	69.5	13.3	Table 19 (p. 30)
		Exit	Residence	1,040 ft. (WNW)	**No**	56.2	45.3	56.5	0.3	Table 20 (p. 30)
#11	Portage River HDD	Entry	Residences	510 ft. (NE)	**Yes**	42.3	65.7	65.8	23.5	Table 21 (p. 30)
		Exit	Residence	400 ft. (SW)	**Yes**	44.1	57.8	58.0	13.9	Table 22 (p. 31)
#12	Findlay Road HDD	Entry	Residence	970 ft. (E)	**Yes**	43.3	59.4	59.5	16.2	Table 23 (p. 31)
		Exit	Residences	360 ft. (SW)	**No**	43.3	54.5	54.9	11.6	Table 24 (p. 31)
#13	Maumee River HDD	Entry	Residences	1,080 ft. (SW)	**Yes**	45.3	58.1	58.5	13.2	Table 25 (p. 32)
		Exit	Residence	1,310 ft. (S)	**No**	43.6	44.8	47.3	3.7	Table 26 (p. 32)
#14	River Raisin HDD	Entry	Residence	540 ft. (NW)	**Yes**	39.4	65.2	65.2	25.8	Table 27 (p. 32)
		Exit	Residence	1,080 ft. (S)	**No**	39.4	45.0	46.0	6.6	Table 28 (p. 33)
#15	Saline River HDD	Entry	Residence	460 ft. (NW)	**Yes**	40.8	66.7	66.7	25.9	Table 29 (p. 33)
		Exit	Residence	720 ft. (S)	**No**	46.3	49.0	50.8	4.5	Table 30 (p. 33)
#16	Hydro Park HDD	Entry	Residences	1,300 ft. (NW)	**No**	49.0	52.5	54.1	5.1	Table 31 (p. 34)
		Exit	Residence	870 ft. (NE)	**No**	53.1	47.1	54.1	1.0	Table 32 (p. 34)
#17	Interstate 94 HDD	Entry	Residence	220 ft. (W)	**Yes**	51.1	75.0	75.1	24.0	Table 33 (p. 34)
		Exit	Residences	250 ft. (NW)	**Yes**	60.6	62.2	64.5	3.9	Table 34 (p. 35)

Table B: Summary of the Estimated Sound Level Contribution of the Planned HDD Sites and assuming that No Additional Noise Mitigation Measures ("Standard HDD Rig/Equipment" Employed).

In summary, the acoustical assessment indicates that the noise of HDD operations at several of the HDD entry and/or HDD exit sites for the planned HDD crossings could exceed the sound level criterion at the closest NSAs if no additional noise mitigation measures are employed.

5.0 NOISE MITIGATION MEASURES/OPTIONS FOR HDDs THAT COULD EXCEED CRITERION

Since the sound criterion could be exceeded if no additional mitigation measures are employed at some HDD entry and exit sites, it is necessary to develop a noise mitigation plan to reduce the noise of the HDD stationary equipment operations. Reducing the noise of mobile equipment is more difficult since mobile equipment may work outside the general HDD workspace. The following summarizes noise mitigation measures/options that could be employed (i.e., primarily at the HDD entry sites).

- Employ a temporary noise barrier (for example, 16 ft. height) around the entry site workspace constructed of 0.75 inch thick plywood panels or constructed of a sound-absorptive/barrier material designed with a septum mass layer with a minimum STC 20–31 rating;
- As an alternative to a workspace barrier, the entry side workspace could be covered with a large acoustically-lined tent (identified as a "noise-reducing tent") designed with sound-absorptive/barrier liner material with a minimum STC 20–31 rating;
- Employ residential–grade exhaust silencers on all engines in conjunction with any of the site HDD equipment (e.g., generators, pumps and hydraulic power unit);
- Partial noise barrier or enclosure around the hydraulic power unit ("HPU") and engine-driven pumps by covering the sides of the equipment with an acoustically-lined plywood barrier system or sound-absorptive/barrier material with a minimum STC 20–31 rating; note that employing a full enclosure for an HPU or other engine-driven pumps can be difficult and expensive due to engine/equipment cooling requirements;
- Employ a partial noise barrier around any engine jacket-water coolers;
- Install a partial barrier or partial enclosure around the mud mixing/cleaning system;
- Relocate specific equipment (e.g., remotely relocate mud rig);
- Employ low-noise generators, which are designed with a factory-installed enclosure;
- As an alternative to noise mitigation at NSA(s) that are relatively close to the HDD sites, sometimes temporary housing or equivalent monetary compensation could be discussed and/or offered to the affected landowners.
- For an HDD exit site in which the sound criterion could be exceeded, employ a temporary noise barrier at the workspace (between site equipment and closest NSAs), since an exit site includes mostly mobile equipment;

For the HDD sites in which the sound criterion could be exceeded with no additional noise mitigation, the following **Table C** summarizes the projected sound level of HDD operations at the closest NSAs for the HDD sites in which additional noise mitigation measures are assumed to be employed to meet the sound criterion. Additional noise mitigation measures that were assumed for each specific HDD site are summarized in the respective noise analysis tables, which are referenced in **Table C**.

Ref. No.	HDD Crossing	Entry or Exit Site	Closest NSA	Distance & Direction of NSA	Ambient Ldn (dBA)	Sound Level (Ldn) of HDD (dBA)	Ldn of HDD + Ambient (dBA)	Increase Above Ambient (dB)	Reference Noise Analysis Table
#1	Wetland B15-31 HDD	Entry	Residence	600 ft. (NW)	43.3	52.1	52.7	9.4	Table 1 (p. 24)
#2	Nimisila Reservoir HDD	Entry	Residences	390 ft. (E)	41.6	54.0	54.3	12.7	Table 3 (p. 24)
#3	Tuscarawas River HDD	Entry	Residence	450 ft. (NW)	42.6	53.5	53.8	11.2	Table 5 (p. 25)
#5	E. Branch Black River HDD	Entry	Residence	1,010 ft. (W)	41.2	49.6	50.2	9.0	Table 9 (p. 26)
#6	W. Branch Black River HDD	Entry	Residence	630 ft. (NW)	43.6	49.7	50.7	7.1	Table 11 (p. 27)
#7	Vermilion River HDD	Entry	Residences	460 ft. (NW)	43.0	54.3	54.6	11.6	Table 13 (p. 28)
#8	Interstate 80 HDD	Entry	Residence	860 ft. (E)	53.0	47.7	54.1	1.1	Table 15 (p. 28)
#9	Huron River HDD	Entry	Residence	590 ft. (NE)	55.8	52.3	57.4	1.6	Table 17 (p. 29)
#10	Sandusky River HDD	Entry	Residences	350 ft. (SW)	56.2	53.3	58.0	1.8	Table 19 (p. 30)
#11	Portage River HDD	Entry	Residences	510 ft. (NE)	42.3	53.7	54.0	11.7	Table 21 (p. 30)
#11	Portage River HDD	Exit	Residence	400 ft. (SW)	44.1	49.0	50.2	6.1	Table 22 (p. 31)
#12	Findlay Road HDD	Entry	Residence	970 ft. (E)	43.3	49.5	50.5	7.2	Table 23 (p. 31)
#13	Maumee River HDD	Entry	Residences	1,080 ft. (SW)	45.3	48.7	50.3	5.0	Table 25 (p. 32)
#14	River Raisin HDD	Entry	Residence	540 ft. (NW)	39.4	53.1	53.3	13.9	Table 27 (p. 32)
#15	Saline River HDD	Entry	Residence	460 ft. (NW)	40.8	51.1	51.5	10.7	Table 29 (p. 33)
#17	Interstate 94 HDD	Entry	Residence	220 ft. (W)	51.1	53.3	55.3	4.2	Table 33 (p. 34)
#17	Interstate 94 HDD	Exit	Residences	250 ft. (NW)	60.6	50.1	61.0	0.4	Table 34 (p. 35)

Table C: Summary of the Estimated Sound Contribution of HDD Operations at the Closest NSA(s) assuming that Noise Mitigation Measures are employed to meet the Sound Criterion.

In addition to additional noise mitigation measures, nearby NSAs will be notified in advance of planned nighttime construction activities, advising them that noise-generating equipment may be operated during nighttime hours. Since mitigated noise levels attributable to HDD are anticipated to be below the FERC sound criterion at any NSAs, overnight construction, if necessary, is not expected to create significant impacts on surrounding NSAs. If the noise levels cannot be reduced to target levels, then temporary housing could be offered to the occupants of affected NSAs in the Project area until the construction activities are completed.

6.0 SUMMARY AND FINAL COMMENT

The acoustical assessment indicates that the noise attributable to the HDD operations at some of the HDD entry and exit sites associated with the pipeline construction for the **NEXUS Project** could exceed the sound level guideline of **55 dBA** (Ldn) at the closest NSAs. As a result, feasible noise mitigation measures are discussed to reduce the noise impact of HDD activities. As a result, if adequate noise mitigations are successfully employed, the sound level due to HDD operations at the HDD construction sites should not exceed **55 dBA** (Ldn) at the nearby NSAs, which is the FERC sound level guideline for project HDD operations. After the exact location of all HDD sites have been confirmed and an HDD contractor has been chosen, it is anticipated that site-specific noise mitigation measures will evaluated for those HDD sites which could exceed the sound level guideline.

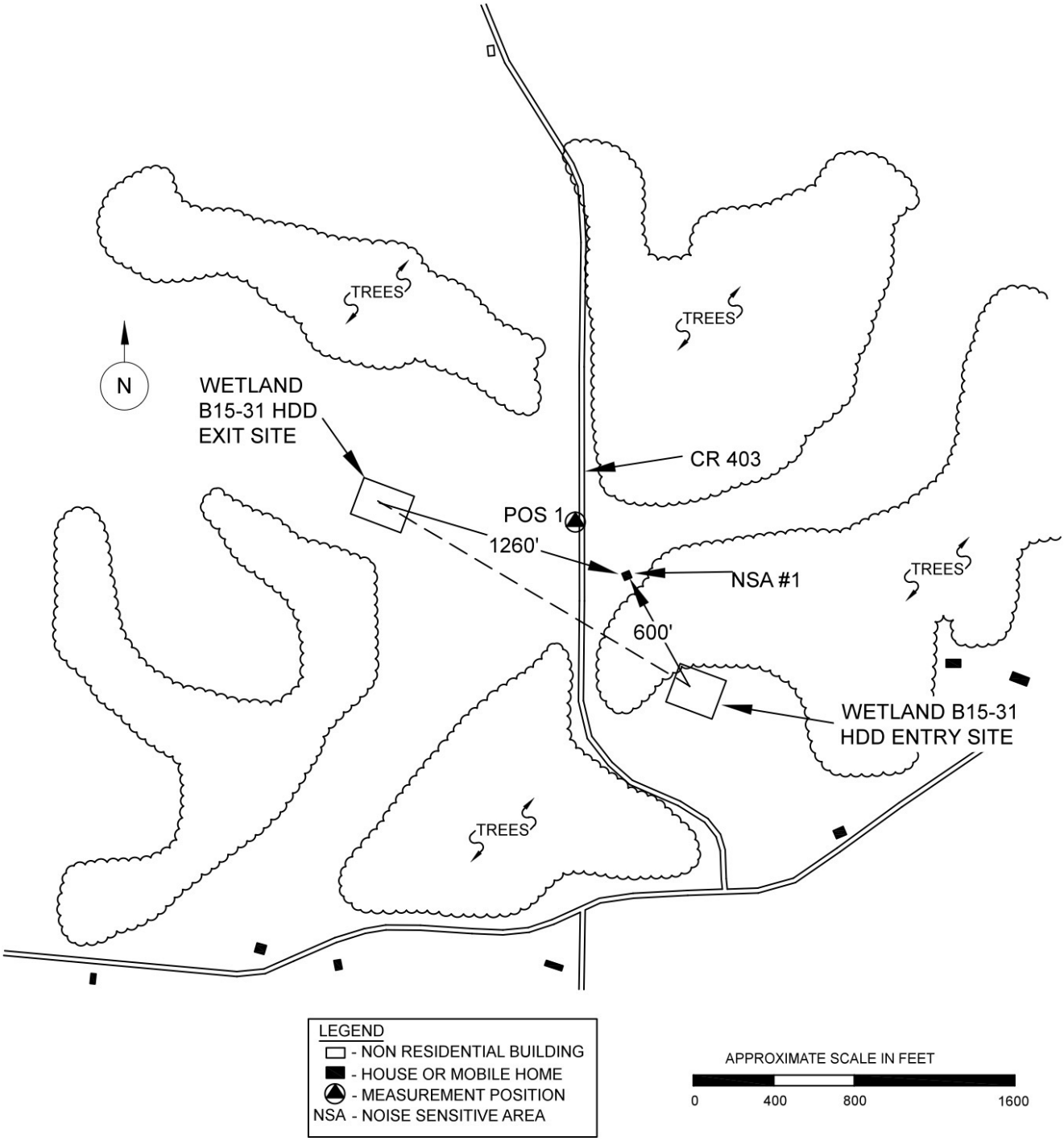

Figure 1: NEXUS Project [HDD #1 (Wetland B15-31 HDD Crossing)]: Area Layout showing the HDD Crossing, HDD Entry/Exit Locations and nearby NSA(s).

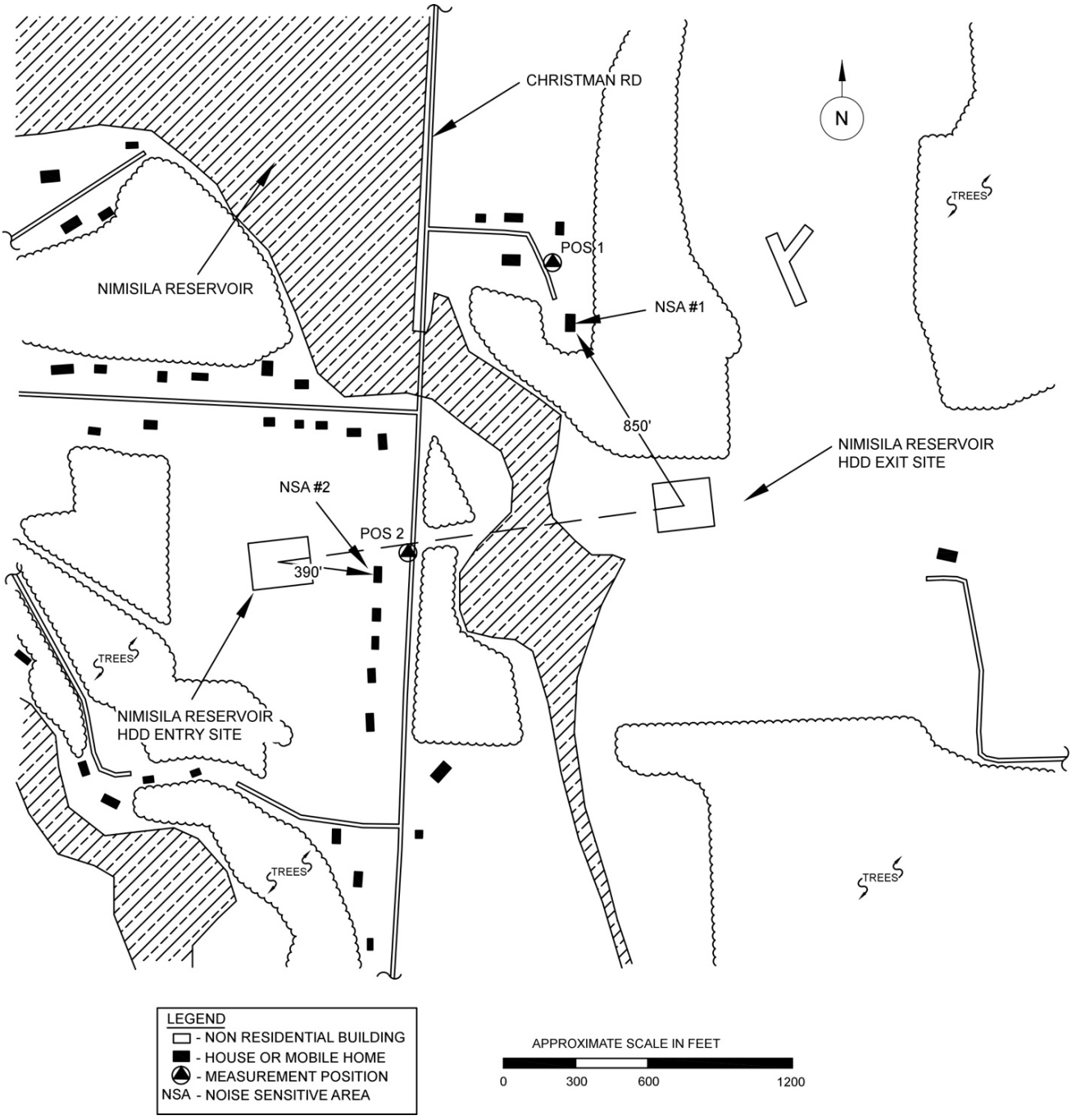

Figure 2: NEXUS Project [HDD #2 (Nimisila Reservoir HDD Crossing)]: Area Layout showing the HDD Crossing, HDD Entry/Exit Locations and nearby NSA(s).

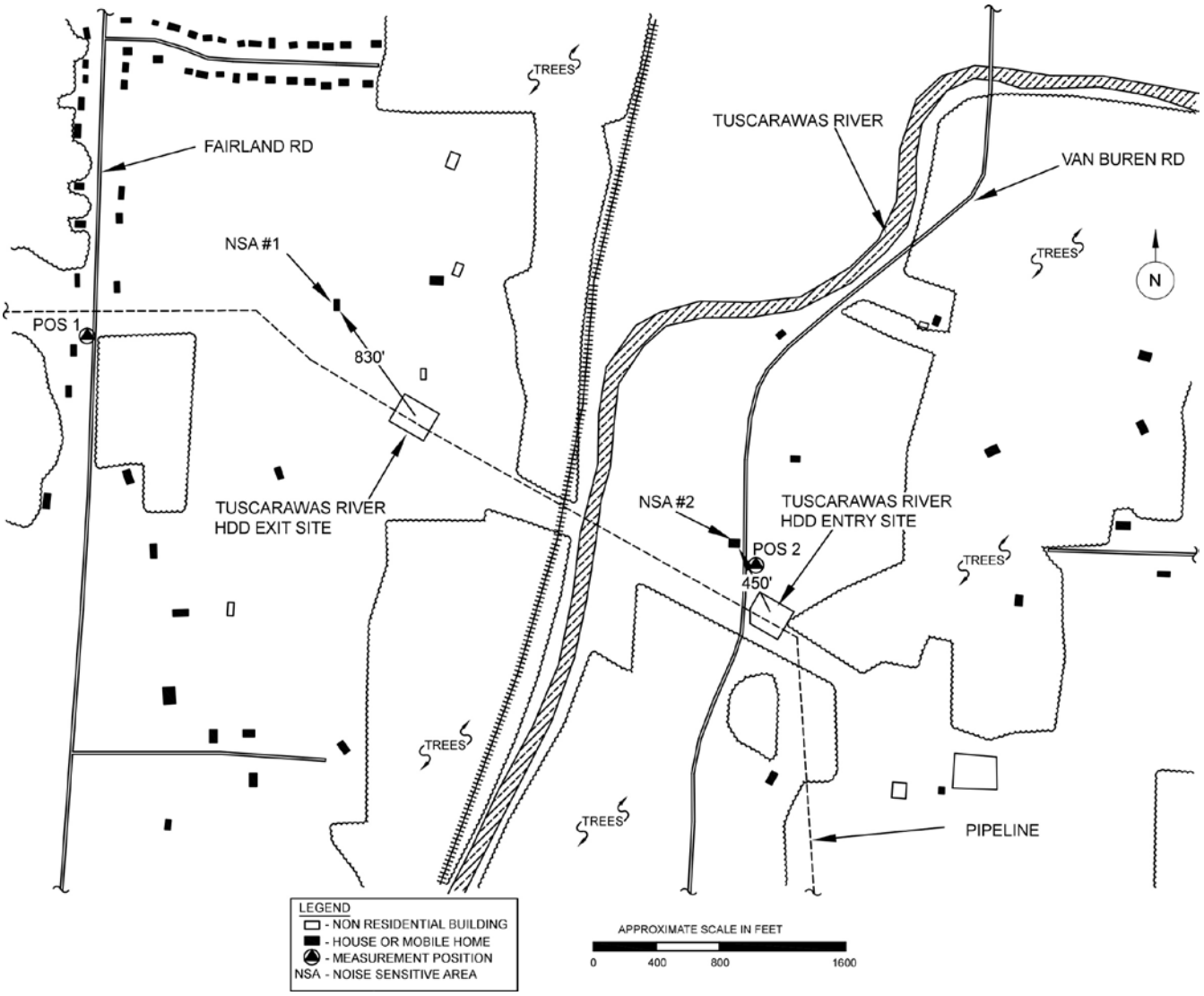

Figure 3: NEXUS Project [HDD #3 (Tuscarawas River HDD Crossing)]: Area Layout showing the HDD Crossing, HDD Entry/Exit Locations and nearby NSA(s).

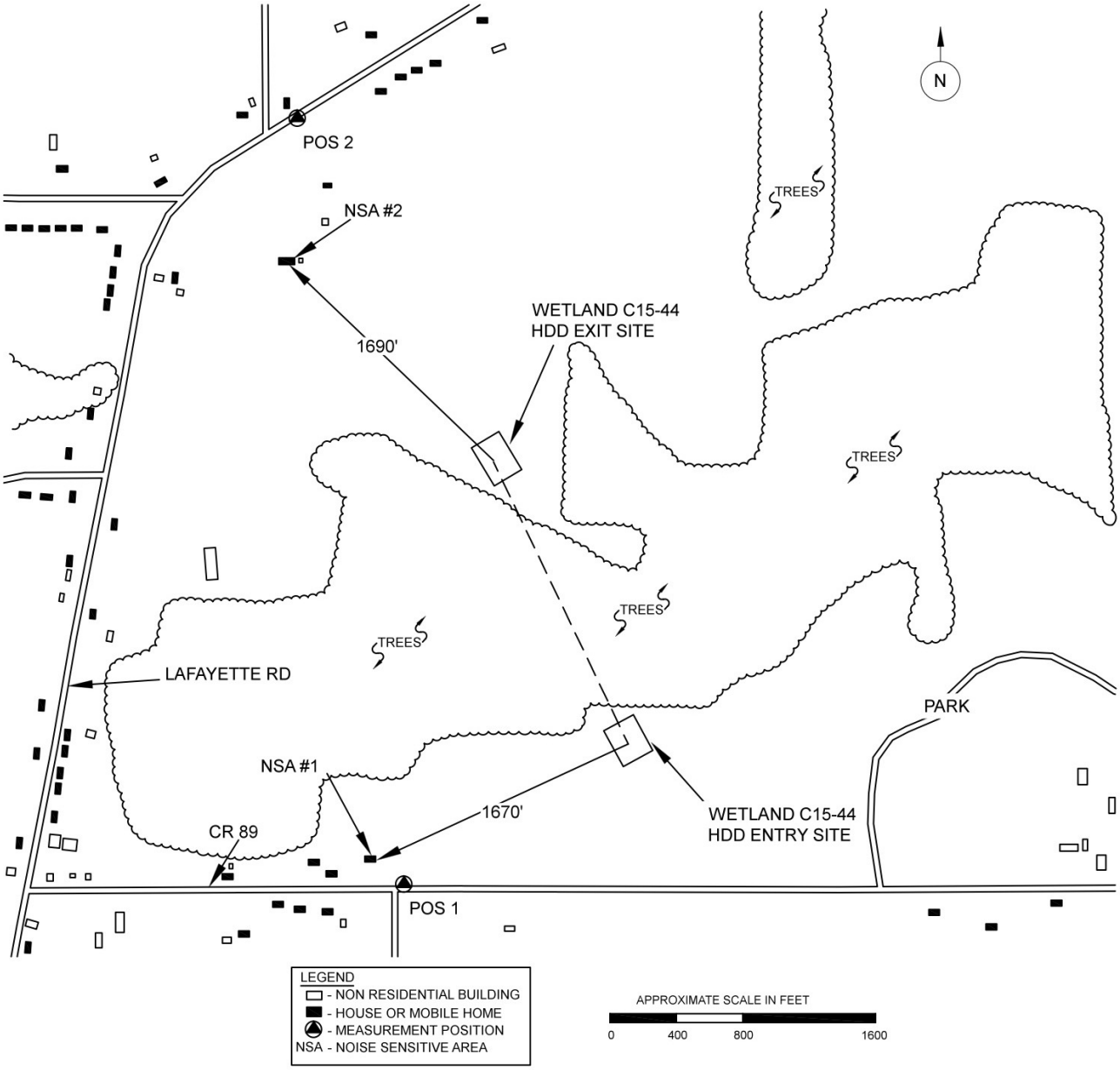

Figure 4: NEXUS Project [HDD #4 (Wetland C15-44 HDD Crossing)]: Area Layout showing the HDD Crossing, HDD Entry/Exit Locations and nearby NSA(s).

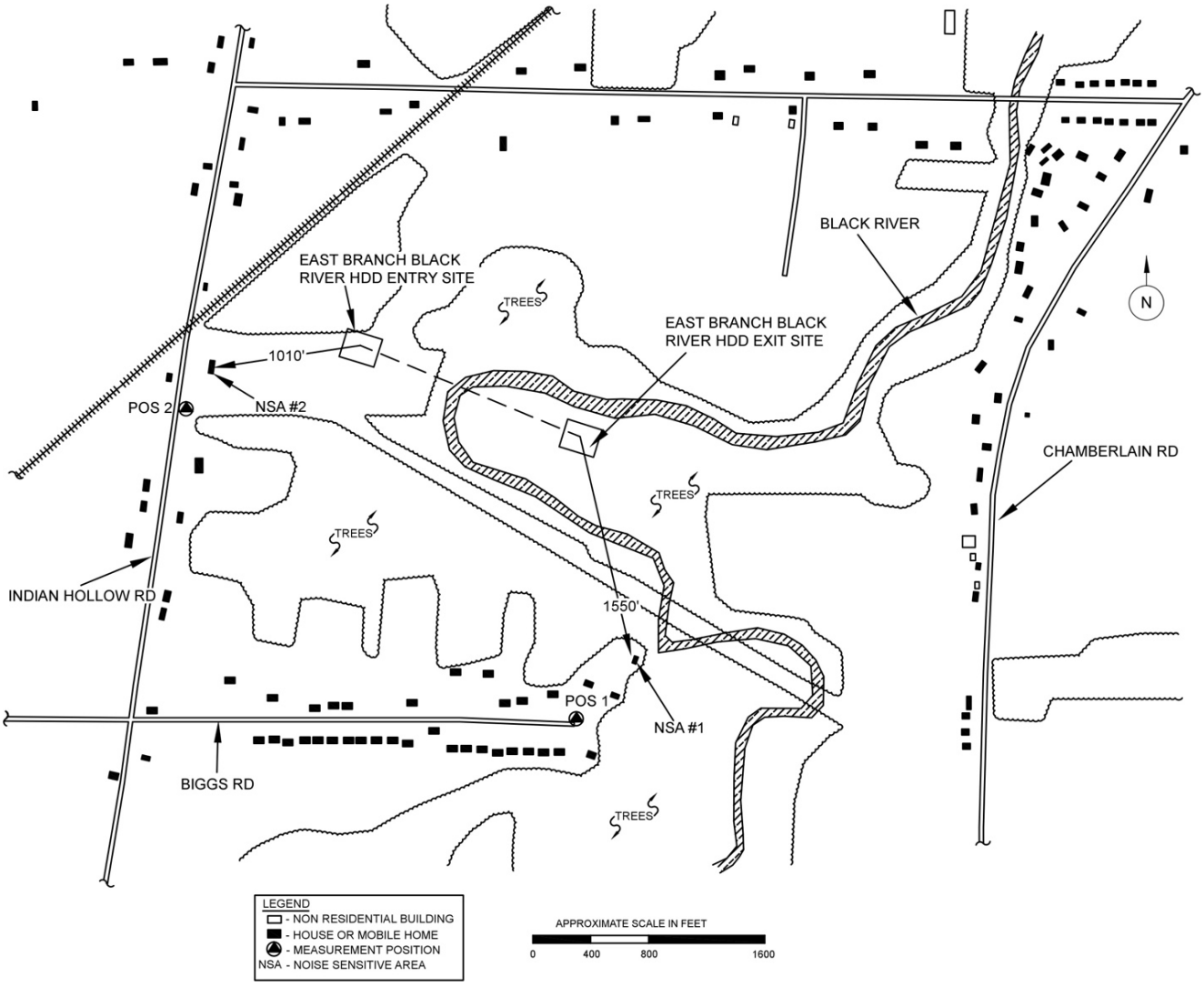

Figure 5: NEXUS Project [HDD #5 (East Branch Black River HDD Crossing)]: Area Layout showing the HDD Crossing, HDD Entry/Exit Locations and nearby NSA(s).

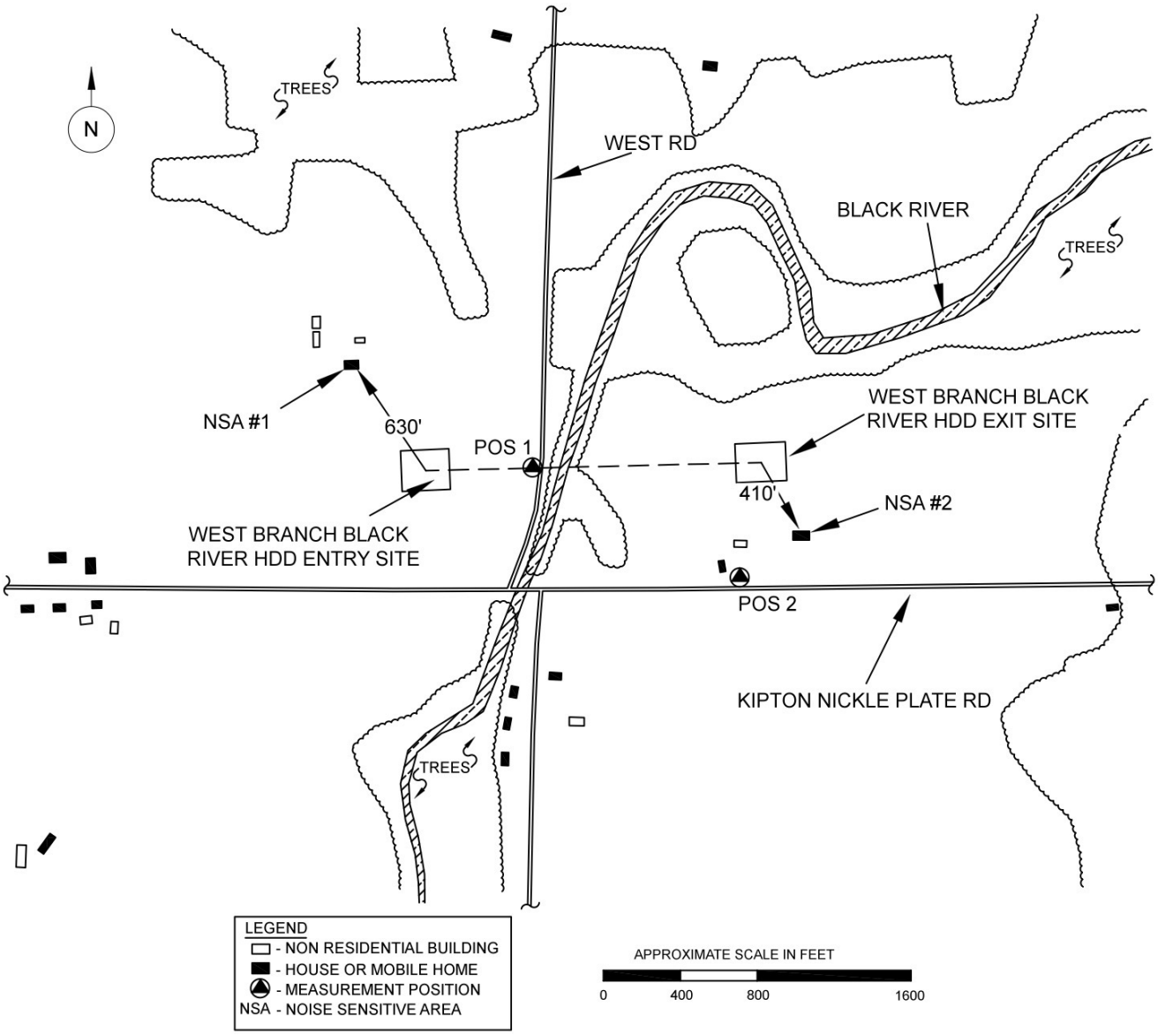

Figure 6: NEXUS Project (HDD #6 (West Branch Black River HDD Crossing)]: Area Layout showing the HDD Crossing, HDD Entry/Exit Locations and nearby NSA(s).

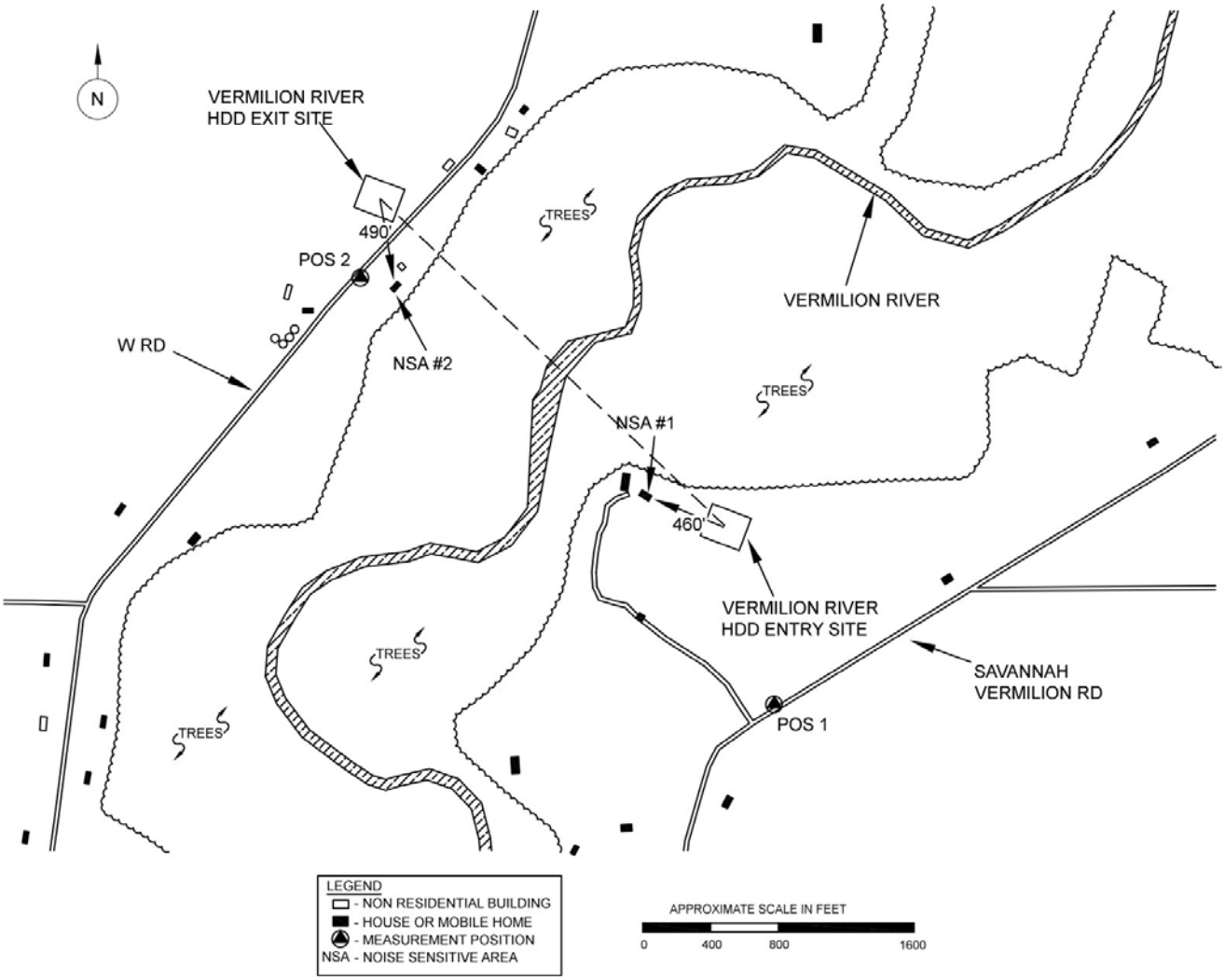

Figure 7: NEXUS Project [HDD #7 (Vermilion River HDD Crossing)]: Area Layout showing the HDD Crossing, HDD Entry/Exit Locations and nearby NSA(s).

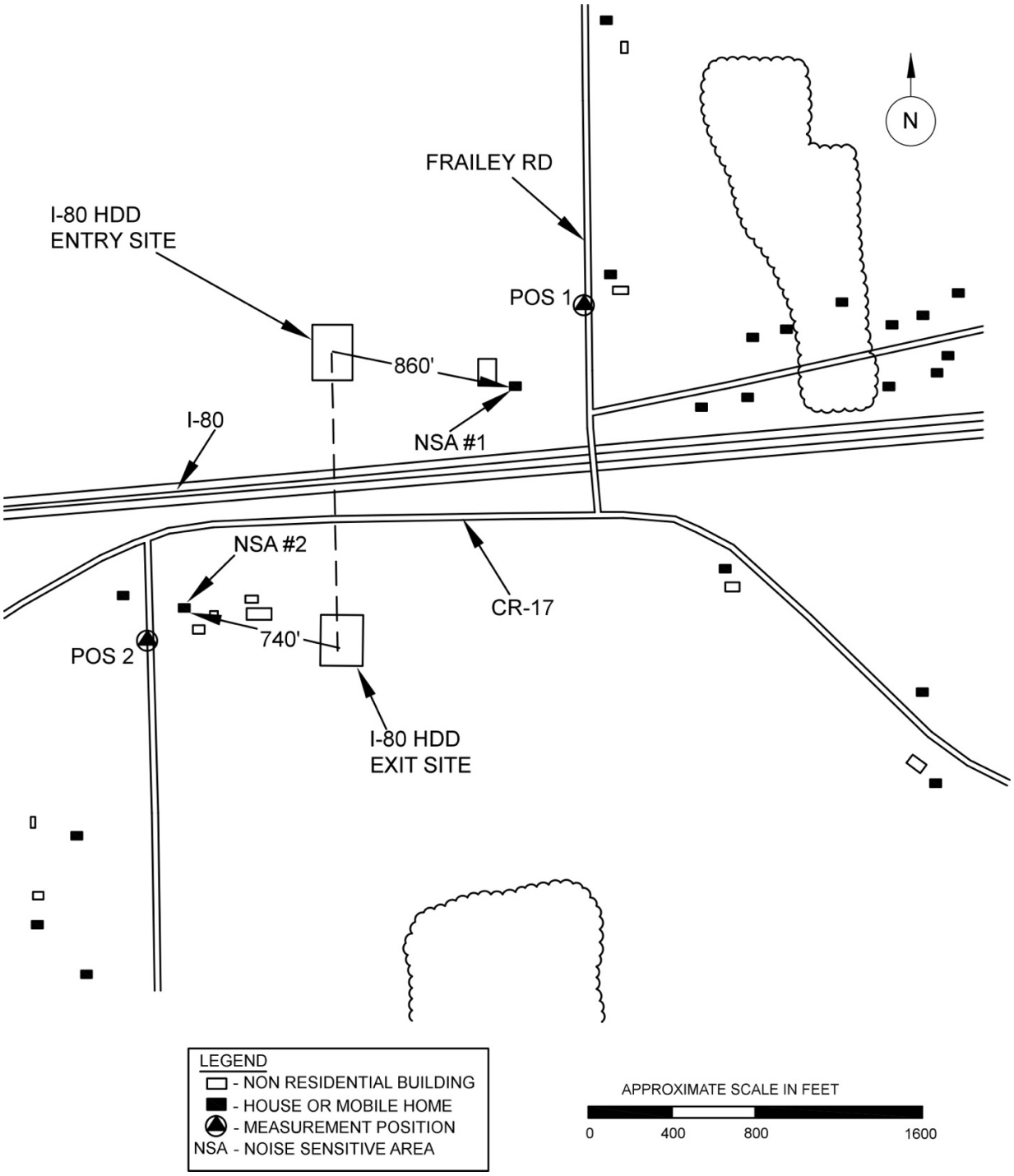

Figure 8: NEXUS Project [HDD #8 (Interstate 80 HDD Crossing)]: Area Layout showing the HDD Crossing, HDD Entry/Exit Locations and nearby NSA(s).

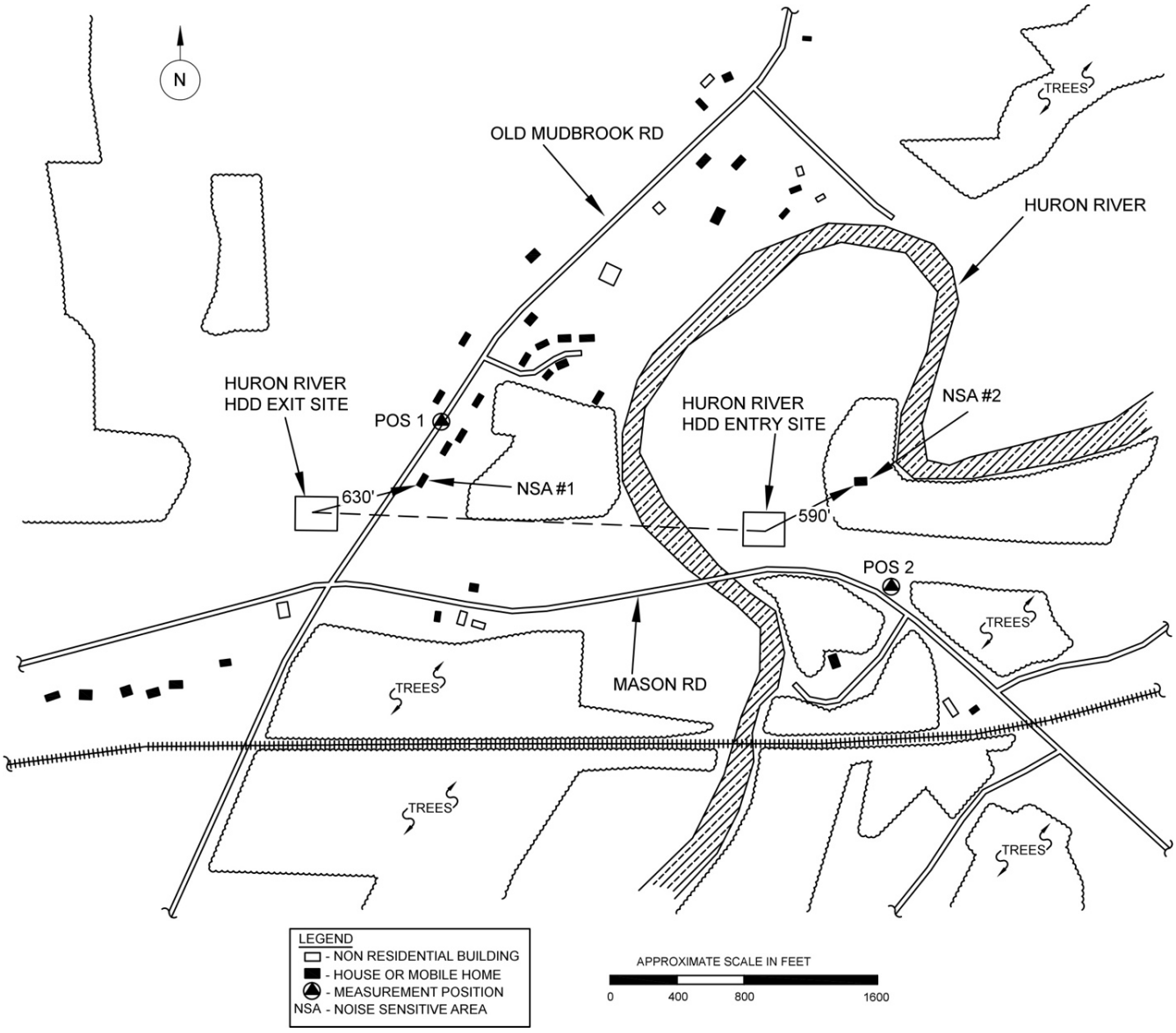

Figure 9: NEXUS Project [HDD #9 (Huron River HDD Crossing)]: Area Layout showing the HDD Crossing, HDD Entry/Exit Locations and nearby NSA(s).

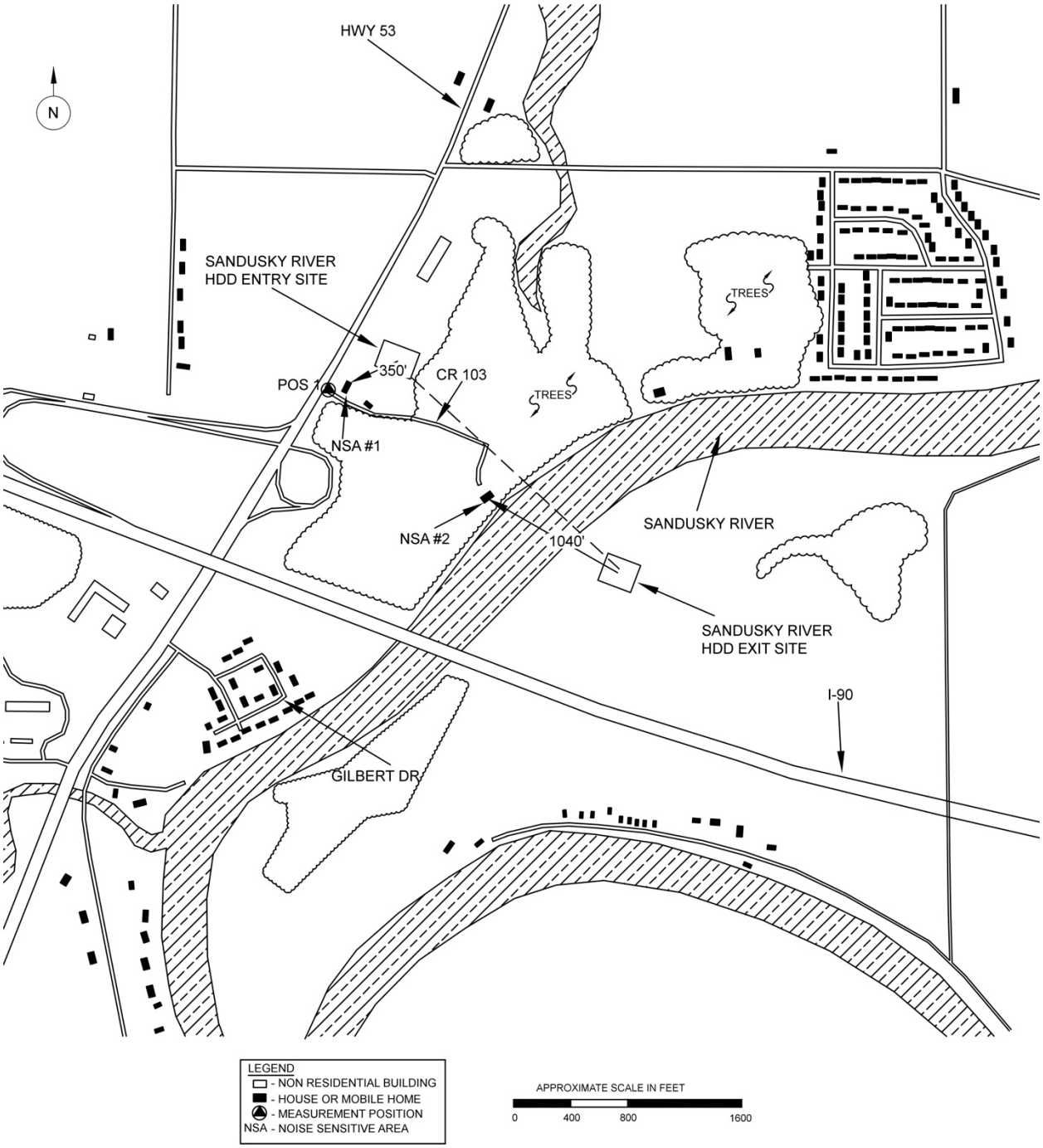

Figure 10: NEXUS Project [HDD #10 (Sandusky River HDD Crossing)]: Area Layout showing the HDD Crossing, HDD Entry/Exit Locations and nearby NSA(s).

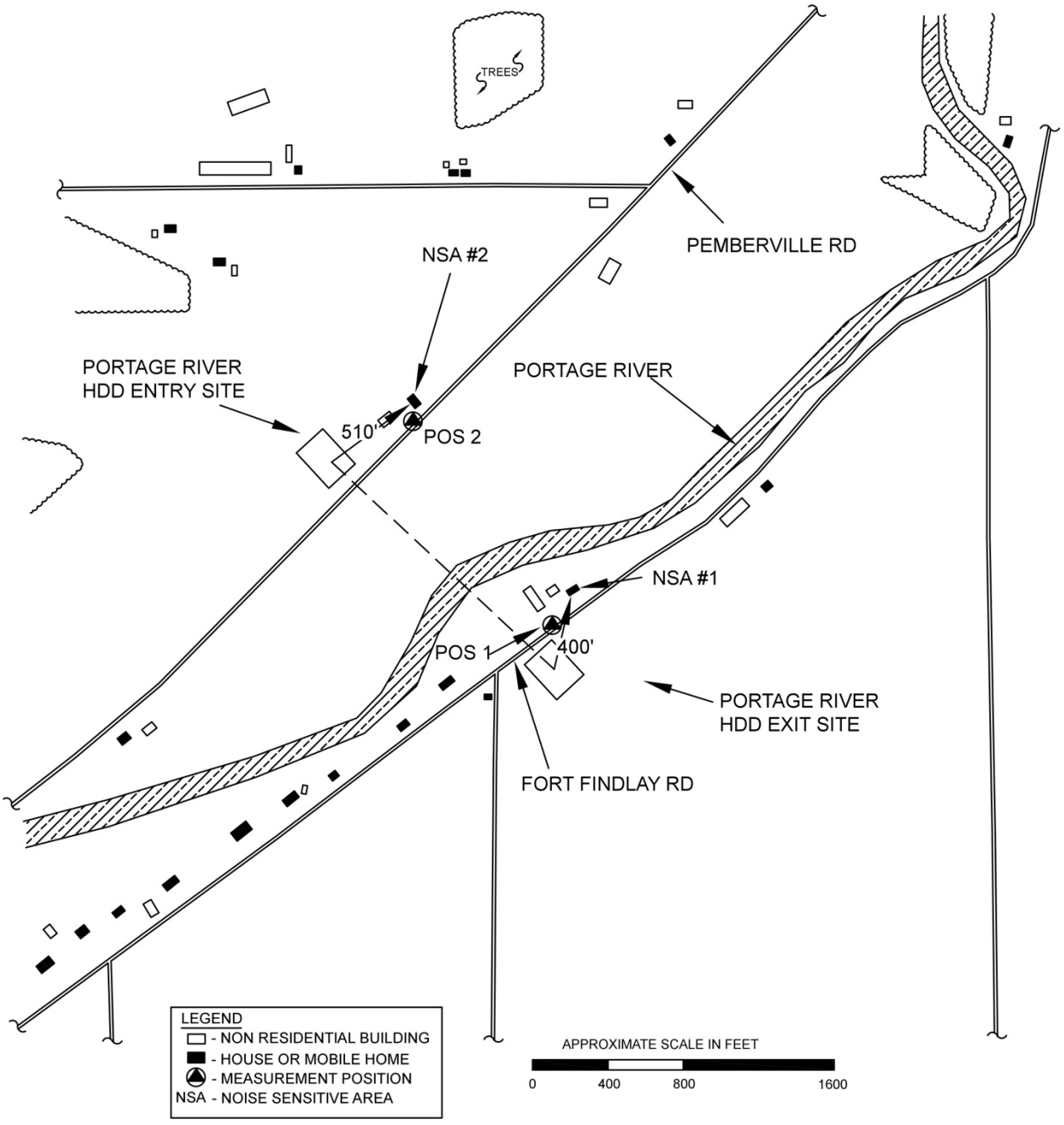

Figure 11: NEXUS Project [HDD #11 (Portage River HDD Crossing)]: Area Layout showing the HDD Crossing, HDD Entry/Exit Locations and nearby NSA(s).

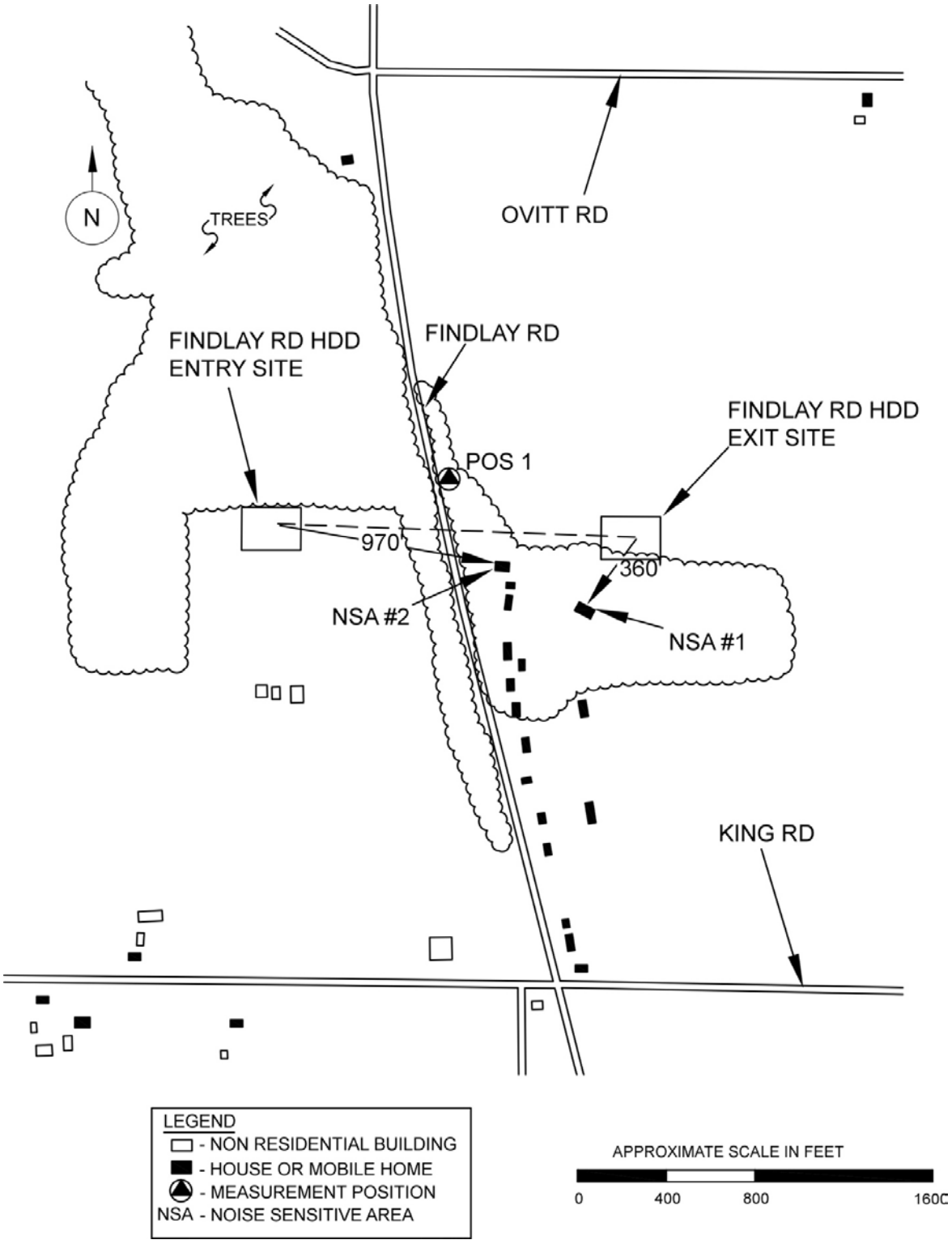

Figure 12: NEXUS Project [HDD #12 (Findlay Road HDD Crossing)]: Area Layout showing the HDD Crossing, HDD Entry/Exit Locations and nearby NSA(s).

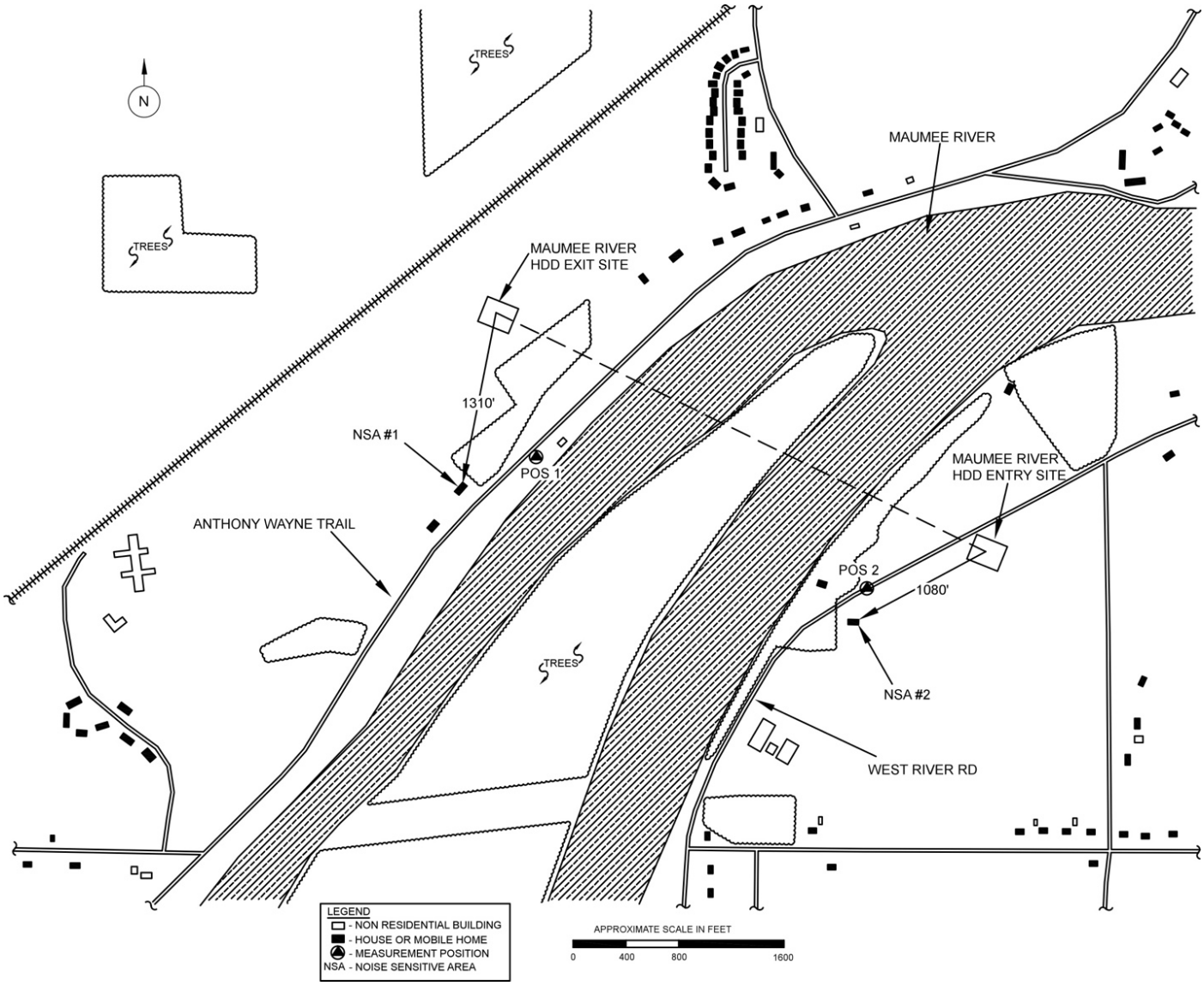

Figure 13: NEXUS Project [HDD #13 (Maumee River HDD Crossing)]: Area Layout showing the HDD Crossing, HDD Entry/Exit Locations and nearby NSA(s).

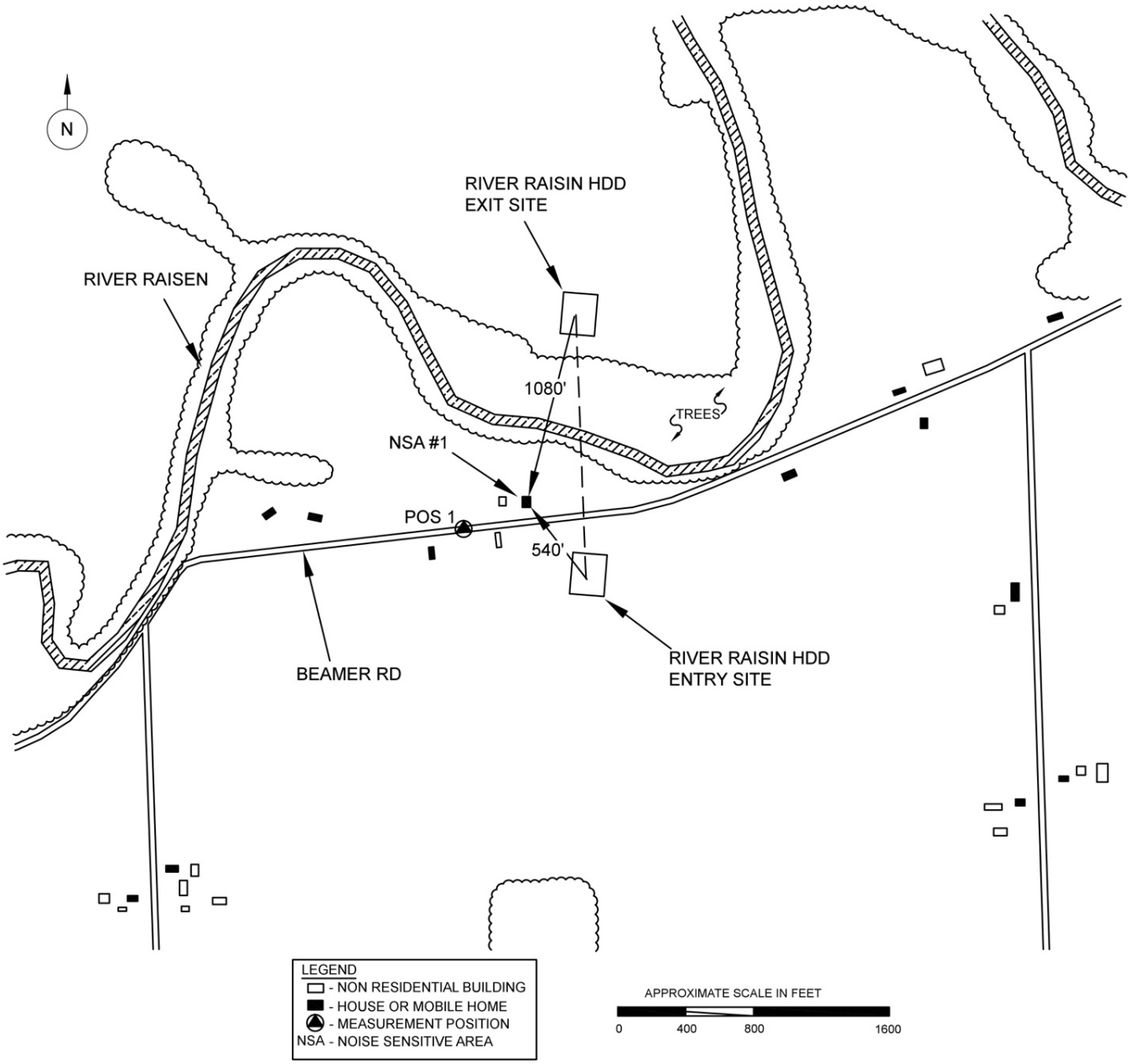

Figure 14: NEXUS Project [HDD #14 (River Raisin HDD Crossing)]: Area Layout showing the HDD Crossing, HDD Entry/Exit Locations and nearby NSA(s).

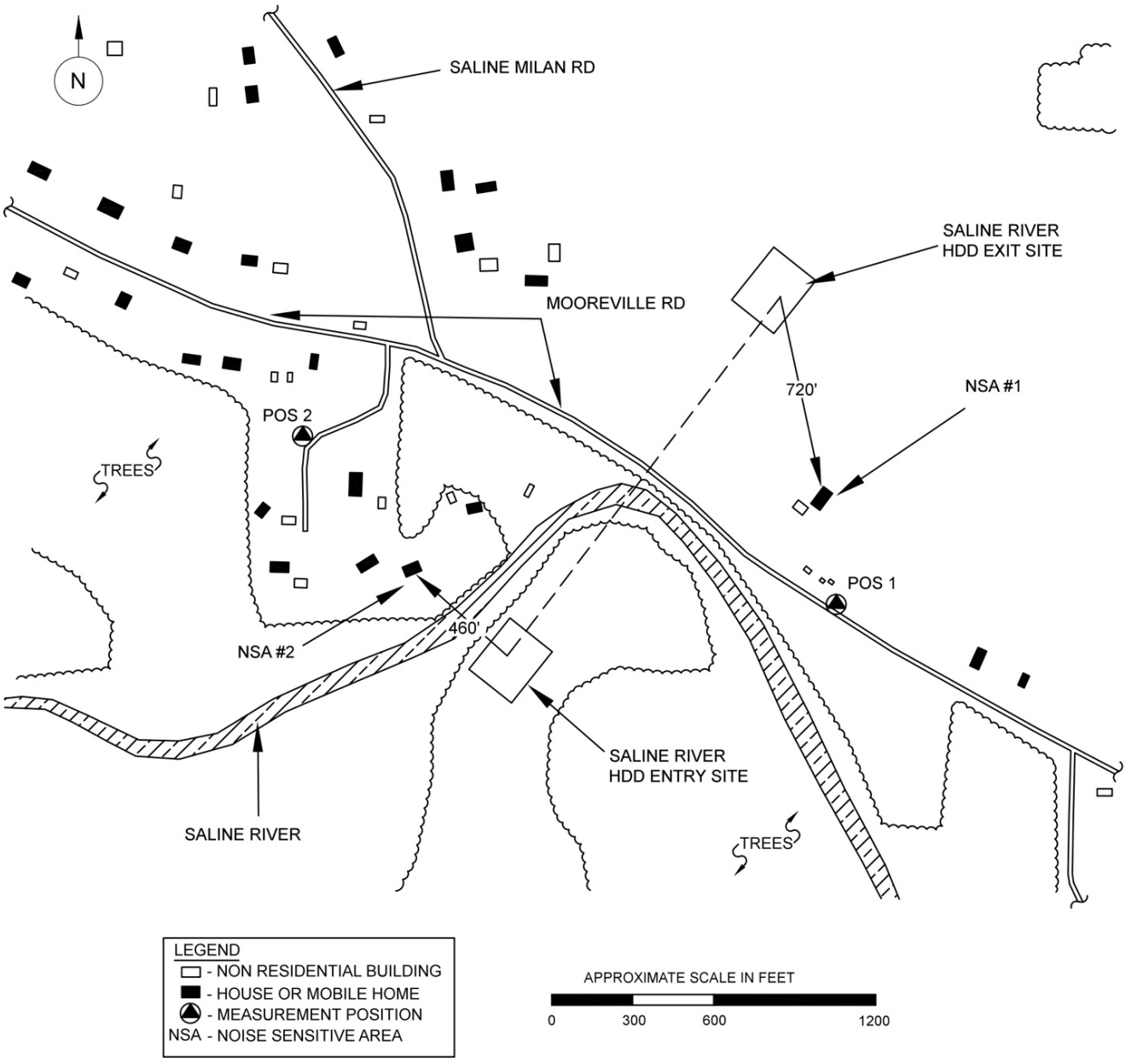

Figure 15: NEXUS Project [HDD #15 (Saline River HDD Crossing)]: Area Layout showing the HDD Crossing, HDD Entry/Exit Locations and nearby NSA(s).

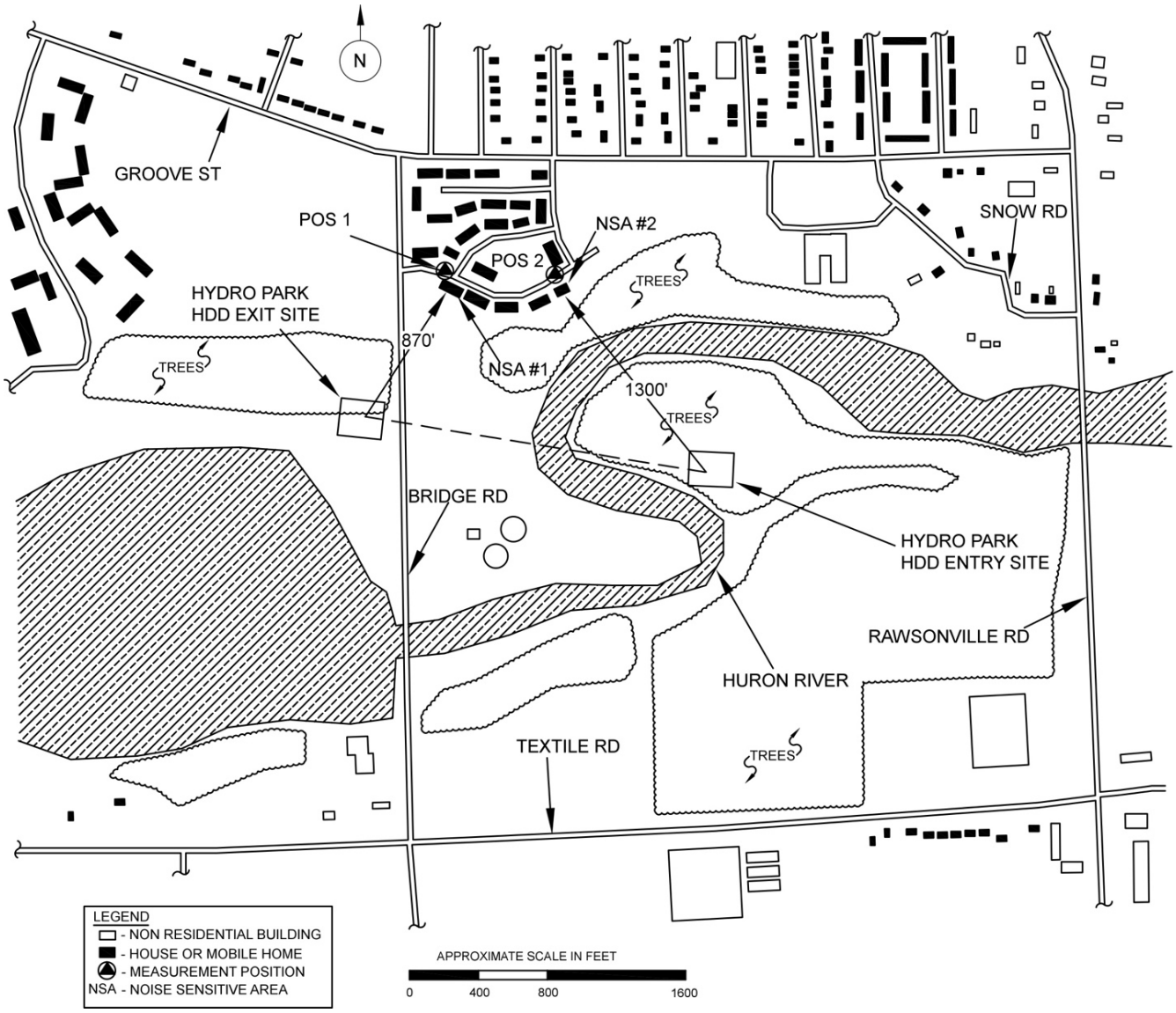

Figure 16: NEXUS Project [HDD #16 (Hydro Park HDD Crossing)]: Area Layout showing the HDD Crossing, HDD Entry/Exit Locations and nearby NSA(s).

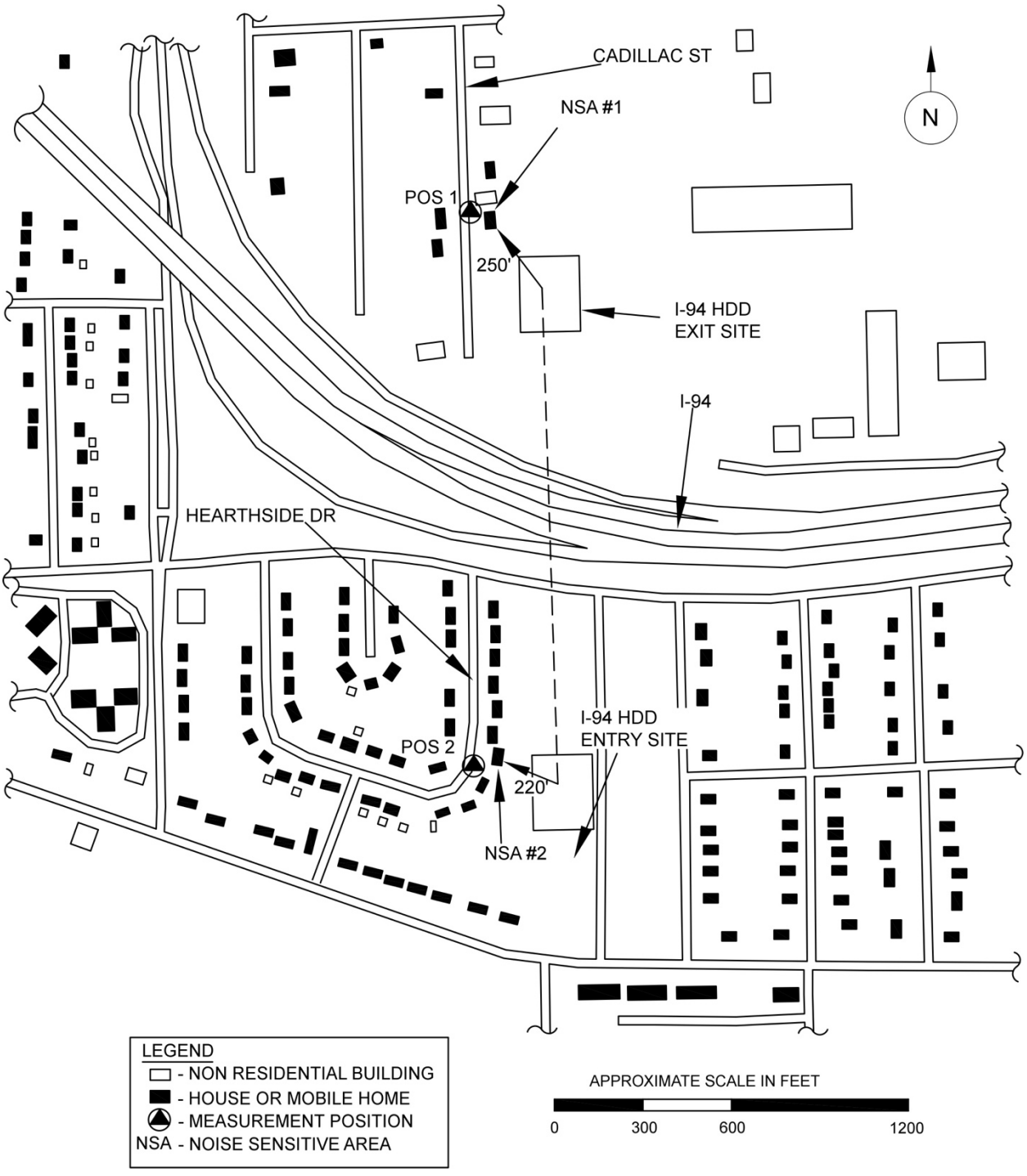

Figure 17: NEXUS Project [HDD #17 (Interstate 94 HDD Crossing)]: Area Layout showing the HDD Crossing, HDD Entry/Exit Locations and nearby NSA(s).

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Entry Point	118	115	112	114	112	109	108	106	98	115	
	Attenuation by Obstructions and/or Land Contour	0	0	0	-1	-2	-3	-4	-5	-5		
600	Hemispherical Radiation	-53	-53	-53	-53	-53	-53	-53	-53	-53		Calc'd
600	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-2	-5	-8		Ldn
Est'd Total Sound Contribution with No Additional NC		**65**	**62**	**59**	**59**	**56**	**52**	**48**	**43**	**31**	**57.8**	**64.2**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									43.3
			Sound Contribution of HDD plus Ambient Level (dBA)									64.2
				Potential Increase above the Ambient Level (dB)								20.9
Attenuation due to Added Noise Mitigation Measures		-3	-6	-8	-10	-12	-14	-15	-16	-16		
Est'd Sound Level of HDD + Added Mitigation Measures		62	56	51	49	44	38	33	27	15	**45.7**	**52.1**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									43.3
			Sound Contribution of HDD plus Ambient Level (dBA)									52.7
				Potential Increase above the Ambient Level (dB)								9.4

Table 1: Nexus Gas Transmission Project [HDD #1 (Wetland B15-31 HDD) Entry Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 600 Ft. NW of the Entry Site). Includes the Est'd Sound Level if Additional Mitigation Measures are Employed such as a Temporary Noise Barrier for Hydraulic Power Unit and Engine-Driven Equipment, and "Low-Noise" Generators.

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Exit Point	110	108	105	102	100	98	95	92	88	103	
	Attenuation by Obstructions and/or Land Contour	0	0	-1	-3	-4	-5	-6	-7	-7		
1260	Hemispherical Radiation	-60	-60	-60	-60	-60	-60	-60	-60	-60		Calc'd
1260	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-1	-1	-3	-5	-10	-18		Ldn
Est'd Total Sound Contribution with No Additional NC		**50**	**48**	**44**	**39**	**35**	**31**	**24**	**15**	**4**	**37.0**	**43.4**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									43.3
			Sound Contribution of HDD plus Ambient Level (dBA)									46.4
				Potential Increase above the Ambient Level (dB)								3.1

Table 2: Nexus Gas Transmission Project [HDD #1 (Wetland B15-31 HDD) Exit Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 1,260 Ft. East of the Exit Site).

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Entry Point	118	115	112	114	112	109	108	106	98	115	
	Attenuation by Obstructions and/or Land Contour	0	0	0	-1	-2	-3	-4	-5	-5		
390	Hemispherical Radiation	-50	-50	-50	-50	-50	-50	-50	-50	-50		Calc'd
390	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-2	-3	-5		Ldn
Est'd Total Sound Contribution with No Additional NC		**68**	**65**	**62**	**63**	**60**	**56**	**53**	**48**	**38**	**61.9**	**68.3**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									41.6
			Sound Contribution of HDD plus Ambient Level (dBA)									68.3
				Potential Increase above the Ambient Level (dB)								26.7
Attenuation due to Added Noise Mitigation Measures		-3	-8	-10	-12	-14	-16	-18	-20	-20		
Est'd Sound Level of HDD + Added Mitigation Measures		65	57	52	51	46	40	35	28	18	**47.6**	**54.0**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									41.6
			Sound Contribution of HDD plus Ambient Level (dBA)									54.3
				Potential Increase above the Ambient Level (dB)								12.7

Table 3: Nexus Gas Transmission Project [HDD #2 (Nimisila Reservoir HDD) Entry Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 390 Ft. East of the Entry Site). Includes the Est'd Sound Level if Additional Mitigation Measures are Employed such as a Temporary Noise Barrier for Hydraulic Power Unit and Engine-Driven Equipment, and "Low-Noise" Generators.

Notes: Est'd sound power level ("PWL") of HDD operation based on field tests by H&K on similar type of HDD rigs anticipated for this pipeline system. Est'd PWL at HDD exit site should be typically 12 to 14 dB lower than PWL at HDD entry site.

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Exit Point	110	108	105	102	100	98	95	92	88	103	
	Attenuation by Obstructions and/or Land Contour	0	0	-1	-3	-4	-5	-6	-7	-7		
850	Hemispherical Radiation	-56	-56	-56	-56	-56	-56	-56	-56	-56		Calc'd
850	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	-1	-2	-3	-7	-12		Ldn
Est'd Total Sound Contribution with No Additional NC		**54**	**52**	**48**	**42**	**39**	**35**	**29**	**22**	**13**	**40.9**	**47.3**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									40.3
			Sound Contribution of HDD plus Ambient Level (dBA)									48.1
				Potential Increase above the Ambient Level (dB)								7.8

Table 4: Nexus Gas Transmission Project [HDD #2 (Nimisila Reservoir HDD) Exit Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 850 Ft. NW of the Exit Site).

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Entry Point	118	115	112	114	112	109	108	106	98	115	
	Attenuation by Obstructions and/or Land Contour	0	0	0	-1	-2	-3	-4	-5	-5		
450	Hemispherical Radiation	-51	-51	-51	-51	-51	-51	-51	-51	-51		Calc'd
450	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-2	-4	-6		Ldn
Est'd Total Sound Contribution with No Additional NC		**67**	**64**	**61**	**62**	**59**	**54**	**51**	**47**	**36**	**60.5**	**66.9**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									42.6
			Sound Contribution of HDD plus Ambient Level (dBA)									67.0
				Potential Increase above the Ambient Level (dB)								24.4
Attenuation due to Added Noise Mitigation Measures		-3	-6	-9	-11	-14	-15	-16	-18	-18		
Est'd Sound Level of HDD + Added Mitigation Measures		64	58	52	51	45	39	35	29	18	**47.1**	**53.5**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									42.6
			Sound Contribution of HDD plus Ambient Level (dBA)									53.8
				Potential Increase above the Ambient Level (dB)								11.2

Table 5: NEXUS Gas Transmission Project [HDD #3 (Tuscarawas River HDD) Entry Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 450 Ft. NW of the Entry Site). Includes the Est'd Sound Level if Additional Mitigation Measures are Employed such as a Temporary Noise Barrier for Hydraulic Power Unit and Engine-Driven Equipment, and "Low-Noise" Generators.

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Exit Point	110	108	105	102	100	98	95	92	88	103	
	Attenuation by Obstructions and/or Land Contour	0	0	0	-1	-2	-3	-4	-5	-5		
830	Hemispherical Radiation	-56	-56	-56	-56	-56	-56	-56	-56	-56		Calc'd
830	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	-1	-2	-3	-7	-12		Ldn
Est'd Total Sound Contribution with No Additional NC		**54**	**52**	**49**	**45**	**41**	**37**	**32**	**24**	**15**	**43.0**	**49.4**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									43.3
			Sound Contribution of HDD plus Ambient Level (dBA)									50.4
				Potential Increase above the Ambient Level (dB)								7.1

Table 6: NEXUS Gas Transmission Project [HDD #3 (Tuscarawas River HDD) Exit Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 830 Ft. NW of the Exit Site).

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Entry Point	118	115	112	114	112	109	108	106	98	115	
	Attenuation by Obstructions and/or Land Contour	0	0	0	-1	-2	-3	-4	-5	-5		
1670	Hemispherical Radiation	-62	-62	-62	-62	-62	-62	-62	-62	-62		Calc'd
1670	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-1	-1	-3	-7	-13	-23		Ldn
Est'd Total Sound Contribution with No Additional NC		**56**	**53**	**50**	**50**	**47**	**41**	**35**	**25**	**7**	**47.3**	**53.7**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									42.3
			Sound Contribution of HDD plus Ambient Level (dBA)									54.0
				Potential Increase above the Ambient Level (dB)								11.7

Table 7: NEXUS Gas Transmission Project [HDD #4 (Wetland C15-44 HDD) Entry Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 1,670 Ft. WSW of the Entry Site).

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Exit Point	110	108	105	102	100	98	95	92	88	103	
	Attenuation by Obstructions and/or Land Contour	0	0	-1	-3	-4	-5	-6	-7	-7		
1690	Hemispherical Radiation	-62	-62	-62	-62	-62	-62	-62	-62	-62		Calc'd
1690	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-1	-1	-3	-7	-14	-24		Ldn
Est'd Total Sound Contribution with No Additional NC		**48**	**46**	**41**	**36**	**32**	**27**	**20**	**9**	**0**	**34.0**	**40.4**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									49.7
			Sound Contribution of HDD plus Ambient Level (dBA)									50.2
				Potential Increase above the Ambient Level (dB)								0.5

Table 8: NEXUS Gas Transmission Project [HDD #4 (Wetland C15-44 HDD) Exit Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 1,690 Ft. NW of the Exit Site).

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Entry Point	118	115	112	114	112	109	108	106	98	115	
	Attenuation by Obstructions and/or Land Contour	0	0	-1	-2	-3	-4	-5	-6	-6		
1010	Hemispherical Radiation	-58	-58	-58	-58	-58	-58	-58	-58	-58		Calc'd
1010	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-1	-1	-2	-4	-8	-14		Ldn
Est'd Total Sound Contribution with No Additional NC		**60**	**57**	**53**	**54**	**50**	**45**	**41**	**34**	**20**	**51.6**	**58.0**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									41.2
			Sound Contribution of HDD plus Ambient Level (dBA)									58.1
				Potential Increase above the Ambient Level (dB)								16.9
Attenuation due to Added Noise Mitigation Measures		-2	-4	-6	-7	-8	-10	-12	-15	-15		
Est'd Sound Level of HDD + Added Mitigation Measures		58	53	47	47	42	35	29	19	5	**43.2**	**49.6**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									41.2
			Sound Contribution of HDD plus Ambient Level (dBA)									50.2
				Potential Increase above the Ambient Level (dB)								9.0

Table 9: NEXUS Gas Transmission Project [HDD #5 (East Branch Black River HDD) Entry Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 1,010 Ft. West of the Entry Site). Includes the Est'd Sound Level if Additional Mitigation Measures are Employed such as a Temporary Noise Barrier for Hydraulic Power Unit and Engine-Driven Equipment.

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Exit Point	110	108	105	102	100	98	95	92	88	103	
	Attenuation by Obstructions and/or Land Contour	0	0	0	0	0	-1	-2	-3	-3		
1480	Hemispherical Radiation	-61	-61	-61	-61	-61	-61	-61	-61	-61		Calc'd
1480	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-1	-1	-3	-6	-12	-21		Ldn
Est'd Total Sound Contribution with No Additional NC		**49**	**47**	**44**	**40**	**38**	**33**	**26**	**16**	**3**	**38.7**	**45.1**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									40.2
			Sound Contribution of HDD plus Ambient Level (dBA)									46.3
				Potential Increase above the Ambient Level (dB)								6.1

Table 10: NEXUS Gas Transmission Project [HDD #5 (East Branch Black River HDD) Exit Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 1,480 Ft. SSE of the Exit Site).

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Entry Point	118	115	112	114	112	109	108	106	98	115	
	Attenuation by Obstructions and/or Land Contour	0	0	0	-1	-2	-3	-4	-5	-5		
630	Hemispherical Radiation	-54	-54	-54	-54	-54	-54	-54	-54	-54		Calc'd
630	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	-1	-1	-3	-5	-9		Ldn
Est'd Total Sound Contribution with No Additional NC		**64**	**61**	**58**	**59**	**56**	**51**	**48**	**42**	**30**	**57.3**	**63.7**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									43.6
			Sound Contribution of HDD plus Ambient Level (dBA)									63.7
				Potential Increase above the Ambient Level (dB)								20.1
Attenuation due to Added Noise Mitigation Measures		-4	-7	-10	-12	-14	-16	-17	-18	-18		
Est'd Sound Level of HDD + Added Mitigation Measures		60	54	48	47	42	35	31	24	12	**43.3**	**49.7**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									43.6
			Sound Contribution of HDD plus Ambient Level (dBA)									50.7
				Potential Increase above the Ambient Level (dB)								7.1

Table 11: NEXUS Gas Transmission Project [HDD #6 (West Branch Black River HDD) Entry Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 630 Ft. NW of the Entry Site). Includes the Est'd Sound Level if Additional Mitigation Measures are Employed such as a Temporary Noise Barrier for Hydraulic Power Unit and Engine-Driven Equipment, and "Low-Noise" Generators.

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Exit Point	110	108	105	102	100	98	95	92	88	103	
	Attenuation by Obstructions and/or Land Contour	0	0	-1	-3	-5	-6	-7	-8	-8		
410	Hemispherical Radiation	-50	-50	-50	-50	-50	-50	-50	-50	-50		Calc'd
410	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-2	-3	-6		Ldn
Est'd Total Sound Contribution with No Additional NC		**60**	**58**	**54**	**49**	**45**	**41**	**36**	**31**	**24**	**47.2**	**53.6**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									41.1
			Sound Contribution of HDD plus Ambient Level (dBA)									53.9
				Potential Increase above the Ambient Level (dB)								12.8

Table 12: NEXUS Gas Transmission Project [HDD #6 (West Branch Black River HDD) Exit Site]: Est'd Sound HDD Operations at the Closest NSA (i.e., Residence approx. 410 Ft. South of the Exit Site).

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Entry Point	118	115	112	114	112	109	108	106	98	115	
	Attenuation by Obstructions and/or Land Contour	0	0	0	-1	-2	-3	-4	-5	-5		
460	Hemispherical Radiation	-51	-51	-51	-51	-51	-51	-51	-51	-51		Calc'd
460	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-2	-4	-6		Ldn
Est'd Total Sound Contribution with No Additional NC		**67**	**64**	**61**	**62**	**59**	**54**	**51**	**46**	**36**	**60.3**	**66.7**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									43.0
			Sound Contribution of HDD plus Ambient Level (dBA)									66.8
				Potential Increase above the Ambient Level (dB)								23.8
Attenuation due to Added Noise Mitigation Measures		-3	-6	-9	-11	-12	-14	-15	-16	-16		
Est'd Sound Level of HDD + Added Mitigation Measures		64	58	52	51	47	40	36	30	20	**47.9**	**54.3**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									43.0
			Sound Contribution of HDD plus Ambient Level (dBA)									54.6
				Potential Increase above the Ambient Level (dB)								11.6

Table 13: NEXUS Gas Transmission Project [HDD #7 (Vermilion River HDD) Entry Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 460 Ft. NW of the Entry Site). Includes the Est'd Sound Level if Additional Mitigation Measures are Employed such as a Temporary Noise Barrier for Hydraulic Power Unit and Engine-Driven Equipment, and "Low-Noise" Generators.

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Exit Point	110	108	105	102	100	98	95	92	88	103	
	Attenuation by Obstructions and/or Land Contour	0	0	-1	-3	-4	-5	-6	-7	-7		
490	Hemispherical Radiation	-52	-52	-52	-52	-52	-52	-52	-52	-52		Calc'd
490	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-2	-4	-7		Ldn
Est'd Total Sound Contribution with No Additional NC		**58**	**56**	**52**	**47**	**44**	**41**	**36**	**30**	**23**	**46.3**	**52.7**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									44.6
			Sound Contribution of HDD plus Ambient Level (dBA)									53.3
				Potential Increase above the Ambient Level (dB)								8.7

Table 14: NEXUS Gas Transmission Project [HDD #7 (Vermilion River HDD) Exit Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 490 Ft. South of the Exit Site).

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Entry Point	118	115	112	114	112	109	108	106	98	115	
	Attenuation by Obstructions and/or Land Contour	0	0	0	-1	-2	-3	-4	-5	-5		
860	Hemispherical Radiation	-56	-56	-56	-56	-56	-56	-56	-56	-56		Calc'd
860	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	-1	-2	-3	-7	-12		Ldn
Est'd Total Sound Contribution with No Additional NC		**62**	**59**	**55**	**56**	**53**	**48**	**44**	**38**	**25**	**54.2**	**60.6**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									53.0
			Sound Contribution of HDD plus Ambient Level (dBA)									61.3
				Potential Increase above the Ambient Level (dB)								8.3
Attenuation due to Added Noise Mitigation Measures		-3	-6	-9	-12	-13	-14	-15	-16	-16		
Est'd Sound Level of HDD + Added Mitigation Measures		59	53	46	44	40	34	29	22	9	**41.3**	**47.7**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									53.0
			Sound Contribution of HDD plus Ambient Level (dBA)									54.1
				Potential Increase above the Ambient Level (dB)								1.1

Table 15: NEXUS Gas Transmission Project [HDD #8 (Interstate 80 HDD) Entry Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 860 Ft. East of the Entry Site). Includes the Est'd Sound Level if Additional Mitigation Measures are Employed such as a Temporary Noise Barrier for Hydraulic Power Unit and Engine-Driven Equipment, and "Low-Noise" Generators.

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Exit Point	110	108	105	102	100	98	95	92	88	103	
	Attenuation by Obstructions and/or Land Contour	0	0	0	-1	-2	-3	-4	-5	-5		
740	Hemispherical Radiation	-55	-55	-55	-55	-55	-55	-55	-55	-55		Calc'd
740	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	-1	-1	-3	-6	-10		Ldn
Est'd Total Sound Contribution with No Additional NC		**55**	**53**	**50**	**46**	**42**	**38**	**33**	**26**	**18**	**44.1**	**50.5**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									59.6
			Sound Contribution of HDD plus Ambient Level (dBA)									60.1
				Potential Increase above the Ambient Level (dB)								0.5

Table 16: NEXUS Gas Transmission Project [HDD #8 (Interstate 80 HDD) Exit Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 740 Ft. West of the Exit Site).

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Entry Point	118	115	112	114	112	109	108	106	98	115	
	Attenuation by Obstructions and/or Land Contour	0	0	0	-1	-2	-3	-4	-5	-5		
590	Hemispherical Radiation	-53	-53	-53	-53	-53	-53	-53	-53	-53		Calc'd
590	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-2	-5	-8		Ldn
Est'd Total Sound Contribution with No Additional NC		**65**	**62**	**59**	**60**	**56**	**52**	**49**	**43**	**32**	**57.9**	**64.3**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									55.8
			Sound Contribution of HDD plus Ambient Level (dBA)									64.9
				Potential Increase above the Ambient Level (dB)								9.1
Attenuation due to Added Noise Mitigation Measures		-3	-6	-8	-10	-12	-14	-15	-16	-16		
Est'd Sound Level of HDD + Added Mitigation Measures		62	56	51	50	44	38	34	27	16	**45.9**	**52.3**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									55.8
			Sound Contribution of HDD plus Ambient Level (dBA)									57.4
				Potential Increase above the Ambient Level (dB)								1.6

Table 17: NEXUS Gas Transmission Project [HDD #9 (Huron River HDD) Entry Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residences approx. 590 Ft. NE of the Entry Site). Includes the Est'd Sound Level if Additional Mitigation Measures are Employed such as a Temporary Noise Barrier for Hydraulic Power Unit and Engine-Driven Equipment, and "Low-Noise" Generators.

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Exit Point	110	108	105	102	100	98	95	92	88	103	
	Attenuation by Obstructions and/or Land Contour	0	0	-1	-3	-4	-5	-6	-7	-7		
630	Hemispherical Radiation	-54	-54	-54	-54	-54	-54	-54	-54	-54		Calc'd
630	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	-1	-1	-3	-5	-9		Ldn
Est'd Total Sound Contribution with No Additional NC		**56**	**54**	**50**	**45**	**42**	**38**	**33**	**26**	**18**	**43.9**	**50.3**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									56.4
			Sound Contribution of HDD plus Ambient Level (dBA)									57.3
				Potential Increase above the Ambient Level (dB)								0.9

Table 18: NEXUS Gas Transmission Project [HDD #9 (Huron River HDD) Exit Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residences approx. 630 Ft. East of the Exit Site).

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Entry Point	118	115	112	114	112	109	108	106	98	115	
	Attenuation by Obstructions and/or Land Contour	0	0	0	-1	-2	-3	-4	-5	-5		
350	Hemispherical Radiation	-49	-49	-49	-49	-49	-49	-49	-49	-49		Calc'd
350	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-1	-3	-5		Ldn
Est'd Total Sound Contribution with No Additional NC		**69**	**66**	**63**	**64**	**61**	**57**	**54**	**50**	**40**	**62.9**	**69.3**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									56.2
			Sound Contribution of HDD plus Ambient Level (dBA)									69.5
				Potential Increase above the Ambient Level (dB)								13.3
Attenuation due to Added Noise Mitigation Measures		-5	-8	-10	-14	-16	-18	-20	-22	-22		
Est'd Sound Level of HDD + Added Mitigation Measures		64	58	53	50	45	39	34	28	18	**46.9**	**53.3**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									56.2
			Sound Contribution of HDD plus Ambient Level (dBA)									58.0
				Potential Increase above the Ambient Level (dB)								1.8

Table 19: NEXUS Gas Transmission Project [HDD #10 (Sandusky River HDD) Entry Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 350 Ft. SW of the Entry Site). Includes the Est'd Sound Level if Additional Mitigation Measures are Employed such as a Temporary Noise Barrier for Hydraulic Power Unit, "Low-Noise" Generators and Workspace Noise-Reducing Tent.

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Exit Point	110	108	105	102	100	98	95	92	88	103	
	Attenuation by Obstructions and/or Land Contour	0	0	-1	-3	-4	-5	-6	-7	-7		
1040	Hemispherical Radiation	-58	-58	-58	-58	-58	-58	-58	-58	-58		Calc'd
1040	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-1	-1	-2	-4	-8	-15		Ldn
Est'd Total Sound Contribution with No Additional NC		**52**	**50**	**46**	**40**	**37**	**33**	**27**	**19**	**8**	**38.9**	**45.3**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									56.2
			Sound Contribution of HDD plus Ambient Level (dBA)									56.5
				Potential Increase above the Ambient Level (dB)								0.3

Table 20: NEXUS Gas Transmission Project [HDD #10 (Sandusky River HDD) Exit Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 1,040 Ft. WNW of the Exit Site).

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Entry Point	118	115	112	114	112	109	108	106	98	115	
	Attenuation by Obstructions and/or Land Contour	0	0	0	-1	-2	-3	-4	-5	-5		
510	Hemispherical Radiation	-52	-52	-52	-52	-52	-52	-52	-52	-52		Calc'd
510	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-2	-4	-7		Ldn
Est'd Total Sound Contribution with No Additional NC		**66**	**63**	**60**	**61**	**58**	**53**	**50**	**45**	**34**	**59.3**	**65.7**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									42.3
			Sound Contribution of HDD plus Ambient Level (dBA)									65.8
				Potential Increase above the Ambient Level (dB)								23.5
Attenuation due to Added Noise Mitigation Measures		-3	-6	-8	-10	-12	-14	-15	-16	-16		
Est'd Sound Level of HDD + Added Mitigation Measures		63	57	52	51	46	39	35	29	18	**47.3**	**53.7**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									42.3
			Sound Contribution of HDD plus Ambient Level (dBA)									54.0
				Potential Increase above the Ambient Level (dB)								11.7

Table 21: NEXUS Gas Transmission Project [HDD #11 (Portage River HDD) Entry Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residences approx. 510 Ft. NE of the Entry Site). Includes the Est'd Sound Level if Additional Mitigation Measures are Employed such as a Temporary Noise Barrier for Hydraulic Power Unit and Engine-Driven Equipment, and "Low-Noise" Generators.

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Exit Point	110	108	105	102	100	98	95	92	88	103	
	Attenuation by Obstructions and/or Land Contour	0	0	0	0	-1	-1	-2	-3	-3		
400	Hemispherical Radiation	-50	-50	-50	-50	-50	-50	-50	-50	-50		Calc'd
400	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-2	-3	-6		Ldn
Est'd Total Sound Contribution with No Additional NC		**60**	**58**	**55**	**52**	**49**	**46**	**42**	**36**	**30**	**51.4**	**57.8**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									44.1
			Sound Contribution of HDD plus Ambient Level (dBA)									58.0
				Potential Increase above the Ambient Level (dB)								13.9
Attenuation due to Added Noise Mitigation Measures		-2	-4	-5	-7	-9	-10	-12	-12	-12		
Est'd Sound Level of HDD + Added Mitigation Measures		58	54	50	45	40	36	30	24	18	**42.6**	**49.0**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									44.1
			Sound Contribution of HDD plus Ambient Level (dBA)									50.2
				Potential Increase above the Ambient Level (dB)								6.1

Table 22: NEXUS Gas Transmission Project [HDD #11 (Portage River HDD) Exit Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residences approx. 400 Ft. SW of the Exit Site). Includes the Est'd Sound Level if Additional Mitigation Measures are Employed such as a Temporary Barrier between the HDD Workspace and Closest NSAs.

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Entry Point	118	115	112	114	112	109	108	106	98	115	
	Attenuation by Obstructions and/or Land Contour	0	0	0	-1	-2	-3	-4	-5	-5		
	Hemispherical Radiation	-57	-57	-57	-57	-57	-57	-57	-57	-57		Calc'd
970	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	-1	-2	-4	-8	-14		Ldn
Est'd Total Sound Contribution with No Additional NC		**60**	**57**	**54**	**55**	**52**	**47**	**43**	**36**	**22**	**53.0**	**59.4**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									43.3
			Sound Contribution of HDD plus Ambient Level (dBA)									59.5
				Potential Increase above the Ambient Level (dB)								16.2
Attenuation due to Added Noise Mitigation Measures		-2	-4	-6	-8	-10	-12	-13	-14	-14		
Est'd Sound Level of HDD + Added Mitigation Measures		58	53	48	47	42	35	30	22	8	**43.1**	**49.5**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									43.3
			Sound Contribution of HDD plus Ambient Level (dBA)									50.5
				Potential Increase above the Ambient Level (dB)								7.2

Table 23: NEXUS Gas Transmission Project [HDD #12 (Findlay Road HDD) Entry Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 970 Ft. East of the Entry Site). Includes the Est'd Sound Level if Additional Mitigation Measures are Employed such as a Temporary Noise Barrier for Hydraulic Power Unit and "Low-Noise" Generators.

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Exit Point	110	108	105	102	100	98	95	92	88	103	
	Attenuation by Obstructions and/or Land Contour	0	-1	-2	-4	-5	-6	-7	-8	-8		
360	Hemispherical Radiation	-49	-49	-49	-49	-49	-49	-49	-49	-49		Calc'd
360	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-1	-3	-5		Ldn
Est'd Total Sound Contribution with No Additional NC		**61**	**58**	**54**	**49**	**46**	**42**	**38**	**32**	**26**	**48.1**	**54.5**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									43.3
			Sound Contribution of HDD plus Ambient Level (dBA)									54.9
				Potential Increase above the Ambient Level (dB)								11.6

Table 24: NEXUS Gas Transmission Project [HDD #12 (Findlay Road HDD) Exit Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 360 Ft. SW of the Exit Site).

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Entry Point	118	115	112	114	112	109	108	106	98	115	
	Attenuation by Obstructions and/or Land Contour	0	0	0	-1	-2	-3	-4	-5	-5		
1080	Hemispherical Radiation	-58	-58	-58	-58	-58	-58	-58	-58	-58		Calc'd
1080	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-1	-1	-2	-4	-9	-15		Ldn
Est'd Total Sound Contribution with No Additional NC		**60**	**57**	**53**	**54**	**51**	**45**	**41**	**34**	**20**	**51.9**	**58.3**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									45.3
			Sound Contribution of HDD plus Ambient Level (dBA)									58.5
				Potential Increase above the Ambient Level (dB)								13.2
Attenuation due to Added Noise Mitigation Measures		-2	-4	-6	-8	-10	-11	-12	-14	-14		
Est'd Sound Level of HDD + Added Mitigation Measures		58	53	47	46	41	34	29	20	6	**42.3**	**48.7**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									45.3
			Sound Contribution of HDD plus Ambient Level (dBA)									50.3
				Potential Increase above the Ambient Level (dB)								5.0

Table 25: NEXUS Gas Transmission Project [HDD #13 (Maumee River HDD) Entry Site]: Est'd Sound Contribution of of HDD Operations at the Closest NSA (i.e., Residence approx. 1,080 Ft. SW of the Entry Site). Includes the Est'd Sound Level if Additional Mitigation Measures are Employed such as a Temporary Noise Barrier for Hydraulic Power Unit and Engine-Driven Equipment.

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Exit Point	110	108	105	102	100	98	95	92	88	103	
	Attenuation by Obstructions and/or Land Contour	0	0	0	-1	-2	-3	-4	-5	-5		
1310	Hemispherical Radiation	-60	-60	-60	-60	-60	-60	-60	-60	-60		Calc'd
1310	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-1	-1	-3	-5	-10	-18		Ldn
Est'd Total Sound Contribution with No Additional NC		**50**	**48**	**45**	**40**	**37**	**32**	**26**	**16**	**5**	**38.4**	**44.8**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									43.6
			Sound Contribution of HDD plus Ambient Level (dBA)									47.3
				Potential Increase above the Ambient Level (dB)								3.7

Table 26: NEXUS Gas Transmission Project [HDD #13 (Maumee River HDD) Exit Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residences approx. 1,310 Ft. South of the Exit Site).

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Entry Point	118	115	112	114	112	109	108	106	98	115	
	Attenuation by Obstructions and/or Land Contour	0	0	0	-1	-2	-3	-4	-5	-5		
540	Hemispherical Radiation	-52	-52	-52	-52	-52	-52	-52	-52	-52		Calc'd
540	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-2	-4	-8		Ldn
Est'd Total Sound Contribution with No Additional NC		**66**	**63**	**60**	**60**	**57**	**53**	**49**	**44**	**33**	**58.8**	**65.2**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									39.4
			Sound Contribution of HDD plus Ambient Level (dBA)									65.2
				Potential Increase above the Ambient Level (dB)								25.8
Attenuation due to Added Noise Mitigation Measures		-3	-6	-8	-10	-12	-14	-15	-16	-16		
Est'd Sound Level of HDD + Added Mitigation Measures		63	57	52	50	45	39	34	28	17	**46.7**	**53.1**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									39.4
			Sound Contribution of HDD plus Ambient Level (dBA)									53.3
				Potential Increase above the Ambient Level (dB)								13.9

Table 27: NEXUS Gas Transmission Project [HDD #14 (River Raisin HDD) Entry Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 540 Ft. NW of the Entry Site). Includes the Est'd Sound Level if Additional Mitigation Measures are Employed such as a Temporary Noise Barrier for Hydraulic Power Unit and Engine-Driven Equipment, and "Low-Noise" Generators.

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Exit Point	110	108	105	102	100	98	95	92	88	103	
	Noise Source and Other Conditions/Factors	0	0	-1	-3	-4	-5	-6	-7	-7		
1080	associated with Acoustical Analysis	-58	-58	-58	-58	-58	-58	-58	-58	-58		Calc'd
1080	Peak PWL of HDD Operation at an Exit Point	0	0	0	-1	-1	-2	-4	-9	-15		Ldn
Est'd Total Sound Contribution with No Additional NC		**52**	**50**	**45**	**40**	**37**	**32**	**26**	**18**	**8**	**38.6**	**45.0**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									39.4
			Sound Contribution of HDD plus Ambient Level (dBA)									46.0
				Potential Increase above the Ambient Level (dB)								6.6

Table 28: NEXUS Gas Transmission Project [HDD #14 (River Raisin HDD) Exit Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 1,080 Ft. South of the Exit Site).

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Entry Point	118	115	112	114	112	109	108	106	98	115	
	Attenuation by Obstructions and/or Land Contour	0	0	0	-1	-2	-3	-4	-5	-5		
460	Hemispherical Radiation	-51	-51	-51	-51	-51	-51	-51	-51	-51		Calc'd
460	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-2	-4	-6		Ldn
Est'd Total Sound Contribution with No Additional NC		**67**	**64**	**61**	**62**	**59**	**54**	**51**	**46**	**36**	**60.3**	**66.7**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									40.8
			Sound Contribution of HDD plus Ambient Level (dBA)									66.7
				Potential Increase above the Ambient Level (dB)								25.9
Attenuation due to Added Noise Mitigation Measures		-4	-8	-10	-14	-16	-17	-18	-20	-20		
Est'd Sound Level of HDD + Added Mitigation Measures		63	56	51	48	43	37	33	26	16	**44.7**	**51.1**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									40.8
			Sound Contribution of HDD plus Ambient Level (dBA)									51.5
				Potential Increase above the Ambient Level (dB)								10.7

Table 29: NEXUS Gas Transmission Project [HDD #15 (Saline River HDD) Entry Site]: Est'd Sound Contribution of of HDD Operations at the Closest NSA (i.e., Residence approx. 460 Ft. NW of the Entry Site). Includes the Est'd Sound Level if Additional Mitigation Measures are Employed such as a Temporary Noise Barrier for Hydraulic Power Unit and Engine-Driven Equipment, and "Low-Noise" Generators.

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Exit Point	110	108	105	102	100	98	95	92	88	103	
	Attenuation by Obstructions and/or Land Contour	0	0	-1	-3	-4	-5	-6	-7	-7		
720	Hemispherical Radiation	-55	-55	-55	-55	-55	-55	-55	-55	-55		Calc'd
720	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	-1	-1	-3	-6	-10		Ldn
Est'd Total Sound Contribution with No Additional NC		**55**	**53**	**49**	**44**	**41**	**37**	**31**	**24**	**16**	**42.6**	**49.0**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									46.3
			Sound Contribution of HDD plus Ambient Level (dBA)									50.8
				Potential Increase above the Ambient Level (dB)								4.5

Table 30: NEXUS Gas Transmission Project [HDD #15 (Saline River HDD) Exit Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 720 Ft. South of the Exit Site).

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Entry Point	118	115	112	114	112	109	108	106	98	115	
	Attenuation by Obstructions and/or Land Contour	0	-1	-3	-5	-6	-7	-8	-8	-8		
1300	Hemispherical Radiation	-60	-60	-60	-60	-60	-60	-60	-60	-60		Calc'd
1300	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	-1	-1	-3	-5	-10	-18		Ldn
Est'd Total Sound Contribution with No Additional NC		**58**	**54**	**49**	**48**	**45**	**39**	**35**	**28**	**12**	**46.1**	**52.5**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									49.0
			Sound Contribution of HDD plus Ambient Level (dBA)									54.1
				Potential Increase above the Ambient Level (dB)								5.1

Table 31: NEXUS Gas Transmission Project [HDD #16 (Hydro Park HDD) Entry Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residences approx. 1,300 Ft. NW of the Entry Site).

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Exit Point	110	108	105	102	100	98	95	92	88	103	
	Noise Source and Other Conditions/Factors	0	0	-1	-3	-4	-5	-6	-7	-7		
870	associated with Acoustical Analysis	-56	-56	-56	-56	-56	-56	-56	-56	-56		Calc'd
870	Peak PWL of HDD Operation at an Exit Point	0	0	0	0	-1	-2	-3	-7	-12		Ldn
Est'd Total Sound Contribution with No Additional NC		**53**	**51**	**47**	**42**	**39**	**35**	**29**	**22**	**12**	**40.7**	**47.1**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									53.1
			Sound Contribution of HDD plus Ambient Level (dBA)									54.1
				Potential Increase above the Ambient Level (dB)								1.0

Table 32: NEXUS Gas Transmission Project [HDD #16 (Hydro Park HDD) Exit Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residences approx. 870 Ft. NE of the Exit Site).

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Entry Point	118	115	112	114	112	109	108	106	98	115	
	Attenuation by Obstructions and/or Land Contour	0	0	0	0	-1	-1	-2	-3	-3		
220	Hemispherical Radiation	-45	-45	-45	-45	-45	-45	-45	-45	-45		Calc'd
220	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	0	-1	-2	-3		Ldn
Est'd Total Sound Contribution with No Additional NC		**73**	**70**	**67**	**69**	**66**	**63**	**61**	**57**	**47**	**68.7**	**75.1**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									51.1
			Sound Contribution of HDD plus Ambient Level (dBA)									75.1
				Potential Increase above the Ambient Level (dB)								24.0
Attenuation due to Added Noise Mitigation Measures		-5	-10	-16	-20	-22	-23	-24	-26	-26		
Est'd Sound Level of HDD + Added Mitigation Measures		68	60	51	49	44	40	37	31	21	**46.9**	**53.3**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									51.1
			Sound Contribution of HDD plus Ambient Level (dBA)									55.3
				Potential Increase above the Ambient Level (dB)								4.2

Table 33: NEXUS Gas Transmission Project [HDD #17 (Interstate 94 HDD) Entry Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 220 Ft. NW of the Entry Site). Includes the Est'd Sound Level if Additional Mitigation Measures are Employed such as a Temporary Noise Barrier for Hydraulic Power Unit, "Low-Noise" Generators and Workspace Noise-Reducing Tent.

Dist (Ft) or Calculation	Noise Source and Other Conditions/Factors associated with Acoustical Analysis	Unweighted SPL or PWL in dB per O.B. Center Freq. (Hz) 31.5	63	125	250	500	1000	2000	4000	8000	A-Wt. Level	
	Peak PWL of HDD Operation at an Exit Point	110	108	105	102	100	98	95	92	88	103	
	Attenuation by Obstructions and/or Land Contour	0	0	0	0	-1	-1	-2	-3	-3		
250	Hemispherical Radiation	-46	-46	-46	-46	-46	-46	-46	-46	-46		Calc'd
250	Atm. Absorption (70% R.H., 60 deg F)	0	0	0	0	0	-1	-1	-2	-4		Ldn
Est'd Total Sound Contribution with No Additional NC		**64**	**62**	**59**	**56**	**53**	**51**	**46**	**41**	**36**	**55.8**	**62.2**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									60.6
			Sound Contribution of HDD plus Ambient Level (dBA)									64.5
				Potential Increase above the Ambient Level (dB)								3.9
Attenuation due to Added Noise Mitigation Measures		-3	-6	-8	-10	-12	-14	-15	-16	-16		
Est'd Sound Level of HDD + Added Mitigation Measures		61	56	51	46	41	37	31	25	20	**43.7**	**50.1**
			Ambient Sound Level (Est'd Ldn via Meas'd Ld) in dBA									60.6
			Sound Contribution of HDD plus Ambient Level (dBA)									61.0
				Potential Increase above the Ambient Level (dB)								0.4

Table 34: NEXUS Gas Transmission Project [HDD #17 (Interstate 94 HDD) Exit Site]: Est'd Sound Contribution of HDD Operations at the Closest NSA (i.e., Residence approx. 250 Ft. NW of the Exit Site). Includes the Est'd Sound Level if Additional Mitigation Measures are Employed such as a Temporary Barrier between the HDD Workspace and Closest NSAs.

Description of Acoustical Assessment Methodology and Source of Sound Data

In general, the predicted A-wt. sound level contributed by HDD operations was calculated as a function of frequency from estimated unweighted octave-band (O.B.) sound power levels (PWLs) during "peak" operations of HDD stationary equipment associated with Project HDDs. This prediction procedure was discussed in a 2009 technical paper[1]. The following summarizes the acoustical analysis procedure:

- Initially, unweighted O.B. PWL and A-wt. PWL values of HDD operations were determined from actual sound level measurements by H&K on similar type of HDD operations and equipment expected for this Project pipeline. Estimated PWL values of the HDD operations were calculated from sound measurements at different distances/directions from HDD operations (e.g., sound level measurements at 150 feet, 200 feet and 400 feet from HDD equipment operations);*****

- Then, expected attenuation in dB per O.B. frequency due to hemispherical sound propagation (discussed in more detail below******), atmospheric sound absorption (discussed in more detail below*******) and other factors (e.g., attenuation due to foliage and topography*******) were subtracted from the unweighted O.B. PWLs to obtain unweighted O.B. SPLs of HDD operations;

- Finally, the resulting estimated total unweighted O.B. SPLs for the HDD operations for each HDD, including sound attenuation effects, were logarithmically summed and corrected for A-weighting to provide the estimated overall A-wt. sound level contributed by the drilling operations at the specified distance(s).

*****It should be noted that the estimated PWL values of HDD operations utilized in the H&K acoustical analyses were based on measured sound level data at different distances from actual HDD construction sites, and therefore, the PWL values, for the most part, includes the effect of ground effect (e.g., ground absorption). Consequently, in our opinion, it would not be appropriate to strictly follow international–based standards, such as ISO 9613-2[2], when calculating the estimated A-wt. sound level at a respective receptor (i.e., NSA) via the PWL values utilized in the H&K acoustical analysis methodology.

******Attenuation due to hemispherical sound propagation: Sound propagates outwards in all directions (i.e., length, width, height) from a point source, and the sound energy of a noise source decreases with increasing distance from the source. In the case of hemispherical sound propagation, the source is located on a flat continuous plane/surface (e.g., ground), and the sound radiates hemispherically (i.e., outward, over and above the surface) from the source. The following equation is the theoretical decrease of sound energy when determining the resulting O.B. SPLs of a noise source at a specific distance ("r") of a receiver from a source O.B. PWL values:

> Decrease in SPL ("hemispherical propagation") from a noise source = **20*log(r) – 2.3 dB**
> where "r" is distance of the receiver from the noise source.

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[1] *Methods for Predicting and evaluating Noise from Horizontal Directional Drilling (HDD) Equipment*; by Paul Burge (URS Corp) and Paul D. Kiteck (Hoover & Keith Inc.); Inter-Noise 2009 (2009 August 23-26; Ottawa, Canada)

[2] International Standard Organization (ISO) 9613-2, Dec. 15, 1996 (Publication Date): *Acoustics - Attenuation of Sound During Propagation Outdoors - Part 2: General Method of Calculation*

*******Attenuation due to air absorption, foliage and topography: Air absorbs sound energy, and the amount of absorption ("sound attenuation") is dependent on the temperature and relative humidity (R.H.) of air and frequency of sound. For example, the attenuation due to air absorption for 1000 Hz O.B. SPL is approximately **1.5 dB** per 1,000 feet for standard day conditions. Potential attenuation of foliage, based on our experience and an ISO Standard[3], the "medium-frequency" attenuation (i.e., 1000 Hz) due to forest/trees greater than 500 feet thick is approximately **10 dB**. Also, forested areas with plantings more than 100 feet deep can provide some attenuation of ground level noise sources, and the topography (i.e., land contour, such as a hill or ridge) between the HDD site and the NSA(s) can provide some additional attenuation of the HDD noise contribution at the respective NSA(s).

Summary of Typical Metrics and Acoustical Terminology

(1) Decibel (dB): A unit for expressing the relative power level difference between acoustical or electrical signals. It is ten times the common logarithm of the ratio of two related quantities that are proportional to power. When adding dB or dBA values, the values must be added logarithmically. For example, the logarithmic addition of **35 dB** plus **35 dB** is **38 dB**.

(2) A-Weighted Sound Level (dBA): The A-wt. sound level is a single-figure sound rating, expressed in decibels (Re 20 μPa), which correlates to the human perception of the loudness of sound. The dBA level is commonly used to measure industrial and environmental noise since it is easy to measure and provides a reasonable indication of the human annoyance value of the noise. The dBA measurement is not a good descriptor of a noise consisting of strong low-frequency components or for a noise with tonal components. The A-weighted curve approximates the response of the average ear at sound levels of 20 to 50 decibels.

(3) Background or Ambient Noise: The total noise produced by all other sources of a given environment in the vicinity of a specific source of interest, and includes any Residual Noise.

(4) Daytime Sound Level (L_d) & Nighttime Sound Level (L_n): L_d is the equivalent A-weighted sound level, in decibels, for a 15 hour time period, between 07:00 to 22:00 Hours (7:00 a.m. to 10:00 p.m.). L_n is the equivalent A-weighted sound level, in decibels, for a 9 hour time period, between 22:00 to 07:00 Hours (10:00 p.m. to 7:00 a.m.).

(5) Equivalent Sound Level (L_{eq}): The equivalent sound level (L_{eq}) can be considered an average sound level measured during a period of time, including any fluctuating sound levels during that period. In this report, the L_{eq} is equal to the level of a steady (in time) A-weighted sound level that would be equivalent to the sampled A-weighted sound level on an energy basis for a specified measurement interval. The concept of the measuring L_{eq} has been used broadly to relate individual and community reaction to aircraft and other environmental noises.

[3]ISO Standard 9613-1: 1993 (E); *Acoustics – Attenuation of sound during propagation outdoors – Part 1: Calculation of the Absorption of Sound by the Atmosphere, and Part 2: General method of calculation*

(6) Day-Night Average Sound Level (L_{dn}): The L_{dn} is an energy average of the measured daytime L_{eq} (L_d) and the measured nighttime L_{eq} (L_n) plus **10 dB**. The **10-dB** adjustment to the L_n is intended to compensate for nighttime sensitivity. As such, the L_{dn} is not a true measure of the sound level but represents a skewed average that correlates generally with past sound surveys which attempted to relate environmental sound levels with physiological reaction and physiological effects. For a steady sound source that operates continuously over a 24-hour period and controls the environmental sound level, an L_{dn} is approximately **6.4 dB** above the measured L_{eq}. Consequently, an L_{dn} of **55 dBA** corresponds to a L_{eq} of **48.6 dBA**. If both the L_d and L_n are measured, then the L_{dn} is calculated using the following formula:

$$L_{\text{dn}} = 10\log_{10}\left(\frac{15}{24}10^{L_{\text{d}}/10} + \frac{9}{24}10^{(L_{\text{n}}+10)/10}\right)$$

(7) Octave Band (O.B.) Sound Pressure Level (SPL): Sound is typically measured in frequency ranges (e.g., high-pitched sound, low-pitched sound, etc.) that provides more meaningful sound data regarding the sound character of the noise. When measuring two noise sources for comparison, it is better to measure the spectrum of each noise, such as in octave band (O.B.) SPL frequency ranges. Then, the relative loudness of two sounds can be compared frequency range by frequency range. As an illustration, 2 noise sources can have the same dBA rating and yet sound completely different. For example, a high-pitched sound at a frequency of 2000 Hz could have the same dBA rating as a much louder low-frequency sound at 50 Hz.

(8) Sound Power Level (L_W or PWL): Ten times the common logarithm of the ratio of the total acoustic power radiated by a sound source to a reference power. A reference power of a picowatt or 10^{-12} watt is conventionally used.

End of Report