From:	Chris McFarlane
To:	EGLE-ROP
Cc:	Benjamin Samuelkutty
Subject:	ROP Renewal Application - MI-ROP-N5586-2019 - ANR Pipeline Company - Lincoln Compressor Station
Date:	Wednesday, January 17, 2024 1:41:02 PM
Attachments:	image001.png Lincoln Renewal Calculations 1 16 2024.xlsx Lincoln Renewal Application 1_17_2024.pdf

Good Morning,

Attached is the Renewable Operating Permit (ROP) renewal application for the ANR Lincoln Compressor Station. A signed hard copy of the application will be sent via FedEx. With the acceptance of this emailed electronic version of the ROP Application Package, ANR requests that the determination of administrative completeness of the application be completed within 15 days of receipt of this hard copy version of the application by AQD.

If you have any questions or comments concerning this application, please feel free to contact me.

Regards,

Christopher McFarlane, PG
US Environment - Air
US Natural Gas Pipelines

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832.320.5490

TC Energy

TCEnergy.com

ANR Pipeline Company
700 Louisiana Street
Houston, TX 77002

January 17, 2024

Michigan Department of Environment, Great Lakes and Energy
Gaylord District
Air Quality Division
2100 West M-32
Gaylord, MI 49735-9282

RE: ANR Pipeline Company
N5586 – Lincoln Compressor Station
Renewable Operating Permit No. MI-ROP-N5586-2019

Dear Permit Engineer,

Enclosed is the Renewable Operating Permit (ROP) renewal application for ANR Pipeline Company (ANR) for the Lincoln Compressor Station which provides transmission of natural gas. The Renewable Operating Permit (ROP) No. MI-ROP-N5586-2019 for the Lincoln Compressor Station was issued on September 23, 2019, and the renewal is due on or before March 23, 2024. As required under Section A.29 of the Lincoln Compressor Station ROP, ANR is submitting both the attached hard copy of the application and an electronic version of the ROP Application Package to EGLE-ROP@michigan.gov and thus requests that the determination of administrative completeness of the application be completed within 15 days of receipt of this hard copy version of the application by AQD.

Please find attached the renewal application including all necessary materials as listed below:

- ROP Application Form
- ROP Mark-up
- Supplemental Data
- Plans Referenced in the ROP

If you have any questions or comments concerning this request, please contact me at (832) 320-5490 or via email at chris_mcfarlane@tcenergy.com.

Sincerely,

Christopher McFarlane
US Environment - Air
TC Energy
Enclosure – Renewable Operating Permit Application

Renewable Operating Permit Application

Lincoln Compressor Station
Clare County, Michigan

December 18, 2023

Prepared for:

ANR Pipeline Company
700 Louisiana Street Suite 700
Houston, TX 77002

Prepared by:

Stantec Consulting Services Inc
1200 Brickyard Lane Suite 400
Baton Rouge LA 70802

Project Number:

227706046

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1 Technical Support Documentation

ANR Pipeline Company (ANR) owns and operates several facilities in Michigan that are used in both natural gas transmission and storage. The function of some of ANR compressor stations, including Lincoln Compressor Station, is to maintain pressure in pipelines to transport natural gas from ANR's mainline to and from storage facilities located in Michigan or to local distribution companies or other end users. The ANR Lincoln Compressor Station (Lincoln Station) is a natural gas compression and transmission station that operates three compressor engines, one emergency engine, two boilers, and a dehydration system. The Station is located near Lake George, Michigan in Clare County.

The Renewable Operating Permit (ROP) No. MI-ROP-N5586-2019 for the Lincoln Station expires on September 23, 2024. As required under Section A.35 of the Lincoln Station ROP, ANR is submitting this permit renewal application within the specified time frame for review by the Michigan Department of Environment, Great Lakes, and Energy (EGLE). Therefore, according to R336.1210(8), this is considered a timely renewal application and the facility will be authorized to continue to operate until EGLE takes final action on this application.

A Rule 215(3) Notification of Off-Permit Change was submitted on July 9, 2019 to replace the existing 3.20 MMBtu/hr Emergency Generator EU-LI004 with a 5.45 MMBtu/hr Emergency Generator EU-LI010.

A Rule 215(3) Notification of Off-Permit Change was submitted on March 19, 2021 to replace the existing 4.185 MMBtu/hr boiler with two (2) new boilers. The new boilers installed are EU-LI011 and EU-LI012 that are each rated at 5.0 MMBtu/hr.

This ROP application is comprised of the following information:

- Section 1 consists of technical support documentation;
- Section 2 consists of the ROP renewal application forms;
- Appendix A consists of the area maps and process flow diagrams;
- Appendix B contains the emission calculations;
- Appendix C contains a mark-up of the current Lincoln Station ROP; and

Please note the address, contact person and phone number, and responsible official for the facility are as follows:

ANR Pipeline Company
700 Louisiana Street, Ste. 700
Houston, Texas 77002

Technical Contact:
Chris McFarlane,
US Environment – Air
Email: chris_mcfarlane@tcenergy.com

Responsible Official:
Mike Coy
Area Manager – Great Lakes
Email: mike_coy@tcenergy.com

1.1 Process Description

Lincoln Station is located at 3991 South Hickory, Lake George, MI 48633. The station maintains pressure (recompression) in pipelines supporting natural gas to and from storage facilities located in Michigan, to industrial customers or to local distribution companies. The Lincoln Station consists of three (3) natural gas-fired internal combustion compressor engines, one (1) emergency engine, two (2) natural gas-fired boilers, one (1) dehydration furnace and various insignificant and exempt sources. These emission sources are further described in the following sections.

Section 1.2 describes the process equipment operating at Lincoln Station that must be included in the Renewal Operating Permit application. Section 1.2.3 describes insignificant equipment and Section 1.2.4 describes exempt equipment from most requirements associated with EGLE's Renewable Operating Permit program [R336.1212(3)].

1.2 Emission Source Description

The Lincoln Station transports natural gas along the pipeline by receiving low-pressure inlet natural gas and compressing the stream to increase the pressure and maintain the downstream flow. The Lincoln Station is covered by Standard Industrial Classification (SIC) 4922 and has the potential to operate seven (7) days per week, twenty-four (24) hours per day. This section provides a brief description of the two (2) 3,200-hp Clark Natural Gas Engines (EU-LI001 and EU-LI002), one (1) 8,000-hp Cooper-Bessemer Natural Gas Engine (EU-LI003), one (1) dehydration unit (EU-LI009), one (1) 755-hr Caterpillar Emergency Natural Gas Engine (EU-LI010), and two (2) 5.0 MMBtu/hr Cleaver Brooks Natural Gas Fire Boilers (EU-LI011 and EU-LI012). No sources are affected as part of this application. Emission calculations for all sources are provided in Appendix B.

1.2.1 ENGINES

The Lincoln Station operates three (3) two-cycle, lean burn compressor engines to compress natural gas into the storage reservoirs during injection and into the pipeline during withdrawal. Two of these engines are Clark TLAD8 models rated at 3,200 hp. The Clarks commenced operation in 1971 and are identified in the permit as EU-LI001 and EU-LI002. The third engine is a model 16W330 manufactured by Cooper Bessemer rated at 8,000 hp. This engine commenced operation in 1974 and is identified as EU-LI003. Depending on storage and delivery contracts, gas availability, and demand by end users, the three compressor engines may operate simultaneously, independently, or not at all.

Emissions of concern are mainly the combustion products, NOx, CO, and VOC. NOx emissions result from thermal generation of nitric oxide (NO) in high-temperature combustion zones, while CO and VOC

emissions result from incomplete combustion. ANR employs good combustion practices on well-maintained engines combined with the exclusive use of natural gas in order to minimize air emissions.

Emissions for additional pollutants emitted by the turbines are described below.

- NOx, CO and VOC emissions are based on Initial Title V Operating Permit Application.
- CO_2e emissions are based on emission factors and global warming potential specified in 40 CFR Part 98.
- Particulate matter (PM), particulate matter less than 10 microns (PM_{10}) and particulate matter less than 2.5 microns ($PM_{2.5}$), and sulfur dioxide (SO_2) emissions are based on emission factors from AP-42 Table 3.2.1 (7/00).
- Emissions for hazardous air pollutants (HAPs) are based on emission factors from AP-42 Table 3.2.1 (7/00).

1.2.2 EMERGENCY GENERATOR

The Lincoln Station has one (1) 4-stroke, lean burn emergency engine (EU-LI010), rated at 755-hp, which is operated during the year on a routine basis for maintenance purposes. The generator is equipped with an internal combustion engine whose emissions exhaust from a single exhaust stack. Emissions of concern are mainly the following products of combustion: NOx, CO, and VOC. ANR employs good combustion practices on well-maintained engines combined with the exclusive use of natural gas in order to minimize air emissions.

1.2.3 BOILERS

The Lincoln Station operates two (2) natural gas fired boilers (EU-LI011 and EU-LI012). These units are operated to ensure that adequate heat is available to the facility. Emissions which result from this process are NOx, CO, VOC, SO2, PM_{10} and $PM_{2.5}$. Emissions may also be associated with routine operations such as calibrating equipment, changing of equipment filters, parts cleaning, and welding.

1.2.4 DEHYDRATION UNIT

The Lincoln Station operates one (1) drybed dehydration unit (EU-LI009) rated at 1.10 MMBtu/hr. Unlike typical glycol dehydration systems, the drybed dehydration unit at the Lincoln Station has no VOC emissions. The only emissions associated with the unit are due to the natural gas combustion in the furnace.

Table 1-1: Summary of Air Emissions – Significant Sources

Emission Point ID	Source	Manufacturer	Model/ Type	Rated Capacity (hp)	Heat Input (MMBTU/hr)	Status
EU-LI001	Compressor Engine 1	Clark	TLAD8	3,200	22.4	Active
EU-LI002	Compressor Engine 2	Clark	TLAD8	3,200	22.4	Active
EU-LI003	Compressor Engine 3	Cooper-Bessemer	16W330	8,000	55.2	Active
EU-LI009	Dehydration Furnace	NA	NA	NA	6.6	Active
EU-LI010	Emergency Generator	Caterpillar	G3412C	755	5.45	Active
EU-LI011	Natural Gas Fired Boiler	Cleaver Brooks	CFC-E 5000	NA	5.0	Active
EU-LI012	Natural Gas Fired Boiler	Cleaver Brooks	CFC-E 5000	NA	5.0	Active

1.2.5 INSIGNIFICANT ACTIVITIES

Activities identified as "insignificant" pursuant to R336.1212 (2) do not need to be included in an administratively complete application for a renewable operating permit. These activities do not significantly contribute to the actual emissions or the potential to emit. The following activities, identified under R336.1212 (2) as insignificant, may be performed at the Lincoln Station:

- Repair and maintenance of grounds and structures;
- Use of office supplies;
- Use of housekeeping and janitorial supplies;
- Sanitary plumbing and associated stacks or vents;
- Temporary activities related to the construction or dismantlement of buildings, utility lines, pipelines, wells, earthworks, or other structures;
- Storage and handling of drums or other transportable containers that are sealed during storage and handling;
- Fire protection equipment, firefighting and training in preparation for fighting fires (prior approval by the department for open burning associated with training in preparation for fighting fires will be obtained pursuant to R336.1310);
- Use, servicing, maintenance of motor vehicles, except where the activity is subject to an applicable requirement;
- Construction, repair, and maintenance of roads or other paved or unpaved areas, except where the activity is subject to an applicable requirement; and
- Piping and storage of sweet natural gas, including venting from pressure relief valves and purging of gas lines.

1.2.6 EXEMPT SOURCES

Certain processes and process equipment exempt by state rule from obtaining a Permit to Install (PTI) may be subject to inclusion in the ROP application. The guidelines for determining whether an exempt process or process equipment must be included in the ROP application are summarized as follows:

- Process or process equipment exempt under R336.1212(3) need not be included in the ROP application, provided there are no applicable requirements;
- Process or process equipment exempt under R336.1212(4) need to be listed in the ROP application as Exempt Devices, provided there are no process-specific emission limitations or standards; and,
- If a process or process equipment identified as exempt under §§1212(3) or 1212(4) has an applicable requirement with a process-specific emission limitation or standard, it must be included as an emission group in the ROP.

There are several sources at the Lincoln Station that qualify for the above exemptions. These sources are also exempt from the requirement of obtaining a PTI. The calculations in Appendix B provides a

source list that includes exempt and insignificant activities. In addition, it provides a brief description and identifies the specific rule that exempts from the ROP and the requirement of obtaining a PTI.

1.3 Permit Summary and Compliance and History

There have been no administrative or judicial actions taken against ANR within the past five years pertaining to operation of the Lincoln Station. There are currently no outstanding violations of state or federal environmental laws or regulations at Lincoln Station. There have been no new PTI issued by EGLE since the issuance of existing ROP. Since its issuance, ANR has complied with the terms and conditions of the existing ROP.

1.4 Federal and State Regulatory Review

The Lincoln Station will be subject to certain federal and state air quality regulations. This section summarizes the air permitting requirements and key air quality regulations that will apply to the operation of the facility once constructed. Specifically, applicability or non- applicability of the following regulatory programs are addressed: Prevention of Significant Deterioration (PSD) permitting, Non-Attainment New Source Review (NNSR), New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP), Compliance Assurance Monitoring (CAM), Chemical Accident Prevention (CAP) and Risk Management Program (RMP), and stratospheric ozone protection regulations. This review is presented to supplement and/or add clarification to the information provided in the EGLEROP renewal application forms, which together fulfill the requirement to include citations and descriptions of applicable statutory and administrative code requirements.

This section provides a summary of applicable requirements and non-applicability determinations for certain regulations allowing the EGLE to confirm that identified regulations are not applicable to the facility. Note that this non-applicability review is limited to those regulations for which there may be some possible applicability specific to the Lincoln Station. Regulations that are categorically non-applicable are not discussed (e.g., NSPS Subpart J, Standards of Performance for Petroleum Refineries).

1.4.1 PREVENTION OF SIGNIFICANT DETERIORATION/NON-ATTAINMENT NEW SOURCE REVIEW

The Lincoln Station is located in Clare County, which is designated by the U.S. EPA 40 CFR §81.323 as in “attainment” or “unclassifiable” for all criteria pollutants. As such, new construction or modifications that result in emission increases are potentially subject to the PSD permitting regulations. PSD applicability depends on the existing status of the facility (i.e., major or minor source) and the net emissions increases associated with the project.

The major source threshold for PSD applicability is 250 tons per year (tpy) unless the source is included on a list of 28 specifically defined industrial source categories for which the PSD “major” source threshold is 100 tpy. Since the Lincoln Station does not fit any of the types of sources mentioned on the above list, the PSD major source threshold is 250 tpy of regulated criteria pollutants. The potential emissions of NOX and CO from the existing equipment at the station each exceed 250 tpy and the facility is considered to be an “existing major source” for PSD permitting purposes. ANR is not requesting any modification with this application that would subject emission units at the Lincoln Station to a PSD review. Therefore, information regarding the ambient air impacts of criteria pollutants is not required and is not addressed herein.

1.4.2 NEW SOURCE PERFORMANCE STANDARDS (NSPS)

NSPS contained in 40 CFR 60 require new, modified, or reconstructed sources to control emissions to the level achievable by the best demonstrated technology as specified in the relevant regulations. These NSPS regulations were reviewed to determine their applicability to Lincoln Station equipment or to confirm non-applicability as appropriate. The results of this review are summarized below by regulatory citation.

NSPS contained in 40 CFR 60 require new, modified, or reconstructed sources to control emissions to the level achievable by the best demonstrated technology as specified in the relevant regulations. These NSPS regulations were reviewed to determine their applicability to Lincoln Station equipment or to confirm non-applicability as appropriate. The results of this review are summarized below by regulatory citation.

Table 1.4.1 NSPS Regulatory Review

Regulatory Citation	Non-Applicability Determination
40 CFR 60 Subpart Dc - Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units	This standard is not applicable to the Lincoln Station because there are no natural gas-fired boilers with a design heat input capacity of 2.9 MW (10 MMBtu/hr) or greater. ANR would like to request a permit shield for this regulation
40 CFR 60 Subpart K - Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced	There are no petroleum storage vessels with capacity greater than 40,000 gallons at this facility. Therefore, this regulation is not applicable. ANR would like to request a permit shield for this regulation.

Regulatory Citation	Non-Applicability Determination
After June 11, 1973 and prior to May 19, 1978	
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	There are no petroleum storage vessels with capacity greater than 40,000 gallons at this facility. Therefore, this regulation is not applicable. ANR would like to request a permit shield for this regulation.
40 CFR 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	There are no volatile organic liquid storage vessels with capacity greater than 75 cubic meters at this facility. Therefore, this regulation is not applicable. ANR would like to request a permit shield for this regulation.
40 CFR 60 Subpart GG – Standards of Performance for Stationary Gas Turbines	This standard is not applicable since there are no turbines installed onsite. ANR would like to request a permit shield for this regulation.
40 CFR 60 Subpart KKK-Standards of Performance for Equipment Leaks of VOC from Onshore Natural Gas Processing Plants	This regulation is not applicable to this facility because the facility is not a natural gas processing plant as defined in the regulation. ANR would like to request a permit shield for this regulation.
40 CFR 60 Subpart LLL - Standards of Performance for Onshore Natural Gas Processing: SO_2 Emissions	Lincoln Station processes natural gas but does not operate a sweetening unit or a sulfur recovery unit. Therefore, this regulation is not applicable. ANR would like to request a permit shield for this regulation.
40 CFR 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines (CI ICE)	This regulation applies to owners or operators of stationary CI ICE that commence construction, modification or reconstruction after July 11, 2005 and to manufacturers of 2007 and later model year CI ICE. The Lincoln Station does not operate any stationary diesel-fired CI ICE. Therefore, this regulation is not applicable. ANR would like to request a permit shield for this regulation.
40 CFR 60 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (SI ICE)	This regulation applies to stationary spark ignition combustion engines with horsepower greater than 25 hp constructed after specified dates, dependent on horsepower rating and combustion type (rich or lean). The three compressor engines (EU-LI001, EU-LI002, EU-LI003) at the Lincoln Station were installed prior to the specified applicability dates outlined in the rule. The emergency generator (EU-LI010) is subject to this rule.

Regulatory Citation	Non-Applicability Determination
40 CFR 60 Subpart KKKK – Standards of Performance for Stationary Combustion Turbines	The standards of performance for Stationary Combustion Turbines, applies to combustion turbines with peak load heat input greater than 10 MMBtu/hour constructed, modified, or reconstructed after February 18, 2005. There are no turbines at Lincoln Station. Therefore, this regulation is not applicable. ANR would like to request a permit shield for this regulation.
40 CFR 60 Subpart OOOO – Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution	Lincoln Station does not employ reciprocating or centrifugal compressors that are located prior to the point of natural gas custody transfer (40 CFR Part 60.5365(b)&(c)). Additionally, all of the storage tanks located at Farwell CS12 were constructed prior to August 23, 2011 and have not been modified or reconstructed after the applicability date. Furthermore, as prescribed in 40 CFR Part 60.5395, these storage tanks are not located at well sites. Therefore, this regulation is not applicable. ANR would like to request a permit shield for this regulation.
40 CFR 60 Subpart OOOOa – Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification, or Reconstruction Commenced After September 18, 2015	On June 3, 2016, the EPA published 40 CFR 60 Subpart OOOOa which establishes emission standards and compliance schedules for the control of methane, volatile organic compounds (VOC) and sulfur dioxide emissions from affected facilities in the crude oil and natural gas source category that commence construction, modification or reconstruction after September 18, 2015. The Lincoln Station is considered a natural gas compressor station and is potentially subject to this regulation. However, all equipment and processes potentially subject to this regulation were installed prior to the applicability date and have not been modified or reconstructed. Therefore, this regulation does not apply. ANR would like to request a permit shield for this regulation.

1.4.3 NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP)

Federal NESHAP regulations promulgated pursuant to Section 112 of the CAA are found in 40 CFR Parts 61 and 63. In general, NESHAP, or Maximum Achievable Control Technology (MACT) standards apply to major stationary sources of HAP emissions, defined as potential-to- emit of 10 tons or more per year of any single HAP or 25 tons or more per year of any combination of HAP and area sources of HAP emissions (thresholds less than a major source). The Lincoln Station is considered a major source of HAPs due to potential total HAPs emissions that exceed 25 tpy, and potential formaldehyde emissions that exceed 10 tpy. Potentially applicable NESHAPs are discussed below.

Table 1.4.2 NESHAP Regulatory Review

Regulatory Citation	Non-Applicability Determination
40 CFR 61 Subpart M - National Emission Standard for Asbestos	Lincoln Station may at times engage in demolition and/or renovation activities involving asbestos-containing materials (ACM). Therefore, the facility could be potentially subject to Subpart M, Standards for Demolition and Renovation (40 CFR 61.145). Procedures are in place to ensure the station complies with these standards.
40 CFR 61 Subpart V - National Emission Standard for Equipment Leaks (Fugitive Emission Sources)	This regulation is not applicable to the Lincoln Station because the provisions of this subpart apply to sources that are intended to operate in volatile hazardous air pollutant (VHAP) service. “In VHAP service means that a piece of equipment either contains or contacts a fluid (liquid or gas) that is at least 10 percent by weight a volatile hazardous air pollutant (VHAP) as determined according to the provisions of 61.245(d).” The Lincoln Station processes do not have any sources that operate in VHAP service. ANR would like to request a permit shield for this regulation.
40 CFR 63 Subpart A – General Provisions	This regulation has general provisions that are referenced by other more specific NESHAP regulations.
40 CFR 63 Subpart HH - NESHAP from Oil and Natural Gas Production Facilities	This regulation is not applicable to the Lincoln Station because the facility is a transmission and storage facility and is not an oil and gas production facility as defined in this regulation. ANR would like to request a permit shield for this regulation.
40 CFR 63 Subpart HHH - NESHAP from Natural Gas Transmission and Storage Facilities	Subpart HHH establishes national emission limitations and operating limitations for natural gas transmission and storage facilities that are major sources of HAP emissions. The rule affects facilities that transport or store natural gas prior to entering the pipeline to a local distribution company or to a final user. The Lincoln Station is a natural gas compression and storage facility and is potentially subject to this regulation. However, the facility does not operate a glycol dehydration unit which is the only ‘affected’ source under the regulation. Therefore, the facility is not subject to this regulation. ANR would like to request a permit shield for this regulation.
40 CFR 63 Subpart EEEE – NESHAP for Organic Liquids Distribution (non-Gasoline)	40 CFR 63 Subpart EEEE was promulgated on August 25, 2003 and applies to organic liquids distribution (OLD) operations that are located at, or are part of, a major source of hazardous air pollutant (HAP) emissions as defined in section 112(a) of the Clean Air Act. This regulation does not apply to the tanks or loading operations at the Lincoln Station because per 40 CFR 63.2334(c)(2), OLD operations located at Natural Gas Transmission facilities as defined in 40 CFR 63 Subpart

Regulatory Citation	Non-Applicability Determination
	HHH are exempt from the requirements of 40 CFR 63 Subpart EEEE (OLD MACT). ANR would like to request a permit shield for this regulation.
40 CFR 63 Subpart ZZZZ – NESHAP for Stationary Reciprocating Internal Combustion Engines (RICE)	Subpart ZZZZ regulates HAP emissions from existing, new, and reconstructed stationary compression ignition (CI) and spark ignition (SI), emergency and non-emergency, RICE located at major and area sources of HAP emissions. This standard is potentially applicable to the Lincoln Station because the facility operates three (3) RICE (EU-LI001, EU-LI002, EU-LI003), one (1) emergency stationary RICE (EU-LI010), and is considered a major source of HAPs. EU-LI001, EU-LI002, and EU-LI003 are each considered existing 2SLB stationary RICE with horsepower greater than 500 hp, and therefore meet the exemption requirements listed in 40 CFR §63.6590(b)(3)(i). EU-LI010 is considered a new 4SLB RICE, rated at 755 hp and is applicable to requirements for a new emergency spark ignition engines > 500 hp that commenced construction or reconstruction after December 19, 2002. ANR will continue to comply with all applicable requirements under this subpart.
40 CFR 63 Subpart DDDDD and Subpart JJJJJJ - NESHAP for Industrial, Commercial and Institutional Boilers	The Industrial/Commercial/Institutional Boilers and Process Heaters MACT for major sources was promulgated on March 21, 2011, and regulates HAP emissions from new and existing industrial, commercial, or institutional boilers and process heaters located at major sources of HAP emissions. The EPA subsequently issued a notice on May 18, 2011 to postpone the effective dates of the final rule until the completion of reconsideration or judicial review, whichever is earlier. On January 9, 2012, the EPA vacated the May 18, 2011 notice that delayed the effective dates of the Boiler MACT rule. The notice on final action on reconsideration was published in the Federal Register on January 31, 2013. This rule is applicable to the Cleaver Brooks boilers (EU-LI011 and EU-LI012) and the drybed dehydration furnace (EU-LI009) at the Lincoln Station since the station is a major source of HAP. The dehydration furnace is classified as existing (constructed before June 4, 2010), natural gas burning units. The boilers are new sources since they were installed in 2021. As such, the boiler and dehydration furnace are subject to a facility assessment, and the associated reporting and recordkeeping requirements. In addition, both the boilers and dehydration furnace have a heat input of 5.00 MMBtu/hr or less and are therefore subject to tune-ups every five years, as listed in 40 CFR §63.7540(a)(12). ANR will continue to comply with all applicable requirements under this subpart. Subpart JJJJJJ regulates existing and new industrial, commercial, and institutional boilers located at area source

Regulatory Citation	Non-Applicability Determination
	facilities. The rule applies to boilers located at an area source of HAPs that burn coal, oil, biomass, or non-waste materials. The boilers are natural gas fired boilers and therefore exempt from all requirements of 40 CFR Part 63, subpart JJJJJ. ANR would like to request a permit shield for this regulation.
40 CFR 63 Subpart YYYY – NESHAP for Stationary Combustion Turbines	Subpart YYYY establishes national emission limitations and operating limitations for hazardous air pollutants (HAP) emissions from stationary combustion turbines located at major sources of HAP emissions, and requirements to demonstrate initial and continuous compliance with the emissions and operating limitations. Lincoln Station is a major source of HAP emissions but has no turbines onsite and is therefore exempt from this regulation. ANR would like to request a permit shield for this regulation.

1.4.4 COMPLIANCE ASSURANCE MONITORING (CAM)

Enhanced monitoring requirements have been adopted into 40 CFR 64. The enhanced monitoring requirements are referred to as Compliance Assurance Monitoring (CAM). CAM is applicable to sources that have a potential to emit in excess of major source thresholds, not considering “tailpipe” emission controls, and use an “active” control device to achieve compliance with the emission limit. Combustion controls may be considered in evaluating the potential to emit.

An emission unit is subject to CAM if all of the following criteria are satisfied:

- the unit is located at a major source that is required to obtain a Part 70 or Part 71 permit;
- the unit is subjected to an emission limitation or standard for a regulated air pollutant;
- the unit uses an active control device to achieve compliance with any such emission limit or standard, and
- the unit has potential pre-controlled emissions of the applicable air pollutant above the major source threshold.

The emissions of NOx from the natural gas-fired compressor engines, and CO from EU-LI0003, are in excess of the appropriate major source thresholds. However, none of these units employ an active control device to control emissions. Therefore, the CAM rule does not apply to the Station at this time. ANR requests a permit shield for this determination.

1.4.5 CHEMICAL ACCIDENT PREVENTION PROVISIONS AND RISK MANAGEMENT PLAN

Lincoln Station is not subject to the Chemical Accident Prevention Provisions of 40 CFR Subpart 68. Applicability to this regulation is based on the type and quantity of certain regulated substances stored at a facility, and the Lincoln Station does not exceed the applicability thresholds (40 CFR 68.10). The facility

is not considered a stationary source under 40 CFR 68.3 (Chemical Accident Prevention) because it is regulated under 49 CFR 192, DOT.

1.4.6 ACID RAIN REGULATIONS

Lincoln Station is not subject to the federal acid rain regulations found in 40 CFR Parts 72 through 77 because the Station does not own or operate an affected unit as defined in 40 CFR part 72.6.

1.4.7 MICHIGAN STATE AIR POLLUTION CONTROL RULES (R336)

The following paragraphs discuss the general compliance with the Michigan state air pollution control rules.

Part 1 – General Provisions

This part provides the definitions for the terms used throughout the Michigan air pollution control rules. These general provisions and definitions generally apply to the facility. There are no specific requirements under this part.

Part 2 – air use approval

This part requires facilities in Michigan to obtain a permit to install prior to installation, construction, reconstruction, relocation, or modification of any process or process equipment, including associated control equipment, that has the potential to emit any pollutant to the atmosphere. In addition, some facilities are required to obtain a renewable operating permit.

All processes or process equipment at this facility either have a permit to install or qualify under one of the various exemptions provided in the rule. This facility was also required to obtain a renewable operating permit. A complete and timely application was submitted for the last renewal and a renewable operating permit was issued in September 2019. This application is being submitted in order to renew this renewable operating permit.

Part 3 – Emission Limitations and Prohibitions- Particulate Matter

The processes and the process equipment at this facility will be subject to the visible emission limitations specified in R336.1301(1). All sources at the facility will be operated in compliance with these requirements. It should be noted that for natural gas-fired fuel burning equipment, compliance with this requirement is demonstrated by using pipeline quality natural gas. R336.1331 of this part limits the emissions of particulate matter from a process or process equipment. This rule also establishes a particulate matter emission limit based on a process weight rate. However, no particulate matter emissions, other than fuel combustion sources, are anticipated from the processes at this facility. Therefore, the rule is not currently applicable to the facility.

Part 4 – Emissions Limitations and Prohibitions- Sulfur-Bearing Compounds

R336.1403 limits emissions of sulfur dioxide from specific sources including coal or oil fuel fired equipment, sour gas handling facilities, and gas sweetening plants. This facility does not handle sour gas

and does not operate any process or process equipment for which an emission limit has been specified in this part. Therefore, this part is not applicable.

Part 6 – Emission Limitations and Prohibitions- Existing Sources of Volatile Organic Compound Emissions

This part limits emissions of volatile organic compounds from various sources including storage vessels, loading facilities, and natural gas processing plants. The facility is in compliance with all the applicable requirements of this regulation. R336.1629 requires a monitoring program to control emissions of volatile organic compounds from components of existing process equipment used in natural gas processing. The rule only applies to facilities located in Kent, Livingston, Macomb, Monroe, Muskegon, Oakland, Ottawa, St. Clair, Washtenaw, and Wayne. This facility is not a natural gas processing plant and is not located in one of the counties listed above. Therefore, this rule is not applicable.

Part 7 – Emission Limitations and Prohibitions- New Sources of Volatile Organic Compound Emissions

This part limits emissions of volatile organic compounds from all new sources. A “new source” is defined as a process or process equipment which is either placed into operation on or after July 1, 1979, or for which a permit to install is made to the DEQ on or after July 1, 1979. Some of the sources at the facility may be subject to this regulation. The facility is in compliance with all the applicable requirements of this regulation.

Part 8 – Emission Limitations and Prohibitions- Oxides of Nitrogen

This part regulates emissions of oxides of nitrogen (NOx) from electric generating units and fossil fuel-fired units with a maximum design heat input of more than 250 million Btu per hour. On April 1, 2004, the US EPA finalized the second phase of the rule known as the “the NOx SIP Call Rule.” In response to this action, EGLE promulgated R336.1818 regulating NOx emissions from stationary internal combustion engines. This facility does not operate any sources regulated under this part. Therefore, this part does not apply to the facility.

Part 9 – Emission Limitations and Prohibitions- Miscellaneous

Part 9 specifies numerous miscellaneous limitations and prohibitions. Rule 336.1901 prohibits emission of an air contaminant which may result in injurious effects to human health or safety, animal life, plant life of significant economic value, property, or interference with the comfortable enjoyment of life and property. Rule 336.1906 prohibits dilution or concealment of emissions. This facility operates in compliance with these requirements.

Rule 336.1911 requires the facility to develop a malfunction abatement plan if and when requested by the department. The facility will develop and implement a malfunction abatement plan upon receipt of such request from the department.

This part also specifies the operating, notification, and reporting procedures associated with start- up, shutdown, and malfunction of a source, process or process equipment in R336.1912. The facility complies with all the requirements of this part in the event of a start-up, shutdown, or a malfunction as required by the general conditions section of the ROP.

Part 10 – Intermittent Testing and Sampling

Part 10 allows the department to require the owner or operator of a source to conduct performance tests using reference test methods or the department to conduct the tests on behalf of the state. Upon receipt of any such request from the department, the facility will conduct the specified performance test within the established timelines and following the agreed upon reference test methods. If the department intends to perform the test, the owner or operator will provide the necessary performance test facilities. ANR will comply with any state requests for testing as necessary.

Part 11 – Continuous Emission Monitoring

Part 11 sets the procedures for continuous emissions monitoring for fossil fuel-fired steam generators, sulfuric acid-producing facilities, fluid bed catalytic cracking unit catalyst regenerators at petroleum refineries, and coal-fired electric generating units at a power plant. The facility and the equipment do not fall into these categories; therefore, this part does not apply.

1.5 Proposed Changes to Existing Renewable Operating Permit

ANR has submitted two (2) Rule 215 (3) Notification of Off-Permit Changes. One was submitted for the new emergency generator in 2019 and another was submitted to install the two (2) 5.0 MMBtu/hr boilers.

1.6 SUMMARY

This document contains all the necessary elements for ANR to meet the requirements for a complete ROP renewal application under the EGLE rules and guidance. The only requested changes are to incorporate the changes requested in the two (2) Rule 215 (3) Notifications of Off-Permit Changes which were requested. A marked up permit with these changes is in Appendix C. ANR requests that this renewal application be reviewed, and a draft ROP be issued at the earliest convenience.

2 Application Form

EGLE

RENEWABLE OPERATING PERMIT
RENEWAL APPLICATION FORM

This information is required by Article II, Chapter 1, Part 55 (Air Pollution Control) of P.A. 451 of 1994, as amended, and the Federal Clean Air Act of 1990. Failure to obtain a permit required by Part 55 may result in penalties and/or imprisonment. Refer to instructions for additional information to complete the Renewable Operating Permit Renewal Application Form.

GENERAL INSTRUCTIONS

This application form should be submitted as part of an administratively complete application package for renewal of a Renewable Operating Permit (ROP). This application form consists of nine parts. Parts A – H must be completed for all applications and must also be completed for each section of a sectioned ROP. Answer all questions in all parts of the form unless directed otherwise. Detailed instructions for this application form can be found at http://michigan.gov/air (select the Permits Tab, "Renewable Operating Permits (ROP)/Title V", then "ROP Forms & Templates").

PART A: GENERAL INFORMATION

Enter information about the source, owner, contact person and the responsible official.

SOURCE INFORMATION

SRN	SIC Code	NAICS Code	Existing ROP Number	Section Number (if applicable)
N5586	4922	486210	MI-ROP-N5586-2019	

Source Name: ANR Pipeline Company - Lincoln Compressor Station

Street Address: 3991 South Hickory

City	State	ZIP Code	County
Lake George	MI	48633	Clare

Section/Town/Range (if address not available):

Source Description:
ANR Pipeline Company (ANR) owns and operates several facilities in Michigan that are used in both natural gas transmission and storage. The function of some ANR compressor stations, including Lincoln Compressor Station (Lincoln Station), is to maintain pressure in pipelines to transport natural gas from ANR's mainline to and from storage facilities located in Michigan or to local distribution companies or other end users. The ANR Lincoln Station is a natural gas compression and transmission station that operates three (3) natural gas-fired engines to recompress gas during transmission and one (1) natural gas-fired emergency generator.

☐ Check here if any of the above information is different than what appears in the existing ROP. Identify any changes on the marked-up copy of your existing ROP.

OWNER INFORMATION

Owner Name	Section Number (if applicable)
ANR Pipeline Company	

Mailing address (☐ check if same as source address)
700 Louisiana Street, Suite 700
Houston, TX 77002

City	State	ZIP Code	County	Country
Houston	TX	77002	Harris	USA

☐ Check here if any information in this ROP renewal application is confidential. Confidential information should be identified on an Additional Information (AI-001) Form.

SRN: N5586	Section Number (if applicable):

PART A: GENERAL INFORMATION (continued)

At least one contact and responsible official must be identified. Additional contacts and responsible officials may be included if necessary.

CONTACT INFORMATION

Contact 1 Name	Title			
Chris McFarlane	US Environment - Air			
Company Name & Mailing address (☐ check if same as source address)				
TC Energy 700 Louisiana Street, Suite 700				
City	State	ZIP Code	County	Country
Houston	TX	77002	Harris	USA
Phone number		E-mail address		
832-320-5490		Chris_mcfarlane@tcenergy.com		

Contact 2 Name (optional)	Title			
Company Name & Mailing address (☐ check if same as source address)				
City	State	ZIP Code	County	Country
Phone number		E-mail address		

RESPONSIBLE OFFICIAL INFORMATION

Responsible Official 1 Name	Title			
Brian Day	Area Manager – Mackinaw Area			
Company Name & Mailing address (☐ check if same as source address)				
Great Lakes Gas Transmission, 3400 Hickory Road				
City	State	ZIP Code	County	Country
Lake	MI	48632	Clare	USA
Phone number		E-mail address		
		Mike_coy@tcenergy.com		

Responsible Official 2 Name (optional)	Title			
Company Name & Mailing address (☐ check if same as source address)				
City	State	ZIP Code	County	Country
Phone number		E-mail address		

☐ Check here if an AI-001 Form is attached to provide more information for Part A. Enter AI-001 Form ID:

SRN: N5586	Section Number (if applicable):

PART B: APPLICATION SUBMITTAL and CERTIFICATION by Responsible Official

Identify the items that are included as part of your administratively complete application in the checklist below. For your application to be complete, it must include information necessary to evaluate the source and to determine all applicable requirements. Answer the compliance statements as they pertain to all the applicable requirements to which the source is subject. The source's Responsible Official must sign and date this form.

Listing of ROP Application Contents. Check the box for the items included with your application.	
☒ Completed ROP Renewal Application Form (and any AI-001 Forms) (required)	☐ Compliance Plan/Schedule of Compliance
☒ Mark-up copy of existing ROP using official version from the AQD website (required)	☐ Stack information
☐ Copies of all Permit(s) to Install (PTIs) that have not been incorporated into existing ROP (required)	☐ Acid Rain Permit Initial/Renewal Application
☒ Criteria Pollutant/Hazardous Air Pollutant (HAP) Potential to Emit Calculations	☐ Cross-State Air Pollution Rule (CSAPR) Information
☐ MAERS Forms (to report emissions not previously submitted)	☐ Confidential Information
☐ Copies of all Consent Order/Consent Judgments that have not been incorporated into existing ROP	☒ Paper copy of all documentation provided (required)
☐ Compliance Assurance Monitoring (CAM) Plan	☒ Electronic documents provided (optional)
☐ Other Plans (e.g., Malfunction Abatement, Fugitive Dust, Operation and Maintenance, etc.)	☐ Other, explain:

Compliance Statement	
This source is in compliance with **all** of its applicable requirements, including those contained in the existing ROP, Permits to Install that have not yet been incorporated into that ROP, and other applicable requirements not currently contained in the existing ROP.	☒ Yes ☐ No
This source will continue to be in compliance with all of its applicable requirements, including those contained in the existing ROP, Permits to Install that have not yet been incorporated into that ROP, and other applicable requirements not currently contained in the existing ROP.	☒ Yes ☐ No
This source will meet in a timely manner applicable requirements that become effective during the permit term.	☒ Yes ☐ No
The method(s) used to determine compliance for each applicable requirement is/are the method(s) specified in the existing ROP, Permits to Install that have not yet been incorporated into that ROP, and all other applicable requirements not currently contained in the existing ROP.	
If any of the above are checked No, identify the emission unit(s) or flexible group(s) affected and the specific condition number(s) or applicable requirement for which the source is or will be out of compliance at the time of issuance of the ROP renewal on an AI-001 Form. Provide a compliance plan and schedule of compliance on an AI-001 Form.	

Name and Title of the Responsible Official (Print or Type)

Brian Day, Area Manager – Great Lakes

As a Responsible Official, I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this application are true, accurate, and complete.

Signature of Responsible Official BRIAN A. DAY AREA MANAGER - Mackinaw Area **Date** January 8th, 2023

SRN: N5586	Section Number (if applicable):

PART C: SOURCE REQUIREMENT INFORMATION

Answer the questions below for specific requirements or programs to which the source may be subject.

C1.	Actual emissions and associated data from **all** emission units with applicable requirements (including those identified in the existing ROP, Permits to Install and other equipment that have not yet been incorporated into the ROP) are required to be reported in MAERS. Are there any emissions and associated data that have not been reported in MAERS for the most recent emissions reporting year? If Yes, identify the emission unit(s) that was/were not reported in MAERS on an AI-001 Form. Applicable MAERS form(s) for unreported emission units must be included with this application.	☐ Yes ☒ No
C2.	Is this source subject to the federal regulations on ozone-depleting substances? (40 CFR Part 82)	☒ Yes ☐ No
C3.	Is this source subject to the federal Chemical Accident Prevention Provisions? (Section 112(r) of the Clean Air Act Amendments, 40 CFR Part 68)	☐ Yes ☒ No
	If Yes, a Risk Management Plan (RMP) and periodic updates must be submitted to the USEPA. Has an updated RMP been submitted to the USEPA?	☐ Yes ☐ No
C4.	Has this stationary source **added or modified** equipment since the last ROP renewal that changes the potential to emit (PTE) for criteria pollutant (CO, NOx, PM10, PM2.5, SO_2, VOC, lead) emissions? If Yes, include potential emission calculations (or the PTI and/or ROP revision application numbers, or other references for the PTE demonstration) for the added or modified equipment on an AI-001 Form. If No, criteria pollutant potential emission calculations do not need to be included.	☐ Yes ☒ No
C5.	Has this stationary source **added or modified** equipment since the last ROP renewal that changes the PTE for hazardous air pollutants (HAPs) regulated by Section 112 of the federal Clean Air Act? If Yes, include potential emission calculations (or the PTI and/or ROP revision application numbers or other references for the PTE demonstration) for the added or modified equipment on an AI-001 Form. Fugitive emissions must be included in HAP emission calculations. If No, HAP potential emission calculations do not need to be included.	☐ Yes ☒ No
C6.	Are any emission units subject to the Cross-State Air Pollution Rule (CSAPR)? If Yes, identify the specific emission unit(s) subject to CSAPR on an AI-001 Form.	☐ Yes ☒ No
C7.	Are any emission units subject to the federal Acid Rain Program? If Yes, identify the specific emission unit(s) subject to the federal Acid Rain Program on an AI-001 Form.	☐ Yes ☒ No
	Is an Acid Rain Permit Renewal Application included with this application?	☐ Yes ☒ No
C8.	Are any emission units identified in the existing ROP subject to compliance assurance monitoring (CAM)? If Yes, identify the specific emission unit(s) subject to CAM on an AI-001 Form. If a CAM plan has not been previously submitted to EGLE, one must be included with the ROP renewal application on an AI-001 Form. If the CAM Plan has been updated, include an updated copy.	☐ Yes ☒ No
	Is a CAM plan included with this application?	☐ Yes ☐ No
	If a CAM Plan is included, check the type of proposed monitoring included in the Plan: 1. Monitoring proposed by the source based on performance of the control device, or	☐
	2. Presumptively Acceptable Monitoring, if eligible	☐
C9.	Does the source have any plans such as a malfunction abatement plan, fugitive dust plan, operation/maintenance plan, or any other monitoring plan that is referenced in an existing ROP, Permit to Install requirement, or any other applicable requirement? If Yes, then a copy must be submitted as part of the ROP renewal application.	☐ Yes ☒ No
C10.	Are there any specific requirements that the source proposes to be identified in the ROP as non-applicable? If Yes, then a description of the requirement and justification must be submitted as part of the ROP renewal application on an AI-001 Form.	☐ Yes ☒ No

☐ Check here if an AI-001 Form is attached to provide more information for Part C. Enter AI-001 Form ID: **AI-**Part C

SRN: N5586	Section Number (if applicable):

PART D: PERMIT TO INSTALL (PTI) EXEMPT EMISSION UNIT INFORMATION

Review all emission units at the source and answer the question below.

D1. Does the source have any emission units that do not appear in the existing ROP but are required to be listed in the ROP application under R 336.1212(4) (Rule 212(4)) of the Michigan Air Pollution Control Rules? If Yes, identify the emission units in the table below. ☒ Yes ☐ No

If No, go to Part E.

Note: Emission units that are subject to process specific emission limitations or standards, even if identified in Rule 212, must be captured in either Part G or H of this application form. Identical emission units may be grouped (e.g. PTI exempt Storage Tanks).

Emission Unit ID	**Emission Unit Description**	**Rule 212(4) Citation** [e.g. Rule 212(4)(c)]	**Rule 201 Exemption Rule Citation** [e.g. Rule 282(2)(b)(i)]
EUBOILER-1	Natural Gas-Fired Boiler 5.0 MMbtu/hr	R336.1282(2)(b)(i)	R336.1212(4)(b)
EUBOILER-2	Natural Gas-Fired Boiler 5.0 MMbtu/hr	R336.1282(2)(b)(i)	R336.1212(4)(b)
EULIFURNACE-1	Furnace in Office Building, rated at 0.204 MMBtu/hr	R336.1282(b)(i)	R336.1212(4)(b)
EULIWTRHTR-1	One (1) water heater in Office Building, 0.083 MMBtu/hr	R336.1282(b)(i)	R336.1212(4)(b)
EULIHTR-1	Seven (7) heaters in Warehouse Building 0.125 MMBtu each	R336.1282(b)(i)	R336.1212(4)(b)
EULIHTR-2	One (1) heater in Chromatograph Skid Building 0.01 MMBtu/hr	R336.1282(b)(i)	R336.1212(4)(b)
EULIHTR-3	Two (2) heaters in Dehy Control Building 0.05 MMBtu/hr	R336.1282(b)(i)	R336.1212(4)(b)
EULIWTRHTR-2	One (1) water heater in Dehy Control Building 0.038 MMBtu/hr	R336.1282(b)(i)	R336.1212(4)(b)
EULIHTR-4	One (1) heater in Dehy/Separator Skid Building 0.01 MMBtu/hr	R336.1282(b)(i)	R336.1212(4)(b)
EULIHTR-5	One (1) heater in Old Communication Building 0.1 MMBtu/hr	R336.1282(b)(i)	R336.1212(4)(b)
EULIHTR-6	One (1) heater in Valve PCV 105 0.004 MMBtu/hr	R336.1282(b)(i)	R336.1212(4)(b)
EULIHTR-7	One (1) heater in Valve Dehy Pressure Control 0.006 MMBtu/hr	R336.1282(b)(i)	R336.1212(4)(b)
EULIHTR-8	One (1) heater in Valve PCV 104 0.004 MMBtu/hr	R336.1282(b)(i)	R336.1212(4)(b)
EULIHTR-9	One (1) heater in Valve PCV 104 0.006 MMBtu/hr	R336.1282(b)(i)	R336.1212(4)(b)
EULIHTR-10	Two (2) heaters in Valve MCU/PCV 103, 0.004 MMBtu/hr each	R336.1282(b)(i)	R336.1212(4)(b)
EULIHTR-11	One (1) heater in Corrosion Inhibitor Injection Point 0.004 MMBtu/hr	R336.1282(b)(i)	R336.1212(4)(b)

EULIHTR-12	One (1) Heater in Separator Shed 0.025 MMBtu/hr	R336.1282(b)(i)	R336.1212(4)(b)
EULIHTR-13	Two (2) heaters in Great Lakes Meter Run Valve PCV 101 A, 0.004 MMBtu/hr each	R336.1282(b)(i)	R336.1212(4)(b)
EULIWTRHTR-3	One (1) water heater in Warehouse Bldg., 0.065 MMBtu/hr	R336.1282(b)(i)	R336.1212(4)(b)
EULIHTR-14	Four (4) catalytic heaters	R336.1282(b)(i)	R336.1212(4)(b)
EULILUBE	Lube Oil Storage Tank, 10,000 gal, T-9 (does not vent to atm)	R336.1284(c)	R336.1212(3)(e)
EULIMAINTOIL	Maintenance Oil Storage Tank, 1,500 gal, T-8	R336.1284(c)	R336.1212(3)(e)
EULIMAINTOIL2	Maintenance Oil Storage Tank, 2,115 gal, T-10	R336.1284(c)	R336.1212(3)(e)
EULIUSEDOIL	Used Oil Storage Tank, 3,760 gal, T-7	R336.1284(c)	R336.1212(3)(e)
EULI008	Condensate Storage Tank, 12,800 gal, T-11	R336.1284(e)	R336.1212(4)(c)
EULIAMBITROL	Ambitrol Storage Tank, 1,000 gal, T-2	R336.1284(i)	R336.1212(4)(c)
EULIAMBMIX1	Maintenance Ambitrol Storage Tank, 10,500 gal, T-1	R336.1284(i)	R336.1212(4)(c)
EULIAMBMIX2	Ambitrol Storage Tank, 7,050 gal, T-3	R336.1284(i)	R336.1212(4)(c)
EULIMETHANOL	Methanol Storage Tank, 3,750 gal, T-18	R336.1284(i)	R336.1212(4)(c)
EULIGASOLINE	Gasoline Storage Tank, 1,000 gal, T-12	R336.1284(i)	R336.1212(4)(c)
	Gasoline Storage Tank, 1,000 gal, T-13	R336.1284(i)	R336.1212(4)(c)
EULIDIESEL	Diesel Storage Tank, 1,000 gal, T-14	R336.1284(i)	R336.1212(4)(c)
EULIPROWTR1	Process Water Tank 1, 1,500 gal, T-15	R336.1284(i)	R336.1212(4)(c)
EULIPROWTR2	1,212-gallon Process Water Tank 2	R336.1284(i)	R336.1212(4)(c)
EULIREMPRO	Remediation Project	R336.1285(w)	R336.1212(3)(f)
Comments:			

☐ Check here if an AI-001 Form is attached to provide more information for Part D. Enter AI-001 Form ID: **AI-**

SRN: N5586	Section Number (if applicable):

PART E: EXISTING ROP INFORMATION

Review all emission units and applicable requirements (including any source wide requirements) in the existing ROP and answer the questions below as they pertain to **all** emission units and **all** applicable requirements in the existing ROP.

E1. Does the source propose to make any additions, changes or deletions to terms, conditions and underlying applicable requirements as they appear in the existing ROP? If Yes, identify changes and additions on Part F, Part G and/or Part H.	☐ Yes ☒ No
E2. For each emission unit(s) identified in the existing ROP, all stacks with applicable requirements are to be reported in MAERS. Are there any stacks with applicable requirements for emission unit(s) identified in the existing ROP that were not reported in the most recent MAERS reporting year? If Yes, identity the stack(s) that was/were not reported on applicable MAERS form(s).	☐ Yes ☒ No
E3. Have any emission units identified in the existing ROP been modified or reconstructed that required a PTI? If Yes, complete Part F with the appropriate information.	☐ Yes ☒ No
E4. Have any emission units identified in the existing ROP been dismantled? If Yes, identify the emission unit(s) and the dismantle date in the comment area below or on an AI-001 Form.	☐ Yes ☒ No

Comments:

☐ Check here if an AI-001 Form is attached to provide more information for Part E. Enter AI-001 Form ID: **AI-**

SRN: N5586	Section Number (if applicable):

PART F: PERMIT TO INSTALL (PTI) INFORMATION

Review all emission units and applicable requirements at the source and answer the following questions as they pertain to **all** emission units with PTIs. Any PTI(s) identified below must be attached to the application.

F1. Has the source obtained any PTIs where the applicable requirements from the PTI have not been incorporated into the existing ROP? If Yes, complete the following table. If No, go to Part G. ☐ Yes ☒ No

Permit to Install Number	Emission Units/Flexible Group ID(s)	Description (*Include Process Equipment, Control Devices and Monitoring Devices*)	Date Emission Unit was Installed/ Modified/ Reconstructed

F2. Do any of the PTIs listed above change, add, or delete terms/conditions to **established emission units** in the existing ROP? If Yes, identify the emission unit(s) or flexible group(s) affected in the comments area below or on an AI-001 Form and identify all changes, additions, and deletions in a mark-up of the existing ROP. ☐ Yes ☐ No

F3. Do any of the PTIs listed above identify **new emission units** that need to be incorporated into the ROP? If Yes, submit the PTIs as part of the ROP renewal application on an AI-001 Form, and include the new emission unit(s) or flexible group(s) in the mark-up of the existing ROP. ☐ Yes ☐ No

F4. Are there any stacks with applicable requirements for emission unit(s) identified in the PTIs listed above that were not reported in MAERS for the most recent emissions reporting year? If Yes, identity the stack(s) that were not reported on the applicable MAERS form(s). ☐ Yes ☐ No

F5. Are there any proposed administrative changes to any of the emission unit names, descriptions or control devices in the PTIs listed above for any emission units not already incorporated into the ROP? If Yes, describe the changes on an AI-001 Form. ☐ Yes ☐ No

Comments:

☐ Check here if an AI-001 Form is attached to provide more information for Part F. Enter AI-001 Form ID: **AI-**

SRN: N5586	Section Number (if applicable):

PART G: EMISSION UNITS MEETING THE CRITERIA OF RULES 281(2)(h), 285(2)(r)(iv), 287(2)(c), OR 290

Review all emission units and applicable requirements at the source and answer the following questions.

G1. Does the source have any new and/or existing emission units which do not already appear in the existing ROP and which meet the criteria of Rules 281(2)(h), 285(2)(r)(iv), 287(2)(c), or 290.

If Yes, identify the emission units in the table below. If No, go to Part H. ☐ Yes ☒ No

Note: If several emission units were installed under the same rule above, provide a description of each and an installation/modification/reconstruction date for each.

Origin of Applicable Requirements	**Emission Unit Description – *Provide Emission Unit ID and a description of Process Equipment, Control Devices and Monitoring Devices***	**Date Emission Unit was Installed/ Modified/ Reconstructed**
☐ Rule 281(2)(h) or 285(2)(r)(iv) cleaning operation		
☐ Rule 287(2)(c) surface coating line		
☐ Rule 290 process with limited emissions		

Comments:

☐ Check here if an AI-001 Form is attached to provide more information for Part G. Enter AI-001 Form ID: **AI-**

SRN: N5586	Section Number (if applicable):

PART H: REQUIREMENTS FOR ADDITION OR CHANGE

Complete this part of the application form for all proposed additions, changes or deletions to the existing ROP. This includes state or federal regulations that the source is subject to and that must be incorporated into the ROP or other proposed changes to the existing ROP. **Do not include additions or changes that have already been identified in Parts F or G of this application form.** If additional space is needed copy and complete an additional Part H.

Complete a separate Part H for each emission unit with proposed additions and/or changes.

H1. Are there changes that need to be incorporated into the ROP that have not been identified in Parts F and G? If Yes, answer the questions below.	☐ Yes	☒ No
H2. Are there any proposed administrative changes to any of the existing emission unit names, descriptions or control devices in the ROP? If Yes, describe the changes in questions H8 – H16 below and in the affected Emission Unit Table(s) in the mark-up of the ROP.	☐ Yes	☒ No
H3. Does the source propose to add a new emission unit or flexible group to the ROP not previously identified in Parts F or G? If Yes, identify and describe the emission unit name, process description, control device(s), monitoring device(s) and applicable requirements in questions H8 – H16 below and in a new Emission Unit Table in the mark-up of the ROP. See instructions on how to incorporate a new emission unit/flexible group into the ROP.	☐ Yes	☒ No
H4. Does the source propose to add new state or federal regulations to the existing ROP? If Yes, on an AI-001 Form, identify each emission unit/flexible group that the new regulation applies to and identify each state or federal regulation that should be added. Also, describe the new requirements in questions H8 – H16 below and add the specific requirements to existing emission units/flexible groups in the mark-up of the ROP, create a new Emission Unit/Flexible Group Table, or add an AQD template table for the specific state or federal requirement.	☐ Yes	☒ No
H5. Has a Consent Order/Consent Judgment (CO/CJ) been issued where the requirements were not incorporated into the existing ROP? If Yes, list the CO/CJ number(s) below and add or change the conditions and underlying applicable requirements in the appropriate Emission Unit/Flexible Group Tables in the mark-up of the ROP.	☐ Yes	☒ No
H6. Does the source propose to add, change and/or delete **source-wide** requirements? If Yes, identify the addition/change/deletion in a mark-up of the corresponding section of the ROP and provide a justification below.	☐ Yes	☒ No
H7. Are you proposing to **streamline** any requirements? If Yes, identify the streamlined and subsumed requirements and the EU ID, and provide a justification for streamlining the applicable requirement below.	☐ Yes	☒ No

SRN: N5586	Section Number (if applicable):

PART H: REQUIREMENTS FOR ADDITION OR CHANGE – (continued)

H8. Does the source propose to add, change and/or delete **emission limit** requirements? If Yes, identify the addition/change/deletion in a mark-up of the corresponding section of the ROP and provide a justification below.	☐ Yes ☒ No
H9. Does the source propose to add, change and/or delete **material limit** requirements? If Yes, identify the addition/change/deletion in a mark-up of the corresponding section of the ROP and provide a justification below.	☐ Yes ☒ No
H10. Does the source propose to add, change and/or delete **process/operational restriction** requirements? If Yes, identify the addition/change/deletion in a mark-up of the corresponding section of the ROP and provide a justification below.	☐ Yes ☒ No
H11. Does the source propose to add, change and/or delete **design/equipment parameter** requirements? If Yes, identify the addition/change/deletion in a mark-up of the corresponding section of the ROP and provide a justification below.	☐ Yes ☒ No
H12. Does the source propose to add, change and/or delete **testing/sampling** requirements? If Yes, identify the addition/change/deletion in a mark-up of the corresponding section of the ROP and provide a justification below.	☐ Yes ☒ No
H13. Does the source propose to add, change and/or delete **monitoring/recordkeeping** requirements? If Yes, identify the addition/change/deletion in a mark-up of the corresponding section of the ROP and provide a justification below.	☐ Yes ☒ No
H14. Does the source propose to add, change and/or delete **reporting** requirements? If Yes, identify the addition/change/deletion in a mark-up of the corresponding section of the ROP and provide a justification below. Propose to incorporate language for the reporting under Rule 285(2)(mm) to match the EGLE template for Rule 285(2)(mm) Natural Gas & Field Gas Venting	☐ Yes ☒ No

PART H: REQUIREMENTS FOR ADDITION OR CHANGE – (continued)

H15.	Does the source propose to add, change and/or delete **stack/vent restrictions**? If Yes, identify the addition/change/deletion in a mark-up of the corresponding section of the ROP and provide a justification below.	☐ Yes ☒ No
H16.	Does the source propose to add, change and/or delete any **other** requirements? If Yes, identify the addition/change/deletion in a mark-up of the corresponding section of the ROP and provide a justification below.	☐ Yes ☒ No
H17.	Does the source propose to add terms and conditions for an alternative operating scenario or intra-facility trading of emissions? If Yes, identify the proposed conditions in a mark-up of the corresponding section of the ROP and provide a justification below.	☐ Yes ☒ No

☐ Check here if an AI-001 Form is attached to provide more information for Part H. Enter AI-001 Form ID: **AI-**

EGLE

RENEWABLE OPERATING PERMIT APPLICATION
AI-001: ADDITIONAL INFORMATION

This information is required by Article II, Chapter 1, part 55 (Air Pollution Control) of P.A. 451 of 1994, as amended, and the Federal Clean Air Act of 1990. Failure to obtain a permit required by Part 55 may result in penalties and/or imprisonment. Please type or print clearly. Refer to instructions for additional information to complete this form.

	SRN: N5586	Section Number (if applicable):

1. Additional Information ID
AI-Part C

Additional Information

2. Is This Information Confidential? ☐ Yes ☒ No

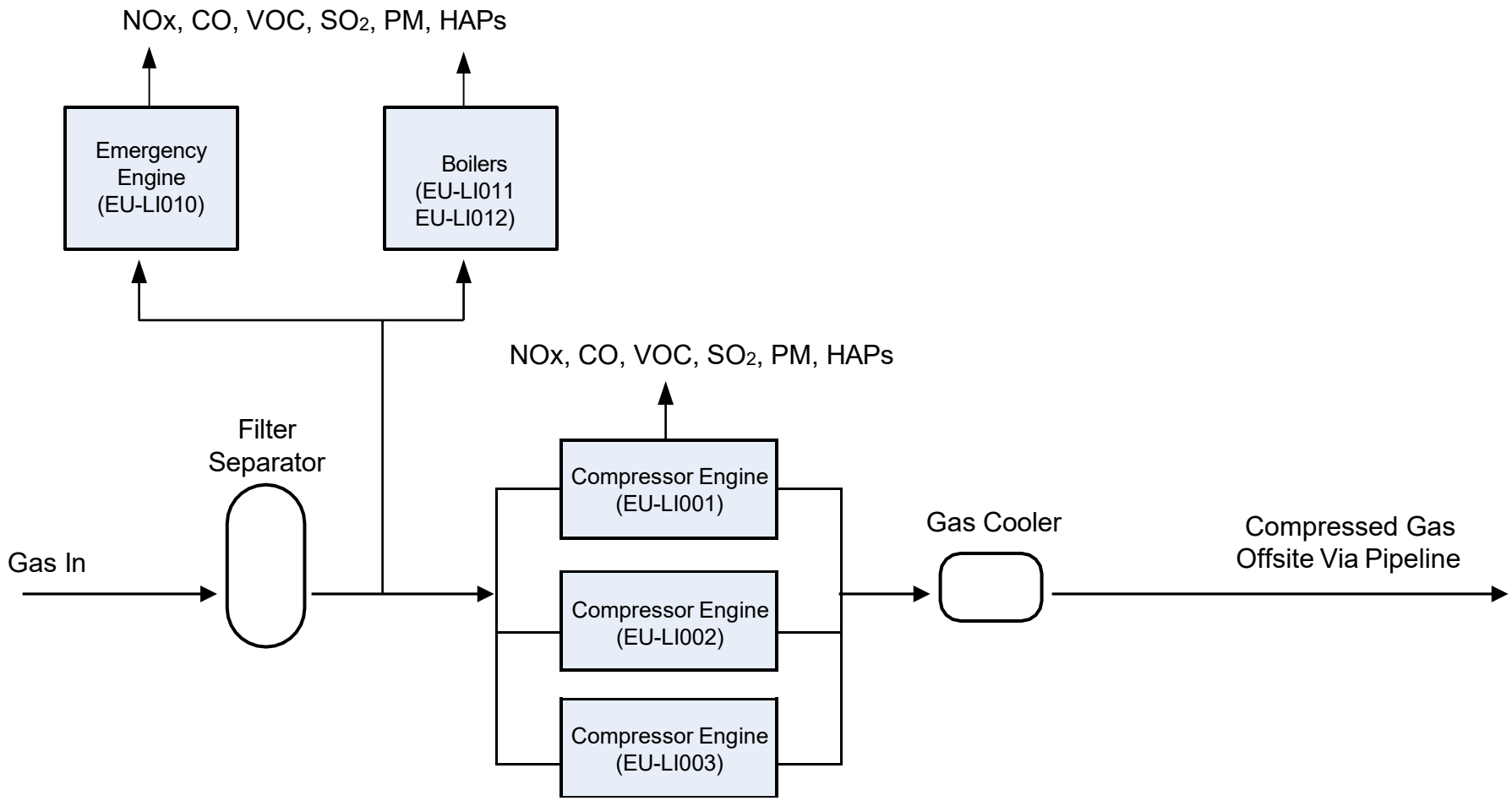
See Appendix B for Criteria Pollutant, HAP and GHG emissions calculations.

Page of

APPENDICIES

Appendix A Area Maps and Process Flow Diagrams

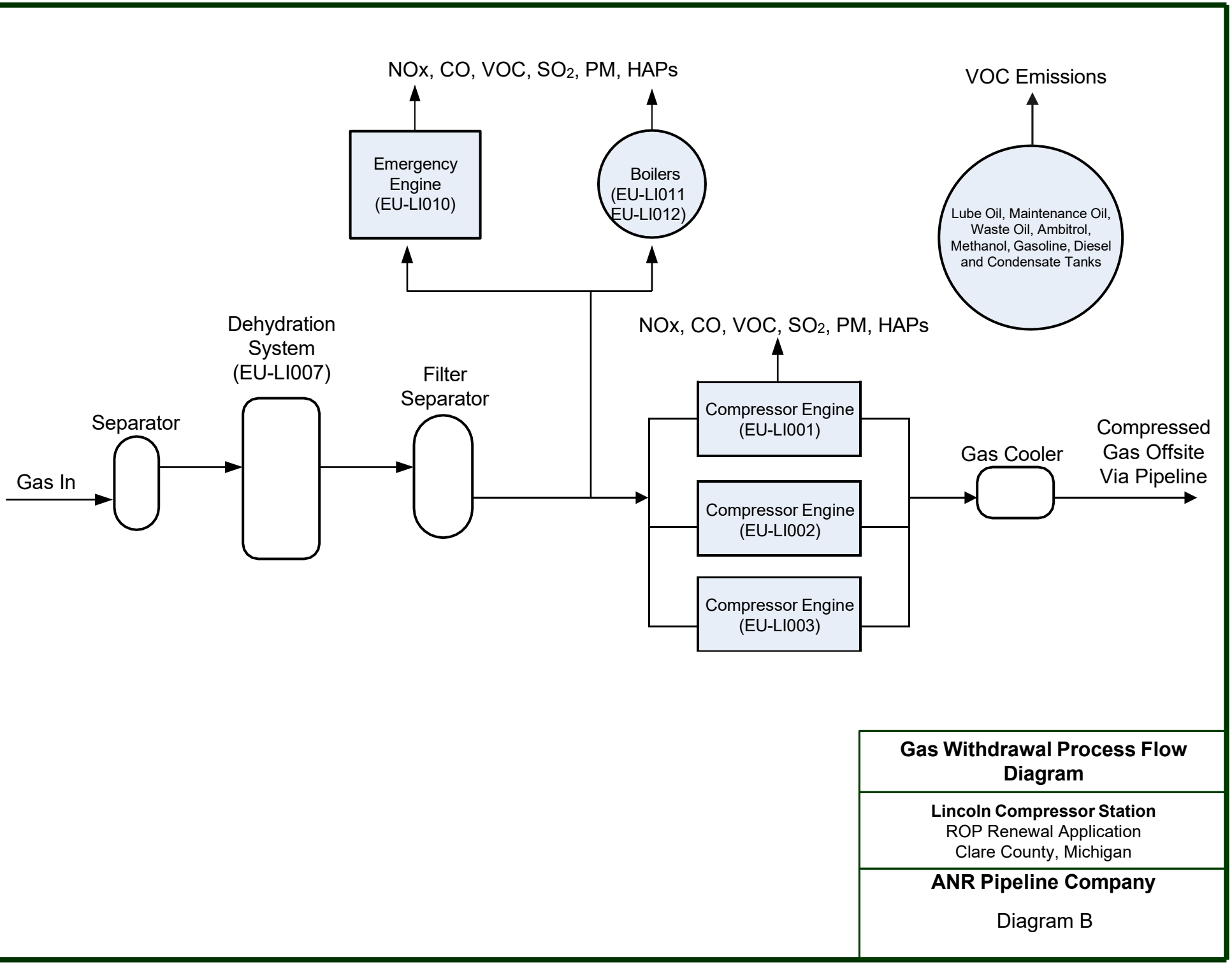
ANR – Lincoln Compressor Station	TC Energy	Area Map
Area Map		December 2023

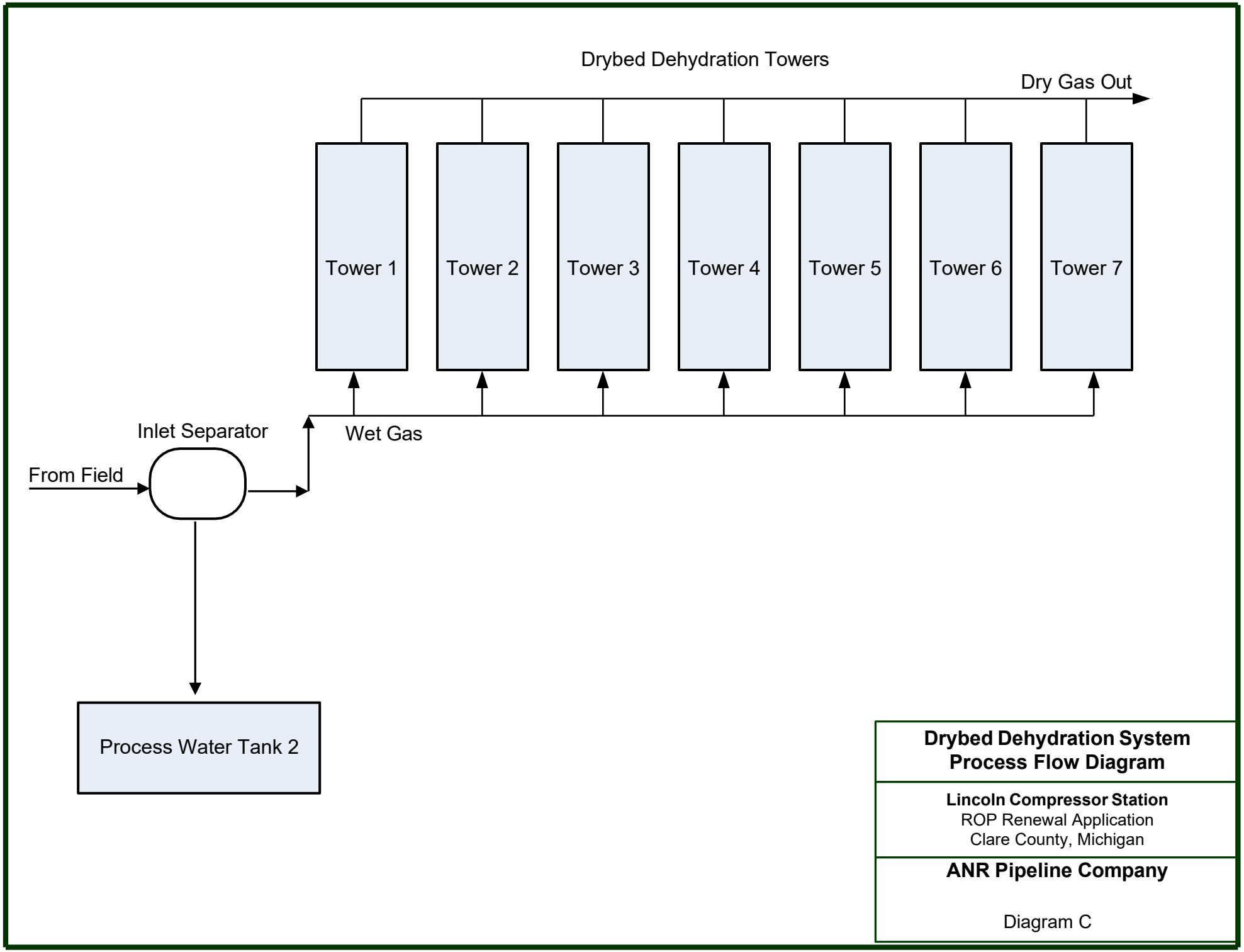


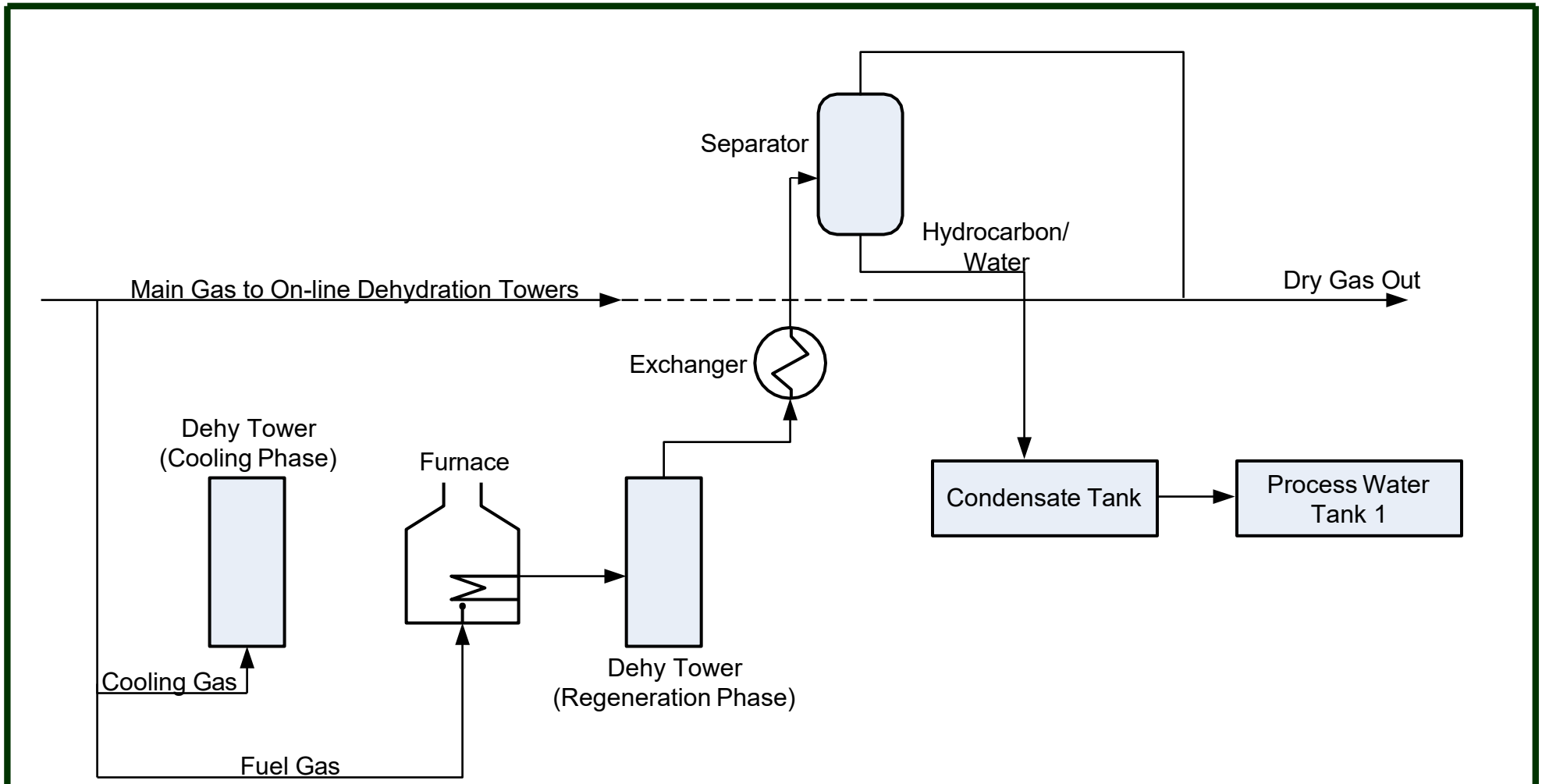
Gas Injection Process Flow Diagram

Lincoln Compressor Station
ROP Renewal Application
Clare County, Michigan

Diagram A


NOx, CO, VOC, SO2, PM, HAPs
Emergency Engine (EU-LI010)
Boilers (EU-LI011 EU-LI012)
VOC Emissions
Lube Oil, Maintenance Oil, Waste Oil, Ambitrol, Methanol, Gasoline, Diesel and Condensate Tanks
Dehydration System (EU-LI007)
Filter Separator
NOx, CO, VOC, SO2, PM, HAPs
Separator
Gas In
Compressor Engine (EU-LI001)
Compressor Engine (EU-LI002)
Compressor Engine (EU-LI003)
Gas Cooler
Compressed Gas Offsite Via Pipeline
Gas Withdrawal Process Flow Diagram
Lincoln Compressor Station
ROP Renewal Application
Clare County, Michigan
ANR Pipeline Company
Diagram B


Drybed Dehydration Towers
Dry Gas Out
Tower 1
Tower 2
Tower 3
Tower 4
Tower 5
Tower 6
Tower 7
Inlet Separator
Wet Gas
From Field
Process Water Tank 2
Drybed Dehydration System
Process Flow Diagram
Lincoln Compressor Station
ROP Renewal Application
Clare County, Michigan
ANR Pipeline Company
Diagram C



Drybed Dehydration Regeneration Process Flow Diagram

Lincoln Compressor Station
ROP Renewal Application
Clare County, Michigan

ANR Pipeline Company

Diagram D

Appendix B Emission Calculations

TITLE V RENEWAL
ANR PIPELINE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Significant Activities

Emission Point ID	Source	Manufacturer	Model/Type	Rated Capacity (hp)	Heat Input (MMBtu/hr)
EU-LI001	Compressor Engine 1	Clark	TLAD8	3,200	22.4
EU-LI002	Compressor Engine 2	Clark	TLAD8	3,200	22.4
EU-LI003	Compressor Engine 3	Cooper-Bessemer	16W330	8,000	55.2
EU-LI009	Dehydration Furnace	N/A	N/A	N/A	6.6
EU-LI010	Emergency Engine	Caterpillar	G379	755	5.4
EU-LI011	Natural Gas Fired Boiler	CleaverBrooks	CFC-E 5000	N/A	5.0
EU-LI012	Natural Gas Fired Boiler	CleaverBrooks	CFC-E 5000	N/A	5.0

Insignificant Activities

Emission Point ID	Source Description	Installation Date	Rating/ Capacity	RO Permit Exemption Rule	NSR Permit Exemption Rule	Basis for Permit Exemption
EULIFURNACE-1	Furnace in Office Building	1995	0.204 MMBtu/hr	R336.1212(4)(b)	R336.1282(b)(i)	< 50 MMBtu/hr Each unit fires sweet natural gas, is used for space heating, service water heating, electric power generation, oil and gas production or processing, and has input capacity of less than 50 MMBtu/hr.
EULIWTRHTR-1	One (1) water heater in Office Building	1971	0.083 MMBtu/hr			
EULIHTR-1	Seven (7) heaters in Warehouse Building	1974	0.125 MMBtu/hr			
EULIHTR-2	One (1) heater in Chromatograph Skid Building	2002	0.01 MMBtu/hr			
EULIHTR-3	Two (2) heaters in Dehy Control Building	1989	0.05 MMBtu/hr			
EULIWTRHTR-2	One (1) water heater in Dehy Control Building	1984	0.038 MMBtu/hr			
EULIHTR-4	One (1) heater in Dehy/Separator Skid Building	1970	0.01 MMBtu/hr			
EULIHTR-5	One (1) heater in Old Communication Building	1970	0.1 MMBtu/hr			
EULIHTR-6	One (1) heater in Valve PCV 105	1980	0.004 MMBtu/hr			
EULIHTR-7	One (1) heater in Valve Dehy Pressure Control	1991	0.006 MMBtu/hr			
EULIHTR-8	One (1) heater in Valve PCV 104	1980	0.004 MMBtu/hr			
EULIHTR-9	One (1) heater in Valve PCV 104	1980	0.006 MMBtu/hr			
EULIHTR-10	Two (2) heaters in Valve MCU/PCV 103	1980	0.004 MMBtu/hr			
EULIHTR-11	One (1) heater in Corrosion Inhibitor Injection Point	1991	0.004 MMBtu/hr			
EULIHTR-12	One (1) Heater in Separator Shed	1970	0.025 MMBtu/hr			
EULIHTR-13	Two (2) heaters in Great Lakes Meter Run Valve PCV 101 A	1980	0.004 MMBtu/hr			
EULIWTRHTR-3	One (1) water heater in Warehouse Bldg.	1974	0.065 MMBtu/hr			
EULIHTR-14	Four (4) catalytic heaters		0.099 MMBtu/hr			
EULILUBE	Lube Oil Storage Tank, T-9 (does not vent to atmosphere)	1970	10,000 gal	R336.1212(3)(e)	R336.128(c)	Container Contents - Each tank is used to store lubricating, hydraulic, thermal oils or indirect heat transfer fluids.
EULIMAINTOIL	Maintenance Oil Storage Tank, T-8	1970	1,500 gal			
EULIMAINTOIL2	Maintenance Oil Storage Tank, T-10	1974	2,115 gal			
EULIUSEDOIL	Used Oil Storage Tank, T-7	1974	3,760 gal			
EULI008	Condensate Storage Tank, T-11	1963	12,800 gal	R336.1212(4)(c)	R336.1284(e)	< 40,000 gallons Each tank is used to store sweet condensate and has a capacity of less than 40,000 gallons.
EULIAMBITROL	Ambitrol Storage Tank, T-2	1970	1,000 gal	R336.1212(4)(c)	R336.1284(i)	< 40,000 gallons and contents with a vapor pressure of ≤ 1.5 psia Each tank has a capacity of less than 40,000 gallons and is used to store non-carcinogenic liquids with a vapor pressure of not more than 1.5 psia at the actual storage conditions.
EULIAMBMIX1	Maintenance Ambitrol Storage Tank, T-1	1970	10,500 gal			
EULIAMBMIX2	Ambitrol Storage Tank, T-3	1974	7,050 gal			
EULIMETHANOL	Methanol Storage Tank,T-18	1997	3,750 gal			
EULIGASOLINE	Gasoline Storage Tank, T-12	1999	1,000 gal			
	Gasoline Storage Tank, T-13	1999	1,000 gal			
EULIDIESEL	Diesel Storage Tank, T-14	1999	1,000 gal			
EULIPROWTR1	Process Water Tank 1, T-15	1963	1,500 gal			
EULIPROWTR2	Process Water Tank 2	1974	1,212 gal			
EULIREMPRO	Remediation Project	1999		R336.1212(3)(f)	R336.1285(w)	The project utilizes air stripping technology, is controlled by an appropriately designed and operated catalytic oxidation system and is used exclusively for clean up of gasoline, natural gas condensate, and crude oil spills.

TITLE V RENEWAL
ANR PIPELINE COMPANY

LINCOLN COMPRESSOR STATION, MICHIGAN

Unit	Unit Description	HP	Type	Heat Input	Potential Emission Rates											
					NOx		CO		VOC		PM		SO2		GHG's	
				(MMBtu/hr)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
EU-LI001	Compressor Engine 1	3,200	2SLB	22.40	101.59	444.95	10.16	44.50	7.05	30.90	1.08	4.74	0.013	0.058	2,620.35	11,477.11
EU-LI002	Compressor Engine 2	3,200	2SLB	22.40	101.59	444.95	10.16	44.50	7.05	30.90	1.08	4.74	0.013	0.058	2,620.35	11,477.11
EU-LI003	Compressor Engine 3	8,000	2SLB	55.20	255.73	1120.11	102.29	448.04	17.64	77.25	2.67	11.68	0.032	0.14	6,457.28	28,282.89
EU-LI009	Dehydration Furnace	N/A	-	6.63	0.65	2.85	0.55	2.39	0.036	0.16	0.05	0.22	3.90E-03	0.017	775.93	3,398.56
EU-LI010	Emergency Engine	755	4SRB	5.45	3.33	0.83	6.66	1.66	1.66	0.42	0.11	0.026	3.20E-03	8.01E-04	637.31	159.33
EU-LI011	Natural Gas Fired Boiler	N/A	-	5.00	0.49	2.15	0.41	1.80	0.027	0.12	0.037	0.16	2.94E-03	0.013	584.90	2,561.86
EU-LI012	Natural Gas Fired Boiler	N/A	-	5.00	0.49	2.15	0.41	1.80	0.027	0.12	0.037	0.16	2.94E-03	0.013	584.90	2,561.86
Total Emissions					**463.87**	**2,017.99**	**130.64**	**544.70**	**33.50**	**139.86**	**5.06**	**21.73**	**0.072**	**0.30**	**14,281.01**	**59,918.72**

TITLE V RENEWAL
ANR PIPELINE COMPANY

LINCOLN COMPRESSOR STATION, MICHIGAN

Compound	Emission Rate														Tanks		Total	
	EU-LI001 Engine 1		EU-LI002 Engine 2		EU-LI003 Engine 3		EU-LI009 Dehydration Furnace		EU-LI010 Emergency Engine		EU-LI011 Boiler		EU-LI012 Boiler					
	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
1,1,2,2-Tetrachloroethane	1.49E-03	6.50E-03	1.49E-03	6.50E-03	3.66E-03	1.60E-02	0.00E+00	0.00E+00	1.38E-04	3.45E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	6.77E-03	2.91E-02
1,1,2-Trichloroethane	1.18E-03	5.17E-03	1.18E-03	5.17E-03	2.91E-03	1.27E-02	0.00E+00	0.00E+00	8.34E-05	2.08E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	5.35E-03	2.31E-02
1,3-Butadiene	1.84E-02	8.05E-02	1.84E-02	8.05E-02	4.53E-02	1.98E-01	0.00E+00	0.00E+00	3.61E-03	9.03E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	8.56E-02	3.60E-01
1,3-Dichloropropene	9.81E-04	4.30E-03	9.81E-04	4.30E-03	2.42E-03	1.06E-02	0.00E+00	0.00E+00	6.92E-05	1.73E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	4.45E-03	1.92E-02
2,2,4-Trimethylpentane	1.90E-02	8.30E-02	1.90E-02	8.30E-02	4.67E-02	2.05E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	8.46E-02	3.71E-01
2-Methylnaphthalene	4.79E-04	2.10E-03	4.79E-04	2.10E-03	1.18E-03	5.17E-03	1.56E-07	6.84E-07	0.00E+00	0.00E+00	1.18E-07	5.15E-07	1.18E-07	5.15E-07	0	0	2.14E-03	9.37E-03
3-Methylcholanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-08	5.13E-08	0.00E+00	0.00E+00	8.82E-09	3.86E-08	8.82E-09	3.86E-08	0	0	2.94E-08	1.29E-07
7,12-Dimethylbenz(a)anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-07	4.56E-07	0.00E+00	0.00E+00	7.84E-08	3.44E-07	7.84E-08	3.44E-07	0	0	2.61E-07	1.14E-06
Acenaphthene	2.98E-05	1.30E-04	2.98E-05	1.30E-04	7.34E-05	3.22E-04	1.17E-08	5.13E-08	0.00E+00	0.00E+00	8.82E-09	3.86E-08	8.82E-09	3.86E-08	0	0	1.33E-04	5.83E-04
Acenaphthylene	7.10E-05	3.11E-04	7.10E-05	3.11E-04	1.75E-04	7.66E-04	1.17E-08	5.13E-08	0.00E+00	0.00E+00	8.82E-09	3.86E-08	8.82E-09	3.86E-08	0	0	3.17E-04	1.39E-03
Acetaldehyde	1.74E-01	7.61E-01	1.74E-01	7.61E-01	4.28E-01	1.88E+00	0.00E+00	0.00E+00	1.52E-02	3.80E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	7.91E-01	3.40E+00
Acrolein	1.74E-01	7.63E-01	1.74E-01	7.63E-01	4.29E-01	1.88E+00	0.00E+00	0.00E+00	1.43E-02	3.58E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	7.92E-01	3.41E+00
Anthracene	1.61E-05	7.04E-05	1.61E-05	7.04E-05	3.96E-05	1.74E-04	1.56E-08	6.84E-08	0.00E+00	0.00E+00	1.18E-08	5.15E-08	1.18E-08	5.15E-08	0	0	7.18E-05	3.15E-04
Benz(a)anthracene	7.53E-06	3.30E-05	7.53E-06	3.30E-05	1.85E-05	8.12E-05	1.17E-08	5.13E-08	0.00E+00	0.00E+00	8.82E-09	3.86E-08	8.82E-09	3.86E-08	0	0	3.36E-05	1.47E-04
Benzene	4.35E-02	1.90E-01	4.35E-02	1.90E-01	1.07E-01	4.69E-01	1.37E-05	5.98E-05	8.61E-03	2.15E-03	1.03E-05	4.51E-05	1.03E-05	4.51E-05	0	0	2.03E-01	8.52E-01
Benzo(a)pyrene	1.27E-07	5.57E-07	1.27E-07	5.57E-07	3.14E-07	1.37E-06	7.80E-09	3.42E-08	0.00E+00	0.00E+00	5.88E-09	2.58E-08	5.88E-09	2.58E-08	0	0	5.88E-07	2.57E-06
Benzo(b)fluoranthene	1.91E-07	8.35E-07	1.91E-07	8.35E-07	4.70E-07	2.06E-06	1.17E-08	5.13E-08	0.00E+00	0.00E+00	8.82E-09	3.86E-08	8.82E-09	3.86E-08	0	0	8.80E-07	3.86E-06
Benzo(e)pyrene	5.24E-07	2.30E-06	5.24E-07	2.30E-06	1.29E-06	5.66E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	2.34E-06	1.02E-05
Benzo(g,h,i)perylene	5.56E-07	2.43E-06	5.56E-07	2.43E-06	1.37E-06	6.00E-06	7.80E-09	3.42E-08	0.00E+00	0.00E+00	5.88E-09	2.58E-08	5.88E-09	2.58E-08	0	0	2.50E-06	1.09E-05
Benzo(k)fluoranthene	9.54E-08	4.18E-07	9.54E-08	4.18E-07	2.35E-07	1.03E-06	1.17E-08	5.13E-08	0.00E+00	0.00E+00	8.82E-09	3.86E-08	8.82E-09	3.86E-08	0	0	4.55E-07	1.99E-06
Biphenyl	8.85E-05	3.88E-04	8.85E-05	3.88E-04	2.18E-04	9.55E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	3.95E-04	1.73E-03
Carbon Tetrachloride	1.36E-03	5.96E-03	1.36E-03	5.96E-03	3.35E-03	1.47E-02	0.00E+00	0.00E+00	9.64E-05	2.41E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	6.17E-03	2.66E-02
Chlorobenzene	9.95E-04	4.36E-03	9.95E-04	4.36E-03	2.45E-03	1.07E-02	0.00E+00	0.00E+00	7.03E-05	1.76E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	4.51E-03	1.95E-02
Chloroform	1.06E-03	4.62E-03	1.06E-03	4.62E-03	2.60E-03	1.14E-02	0.00E+00	0.00E+00	7.46E-05	1.87E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	4.78E-03	2.06E-02
Chrysene	1.51E-05	6.59E-05	1.51E-05	6.59E-05	3.71E-05	1.62E-04	1.17E-08	5.13E-08	0.00E+00	0.00E+00	8.82E-09	3.86E-08	8.82E-09	3.86E-08	0	0	6.72E-05	2.94E-04
Dichlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.80E-06	3.42E-05	0.00E+00	0.00E+00	5.88E-06	2.58E-05	5.88E-06	2.58E-05	0	0	1.96E-05	8.57E-05
Ethylbenzene	2.42E-03	1.06E-02	2.42E-03	1.06E-02	5.96E-03	2.61E-02	0.00E+00	0.00E+00	1.35E-04	3.38E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	1.09E-02	4.73E-02
Ethylene Dibromide	1.64E-03	7.20E-03	1.64E-03	7.20E-03	4.05E-03	1.77E-02	0.00E+00	0.00E+00	1.16E-04	2.90E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	7.46E-03	3.22E-02
Fluoranthene	8.09E-06	3.54E-05	8.09E-06	3.54E-05	1.99E-05	8.73E-05	1.95E-08	8.54E-08	0.00E+00	0.00E+00	1.47E-08	6.44E-08	1.47E-08	6.44E-08	0	0	3.61E-05	1.58E-04
Fluorene	3.79E-05	1.66E-04	3.79E-05	1.66E-04	9.33E-05	4.09E-04	1.82E-08	7.98E-08	0.00E+00	0.00E+00	1.37E-08	6.01E-08	1.37E-08	6.01E-08	0	0	1.69E-04	7.40E-04
Formaldehyde	1.24E+00	5.42E+00	1.24E+00	5.42E+00	3.05E+00	1.33E+01	4.88E-04	2.14E-03	1.12E-01	2.79E-02	3.68E-04	1.61E-03	3.68E-04	1.61E-03	0	0	5.63E+00	2.42E+01
Indeno(1,2,3-c,d)pyrene	2.22E-07	9.74E-07	2.22E-07	9.74E-07	5.48E-07	2.40E-06	1.17E-08	5.13E-08	0.00E+00	0.00E+00	8.82E-09	3.86E-08	8.82E-09	3.86E-08	0	0	1.02E-06	4.48E-06
Methanol	5.56E-02	2.43E-01	5.56E-02	2.43E-01	1.37E-01	6.00E-01	0.00E+00	0.00E+00	1.67E-02	4.17E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	2.65E-01	1.09E+00
Methylene Chloride	3.29E-03	1.44E-02	3.29E-03	1.44E-02	8.11E-03	3.55E-02	0.00E+00	0.00E+00	2.24E-04	5.61E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	1.49E-02	6.44E-02
n-Hexane	9.97E-03	4.37E-02	9.97E-03	4.37E-02	2.46E-02	1.08E-01	1.17E-02	5.13E-02	0.00E+00	0.00E+00	8.82E-03	3.86E-02	8.82E-03	3.86E-02	0	0	7.39E-02	3.23E-01
Naphthalene	2.16E-03	9.45E-03	2.16E-03	9.45E-03	5.32E-03	2.33E-02	3.97E-06	1.74E-05	5.29E-04	1.32E-04	2.99E-06	1.31E-05	2.99E-06	1.31E-05	0	0	1.02E-02	4.24E-02
PAH	3.00E-03	1.31E-02	3.00E-03	1.31E-02	7.40E-03	3.24E-02	1.39E-07	6.10E-07	7.68E-04	1.92E-04	1.05E-07	4.59E-07	1.05E-07	4.59E-07	0	0	1.42E-02	5.89E-02
Perylene	1.11E-07	4.88E-07	1.11E-07	4.88E-07	2.74E-07	1.20E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	4.97E-07	2.18E-06
Phenanthrene	7.91E-05	3.46E-04	7.91E-05	3.46E-04	1.95E-04	8.53E-04	1.11E-07	4.84E-07	0.00E+00	0.00E+00	8.33E-08	3.65E-07	8.33E-08	3.65E-07	0	0	3.53E-04	1.55E-03
Phenol	9.43E-04	4.13E-03	9.43E-04	4.13E-03	2.32E-03	1.02E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	4.21E-03	1.84E-02
Propylene Oxide	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00
Pyrene	1.31E-05	5.73E-05	1.31E-05	5.73E-05	3.22E-05	1.41E-04	3.25E-08	1.42E-07	0.00E+00	0.00E+00	2.45E-08	1.07E-07	2.45E-08	1.07E-07	0	0	5.85E-05	2.56E-04
Styrene	1.23E-03	5.38E-03	1.23E-03	5.38E-03	3.02E-03	1.32E-02	0.00E+00	0.00E+00	6.48E-05	1.62E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	5.54E-03	2.40E-02
Tetrachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00
Toluene	2.16E-02	9.45E-02	2.16E-02	9.45E-02	5.32E-02	2.33E-01	2.21E-05	9.68E-05	3.04E-03	7.60E-04	1.67E-05	7.30E-05	1.67E-05	7.30E-05	0	0	9.94E-02	4.23E-01
Vinyl Chloride	5.53E-04	2.42E-03	5.53E-04	2.42E-03	1.36E-03	5.97E-03	0.00E+00	0.00E+00	3.91E-05	9.78E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	2.51E-03	1.08E-02
Xylene	6.00E-03	2.63E-02	6.00E-03	2.63E-02	1.48E-02	6.48E-02	0.00E+00	0.00E+00	1.06E-03	2.64E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	2.79E-02	1.18E-01
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E-06	5.70E-06	0.00E+00	0.00E+00	9.80E-07	4.29E-06	9.80E-07	4.29E-06	0	0	3.26E-06	1.43E-05
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.80E-08	3.42E-07	0.00E+00	0.00E+00	5.88E-08	2.58E-07	5.88E-08	2.58E-07	0	0	1.96E-07	8.57E-07
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.15E-06	3.13E-05	0.00E+00	0.00E+00	5.39E-06	2.36E-05	5.39E-06	2.36E-05	0	0	1.79E-05	7.86E-05
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.10E-06	3.99E-05	0.00E+00	0.00E+00	6.86E-06	3.01E-05	6.86E-06	3.01E-05	0	0	2.28E-05	1.00E-04
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.46E-07	2.39E-06	0.00E+00	0.00E+00	4.12E-07	1.80E-06	4.12E-07	1.80E-06	0	0	1.37E-06	6.00E-06
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.47E-06	1.08E-05	0.00E+00	0.00E+00	1.86E-06	8.16E-06	1.86E-06	8.16E-06	0	0	6.20E-06	2.71E-05
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-06	7.41E-06	0.00E+00	0.00E+00	1.27E-06	5.58E-06	1.27E-06	5.58E-06	0	0	4.24E-06	1.86E-05
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-05	5.98E-05	0.00E+00	0.00E+00	1.03E-05	4.51E-05	1.03E-05	4.51E-05	0	0	3.42E-05	1.50E-04
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-07	6.84E-07	0.00E+00	0.00E+00	1.18E-07	5.15E-07	1.18E-07	5.15E-07	0	0	3.91E-07	1.71E-06
Total	**1.78**	**7.80**	**1.78**	**7.80**	**4.39**	**19.23**	**0.01**	**0.05**	**0.18**	**0.04**	**0.01**	**0.04**	**0.01**	**0.04**	**0.06**	**0.28**	**8.23**	**35.30**

TITLE V RENEWAL
ANR PIPELINE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Emission Unit ID	**EU-LI011 & EU-LI012**	
Unit ID No.	**--**	
Description of Unit	**Natural Gas Fired Boiler**	
Manufacturer	CFC-E 5000	
Date of Construction/Modification	2021	
Fuel Used	Natural Gas	
Minimum Higher Heating Value (HHV)	918	Btu/scf
Maximum Higher Heating Value (HHV)	1,020	Btu/scf
Rated Horsepower (hp)	N/A	hp
Heat Input (MMBtu/hr)	5.00	MMBtu/hr
Maximum Hourly Fuel Consumption	4,902	scf/hr
Control Device	N/A	
Stack Designation	N/A	
Annual Hours of Operation	8,760	hr/yr
Annual Fuel Consumption	42.94	MMscf/yr

Emission Factors:

Pollutant	Emission Factor (lb/MMscf)	Emission Factor Source
NOx	100	a
CO	84	a
NM/NE VOC	5.5	b
PM (Filterable + Condensable)	7.6	b
SO2	0.6	b

[a] AP-42 Table 1.4-1 "Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion" (7/98).
[b] AP-42 Table 1.4-2 "Emission Factors for Criteria Pollutants and Greenhouse Gasses from Natural Gas Combustion" (7/98).

Two (2) heaters in Valve MCU/PCV 103

POTENTIAL EMISSIONS:

Pollutant	Emission Rate lb/hr	Calculation Methodology	Potential Emissions [d] ton/yr	Potential Emissions [e] lb/yr
NOx	0.49	c	2.15	4,294.12
CO	0.41	c	1.80	3,607.06
NM/NEVOC	0.03	c	0.12	236.18
PM (Filterable + Condensable)	0.04	c	0.16	326.35
SO2	2.94E-03	c	0.013	25.76

Sample Calculation:
[c] Emission Rate (lb/hr) = (Emission Factor lb/MMscf) * (Max. Hourly Fuel Consumption scf/hr)/1000000
[d] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)
[e] Emission Rate (lb/yr)=Emission Rate (lb/hr) *Annual Hours of Operation (hrs/yr)

HAP Calculated Emissions:

Pollutant	Emission Factor (lb/MMscf)[f]	Potential Emissions (lb/hr)[g]	Potential Emissions (tons/yr)[h]
HAPs:			
1,1,2,2-Tetrachloroethane	0.00E+00	0.00E+00	0.00E+00
1,1,2-Trichloroethane	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00
1,3-Dichloropropene	0.00E+00	0.00E+00	0.00E+00
2,2,4-Trimethylpentane	0.00E+00	0.00E+00	0.00E+00
2-Methylnaphthalene	2.40E-05	1.18E-07	5.15E-07
3-Methylcholanthrene	1.80E-06	8.82E-09	3.86E-08
7,12-Dimethylbenz(a)anthracene	1.60E-05	7.84E-08	3.44E-07
Acenaphthene	1.80E-06	8.82E-09	3.86E-08
Acenaphthylene	1.80E-06	8.82E-09	3.86E-08
Acetaldehyde	0.00E+00	0.00E+00	0.00E+00
Acrolein	0.00E+00	0.00E+00	0.00E+00
Anthracene	2.40E-06	1.18E-08	5.15E-08
Benz(a)anthracene	1.80E-06	8.82E-09	3.86E-08
Benzene	2.10E-03	1.03E-05	4.51E-05
Benzo(a)pyrene	1.20E-06	5.88E-09	2.58E-08
Benzo(b)fluoranthene	1.80E-06	8.82E-09	3.86E-08
Benzo(e)pyrene	0.00E+00	0.00E+00	0.00E+00
Benzo(g,h,i)perylene	1.20E-06	5.88E-09	2.58E-08
Benzo(k)fluoranthene	1.80E-06	8.82E-09	3.86E-08
Biphenyl	0.00E+00	0.00E+00	0.00E+00
Carbon Tetrachloride	0.00E+00	0.00E+00	0.00E+00
Chlorobenzene	0.00E+00	0.00E+00	0.00E+00
Chloroform	0.00E+00	0.00E+00	0.00E+00
Chrysene	1.80E-06	8.82E-09	3.86E-08
Dichlorobenzene	1.20E-03	5.88E-06	2.58E-05
Ethylbenzene	0.00E+00	0.00E+00	0.00E+00
Ethylene Dibromide	0.00E+00	0.00E+00	0.00E+00
Fluoranthene	3.00E-06	1.47E-08	6.44E-08
Fluorene	2.80E-06	1.37E-08	6.01E-08
Formaldehyde	7.50E-02	3.68E-04	1.61E-03
Indeno(1,2,3-c,d)pyrene	1.80E-06	8.82E-09	3.86E-08
Methanol	0.00E+00	0.00E+00	0.00E+00
Methylene Chloride	0.00E+00	0.00E+00	0.00E+00
n-Hexane	1.80E+00	8.82E-03	3.86E-02
Naphthalene	6.10E-04	2.99E-06	1.31E-05
PAH	2.14E-05	1.05E-07	4.59E-07
Perylene	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	1.70E-05	8.33E-08	3.65E-07
Phenol	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	0.00E+00	0.00E+00	0.00E+00
Pyrene	5.00E-06	2.45E-08	1.07E-07
Styrene	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethane	0.00E+00	0.00E+00	0.00E+00
Toluene	3.40E-03	1.67E-05	7.30E-05
Vinyl Chloride	0.00E+00	0.00E+00	0.00E+00
Xylene	0.00E+00	0.00E+00	0.00E+00
Arsenic	2.00E-04	9.80E-07	4.29E-06
Beryllium	1.20E-05	5.88E-08	2.58E-07
Cadmium	1.10E-03	5.39E-06	2.36E-05
Chromium	1.40E-03	6.86E-06	3.01E-05
Cobalt	8.40E-05	4.12E-07	1.80E-06
Manganese	3.80E-04	1.86E-06	8.16E-06
Mercury	2.60E-04	1.27E-06	5.58E-06
Nickel	2.10E-03	1.03E-05	4.51E-05
Selenium	2.40E-05	1.18E-07	5.15E-07
Total HAP (each boiler)		**9.25E-03**	**0.041**

[f] AP-42 Table 1.4-3 "Emission Factors for Speciated Organic Compounds from Natural Gas Combustion" (7/98) and Table 1.4-4 "Emission Factors for Metals from Natural Gas Combustion" (7/98).

[g] Emission Rate (lb/hr) = (Emission Factor lb/MMscf) * (Maximum Hourly Fuel Consumption scf/hr) *

[h] Emission Rate (ton/yr) = (Emission Rate lb/hr) * (Annual Operation hrs/yr) * (1 ton/2000 lb)

TITLE V RENEWAL

ANR PIPELNE COMPANY

LINCOLN COMPRESSOR STATION, MICHIGAN

Unit ID No.: **EU-LI011 & EU-LI012**
Description of Unit: **Natural Gas Fired Boiler**

Potential Greenhouse Gas (GHG) Emission Calculations[2]

Pollutant	Uncontrolled Emission Factor[2]	Factor Units[2]	Emissions (lb/hr)	Emissions (TPY)	Global Warming Potential (GWP)[2]	CO2e Emissions (lb/hr)	CO2e Emissions (TPY)
CO_2	53.06	kg CO_2/MMBtu	584.89	2,561.80	1.00	584.89	2,561.80
CH_4	0.001	kg CH_4/MMBtu	0.01	0.05	25.00	0.28	1.21
N_2O	0.0001	kg N_2O/MMBtu	0.00	0.00	298.00	0.33	1.44
TOTAL GHGs	--	--	**584.90**	**2,561.86**	--	--	--
TOTAL GHGs (CO_2e)	--	--	--	--	--	**585.49**	**2,564.45**

[1] Heat input based on fuel consumption and permitted HP.

[2] Based on 40 CFR 98 Subpart C, 98.33(a)(1)(i), Tier 1 Methodology, Equation C-1 and using source specific heat input.

GHG Emissions (lb/hr) = EF_{GHG} (kg/MMBtu) * 2.204623 lb/kg * Source Specific Heat Input (MMbtu/hr)

GHG Emissions (TPY) = GHG Emissions (lb/hr) * Annual Hoperating Hours (hr/yr) * 1 Ton/2000 lb

CO_2e Emissions (TPY) = Σ (GHG Emissions (tpy) * GWP)

Where:

EF_{GHG} = Fuel-specific default CO_2, CH_4, or N_2O emission factors from Table C-1 for CO_2 (Natural gas - Weighted U.S. Average) and Table C-2 for CH_4 and N_2O (Natural Gas) of 40 CFR Part 98, Subpart C (kg/MMBtu)

Heat Input = Btu/hp-hr x Site-rated hp x (1 MMBtu/1,000,000 Btu) = MMBtu/hr

GWP = Global Warming Potentials, 40 CFR 98, Subpart A, Table A-1

TITLE V RENEWAL
ANR PIPELINE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Emission Unit ID	**EU-LI001**	
Unit ID No.	**EU00015**	
Description of Unit	**Compressor Engine 1**	
Manufacturer	Clark TLAD8	
Date of Construction/Modification	1/1/1971	
Stroke Cycle	2-Stroke	
Type of Burn	Lean-burn	
Fuel Used	Natural Gas	
Minimum Higher Heating Value (HHV)	918	Btu/scf
Maximum Higher Heating Value (HHV)	1,020	Btu/scf
Rated Horsepower (hp)	3,200	hp
Heat Rate (Btu/bhp-hr)	7,000	Btu/bhp-hr
Heat Input (MMBtu/hr)	22.4	MMBtu/hr
Maximum Hourly Fuel Consumption	24,401	scf/hr
Control Device	N/A	
Stack Designation	SVLI001	
Annual Hours of Operation	8,760	hr/yr
Annual Fuel Consumption	213.75	MMscf/yr

Emission Factors:

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Source
NOx	14.40	g/hp-hr	a
CO	1.44	g/hp-hr	a
NM/NE VOC	1.00	g/hp-hr	a
PM (Filterable + Condensable)	4.83E-02	lb/MMBtu	b
PM10	3.84E-02	lb/MMBtu	b
SO2	5.88E-04	lb/MMBtu	b

[a] Initial Title V Operating Permit Application values.

[b] AP-42 Table 3.2-1 "Uncontrolled Emission Factors for 2-Stroke Lean Burn Engines" (7/00).

POTENTIAL EMISSIONS:

Pollutant	Emission Rate lb/hr	Calculation Methodology	Potential Emissions [e] ton/yr	Potential Emissions [f] lb/yr
NOx	101.59	c	444.95	889,904.76
CO	10.16	c	44.50	88,990.48
NM/NEVOC	7.05	c	30.90	61,798.94
PM (Filterable + Condensable)	1.082	d	4.74	9,479.58
PM10	0.860	d	3.77	7,535.00
SO2	0.013	d	0.06	115.38

[c] Emission Rate (lb/hr) = (Emission Factor g/hp-hr) / (453.6 g/lb) * (Max Horsepower hp)

[d] Emission Rate (lb/hr) = (Emission Factor lb/MMBtu) * (Heat Input MMBtu/hr)

[e] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

[f] Emission Rate (lb/yr)=Emission Rate (lb/hr) *Annual Hours of Operation (hrs/yr)

HAP Calculated Emissions:

Pollutant	Emission Factor (lb/MMBtu)[g]	Potential Emissions (lb/hr)[h]	Potential Emissions (tons/yr)[i]
HAPs:			
1,1,2,2-Tetrachloroethane	6.63E-05	1.49E-03	0.0065
1,1,2-Trichloroethane	5.27E-05	1.18E-03	0.0052
1,3-Butadiene	8.20E-04	1.84E-02	0.0805
1,3-Dichloropropene	4.38E-05	9.81E-04	0.0043
2,2,4-Trimethylpentane	8.46E-04	1.90E-02	0.0830
2-Methylnaphthalene	2.14E-05	4.79E-04	0.0021
3-Methylcholanthrene	0.00E+00	0.00E+00	0.0000
7,12-Dimethylbenz(a)anthracene	0.00E+00	0.00E+00	0.0000
Acenaphthene	1.33E-06	2.98E-05	0.0001
Acenaphthylene	3.17E-06	7.10E-05	0.0003
Acetaldehyde	7.76E-03	1.74E-01	0.7613
Acrolein	7.78E-03	1.74E-01	0.7633
Anthracene	7.18E-07	1.61E-05	0.0001
Benz(a)anthracene	3.36E-07	7.53E-06	0.0000
Benzene	1.94E-03	4.35E-02	0.1903
Benzo(a)pyrene	5.68E-09	1.27E-07	0.0000
Benzo(b)fluoranthene	8.51E-09	1.91E-07	0.0000
Benzo(e)pyrene	2.34E-08	5.24E-07	0.0000
Benzo(g,h,i)perylene	2.48E-08	5.56E-07	0.0000
Benzo(k)fluoranthene	4.26E-09	9.54E-08	0.0000
Biphenyl	3.95E-06	8.85E-05	0.0004
Carbon Tetrachloride	6.07E-05	1.36E-03	0.0060
Chlorobenzene	4.44E-05	9.95E-04	0.0044
Chloroform	4.71E-05	1.06E-03	0.0046
Chrysene	6.72E-07	1.51E-05	0.0001
Dichlorobenzene	0.00E+00	0.00E+00	0.0000
Ethylbenzene	1.08E-04	2.42E-03	0.0106
Ethylene Dibromide	7.34E-05	1.64E-03	0.0072
Fluoranthene	3.61E-07	8.09E-06	0.0000
Fluorene	1.69E-06	3.79E-05	0.0002
Formaldehyde	5.52E-02	1.24E+00	5.4158
Indeno(1,2,3-c,d)pyrene	9.93E-09	2.22E-07	0.0000
Methanol	2.48E-03	5.56E-02	0.2433
Methylene Chloride	1.47E-04	3.29E-03	0.0144
n-Hexane	4.45E-04	9.97E-03	0.0437
Naphthalene	9.63E-05	2.16E-03	0.0094
PAH	1.34E-04	3.00E-03	0.0131
Perylene	4.97E-09	1.11E-07	0.0000
Phenanthrene	3.53E-06	7.91E-05	0.0003
Phenol	4.21E-05	9.43E-04	0.0041
Propylene Oxide	0.00E+00	0.00E+00	0.0000
Pyrene	5.84E-07	1.31E-05	0.0001
Styrene	5.48E-05	1.23E-03	0.0054
Tetrachloroethane	0.00E+00	0.00E+00	0.0000
Toluene	9.63E-04	2.16E-02	0.0945
Vinyl Chloride	2.47E-05	5.53E-04	0.0024
Xylene	2.68E-04	6.00E-03	0.0263
Arsenic	0.00E+00	0.00E+00	0.0000
Beryllium	0.00E+00	0.00E+00	0.0000
Cadmium	0.00E+00	0.00E+00	0.0000
Chromium	0.00E+00	0.00E+00	0.0000
Cobalt	0.00E+00	0.00E+00	0.0000
Manganese	0.00E+00	0.00E+00	0.0000
Mercury	0.00E+00	0.00E+00	0.0000
Nickel	0.00E+00	0.00E+00	0.0000
Selenium	0.00E+00	0.00E+00	0.0000
Total HAP		**1.78**	**7.80**

[g] Based on AP-42 Table 3.2-1 "Uncontrolled Emission Factors for 2-Stroke Lean Burn Engines" (7/00).

[h] Emission Rate (lb/hr) = (Emission Factor lb/MMBtu) * (Heat Input MMBtu/hr)

[i] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

TITLE V RENEWAL
ANR PIPELNE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Unit ID No.: **EU-LI001**
Description of Unit: **Compressor Engine 1**

Potential Greenhouse Gas (GHG) Emission Calculations[2]

Pollutant	Uncontrolled Emission Factor[2]	Factor Units[2]	Emissions (lb/hr)	Emissions (TPY)	Global Warming Potential (GWP)[2]	CO2e Emissions (lb/hr)	CO2e Emissions (TPY)
CO_2	53.06	kg CO_2/MMBtu	2,620.29	11,476.88	1.00	2,620.29	11,476.88
CH_4	0.001	kg CH_4/MMBtu	0.05	0.22	25.00	1.23	5.41
N_2O	0.0001	kg N_2O/MMBtu	0.00	0.02	298.00	1.47	6.45
TOTAL GHGs	--	--	**2,620.35**	**11,477.11**	--	--	--
TOTAL GHGs (CO_2e)	--	--	--	--	--	**2,623.00**	**11,488.73**

[1] Heat input based on fuel consumption and permitted HP.

[2] Based on 40 CFR 98 Subpart C, 98.33(a)(1)(i), Tier 1 Methodology, Equation C-1 and using source specific heat input.

GHG Emissions (lb/hr) = EF_{GHG} (kg/MMBtu) * 2.204623 lb/kg * Source Specific Heat Input (MMbtu/hr)

GHG Emissions (TPY) = GHG Emissions (lb/hr) * Annual Hoperating Hours (hr/yr) * 1 Ton/2000 lb

CO_2e Emissions (TPY) = Σ (GHG Emissions (tpy) * GWP)

Where:

EF_{GHG} = Fuel-specific default CO_2, CH_4, or N_2O emission factors from Table C-1 for CO_2 (Natural gas - Weighted U.S. Average) and Table C-2 for CH_4 and N_2O (Natural Gas) of 40 CFR Part 98, Subpart C (kg/MMBtu)

Heat Input = Btu/hp-hr x Site-rated hp x (1 MMBtu/1,000,000 Btu) = MMBtu/hr

GWP = Global Warming Potentials, 40 CFR 98, Subpart A, Table A-1

TITLE V RENEWAL
ANR PIPELINE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Emission Unit ID	**EU-LI002**	
Unit ID No.	**EU00016**	
Description of Unit	**Compressor Engine 2**	
Manufacturer	Clark TLAD8	
Date of Construction/Modification	1/1/1971	
Stroke Cycle	2-Stroke	
Type of Burn	Lean-burn	
Fuel Used	Natural Gas	
Minimum Higher Heating Value (HHV)	918	Btu/scf
Maximum Higher Heating Value (HHV)	1,020	Btu/scf
Rated Horsepower (hp)	3,200	hp
Heat Rate (Btu/bhp-hr)	7,000	Btu/bhp-hr
Heat Input (MMBtu/hr)	22.4	MMBtu/hr
Maximum Hourly Fuel Consumption	24,401	scf/hr
Control Device	N/A	
Stack Designation	SVLI001	
Annual Hours of Operation	8,760	hr/yr
Annual Fuel Consumption	213.75	MMscf/yr

Emission Factors:

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Source
NOx	14.40	g/hp-hr	a
CO	1.44	g/hp-hr	a
NM/NE VOC	1.00	g/hp-hr	a
PM (Filterable + Condensable)	4.83E-02	lb/MMBtu	b
PM10	3.84E-02	lb/MMBtu	b
SO2	5.88E-04	lb/MMBtu	b

[a] Initial Title V Operating Permit Application values.

[b] AP-42 Table 3.2-1 "Uncontrolled Emission Factors for 2-Stroke Lean Burn Engines" (7/00).

POTENTIAL EMISSIONS:

Pollutant	Emission Rate lb/hr	Calculation Methodology	Potential Emissions [e] ton/yr	Potential Emissions [f] lb/yr
NOx	101.59	c	444.95	889,904.76
CO	10.16	c	44.50	88,990.48
NM/NEVOC	7.05	c	30.90	61,798.94
PM (Filterable + Condensable)	1.082	d	4.74	9,479.58
PM10	0.860	d	3.77	7,535.00
SO2	0.013	d	0.06	115.38

[c] Emission Rate (lb/hr) = (Emission Factor g/hp-hr) / (453.6 g/lb) * (Max Horsepower hp)

[d] Emission Rate (lb/hr) = (Emission Factor lb/MMBtu) * (Heat Input MMBtu/hr)

[e] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

[f] Emission Rate (lb/yr)=Emission Rate (lb/hr) *Annual Hours of Operation (hrs/yr)

HAP Calculated Emissions:

Pollutant	Emission Factor (lb/MMBtu)[g]	Potential Emissions (lb/hr)[h]	Potential Emissions (tons/yr)[i]
HAPs:			
1,1,2,2-Tetrachloroethane	6.63E-05	1.49E-03	0.0065
1,1,2-Trichloroethane	5.27E-05	1.18E-03	0.0052
1,3-Butadiene	8.20E-04	1.84E-02	0.0805
1,3-Dichloropropene	4.38E-05	9.81E-04	0.0043
2,2,4-Trimethylpentane	8.46E-04	1.90E-02	0.0830
2-Methylnaphthalene	2.14E-05	4.79E-04	0.0021
3-Methylcholanthrene	0.00E+00	0.00E+00	0.0000
7,12-Dimethylbenz(a)anthracene	0.00E+00	0.00E+00	0.0000
Acenaphthene	1.33E-06	2.98E-05	0.0001
Acenaphthylene	3.17E-06	7.10E-05	0.0003
Acetaldehyde	7.76E-03	1.74E-01	0.7613
Acrolein	7.78E-03	1.74E-01	0.7633
Anthracene	7.18E-07	1.61E-05	0.0001
Benz(a)anthracene	3.36E-07	7.53E-06	0.0000
Benzene	1.94E-03	4.35E-02	0.1903
Benzo(a)pyrene	5.68E-09	1.27E-07	0.0000
Benzo(b)fluoranthene	8.51E-09	1.91E-07	0.0000
Benzo(e)pyrene	2.34E-08	5.24E-07	0.0000
Benzo(g,h,i)perylene	2.48E-08	5.56E-07	0.0000
Benzo(k)fluoranthene	4.26E-09	9.54E-08	0.0000
Biphenyl	3.95E-06	8.85E-05	0.0004
Carbon Tetrachloride	6.07E-05	1.36E-03	0.0060
Chlorobenzene	4.44E-05	9.95E-04	0.0044
Chloroform	4.71E-05	1.06E-03	0.0046
Chrysene	6.72E-07	1.51E-05	0.0001
Dichlorobenzene	0.00E+00	0.00E+00	0.0000
Ethylbenzene	1.08E-04	2.42E-03	0.0106
Ethylene Dibromide	7.34E-05	1.64E-03	0.0072
Fluoranthene	3.61E-07	8.09E-06	0.0000
Fluorene	1.69E-06	3.79E-05	0.0002
Formaldehyde	5.52E-02	1.24E+00	5.4158
Indeno(1,2,3-c,d)pyrene	9.93E-09	2.22E-07	0.0000
Methanol	2.48E-03	5.56E-02	0.2433
Methylene Chloride	1.47E-04	3.29E-03	0.0144
n-Hexane	4.45E-04	9.97E-03	0.0437
Naphthalene	9.63E-05	2.16E-03	0.0094
PAH	1.34E-04	3.00E-03	0.0131
Perylene	4.97E-09	1.11E-07	0.0000
Phenanthrene	3.53E-06	7.91E-05	0.0003
Phenol	4.21E-05	9.43E-04	0.0041
Propylene Oxide	0.00E+00	0.00E+00	0.0000
Pyrene	5.84E-07	1.31E-05	0.0001
Styrene	5.48E-05	1.23E-03	0.0054
Tetrachloroethane	0.00E+00	0.00E+00	0.0000
Toluene	9.63E-04	2.16E-02	0.0945
Vinyl Chloride	2.47E-05	5.53E-04	0.0024
Xylene	2.68E-04	6.00E-03	0.0263
Arsenic	0.00E+00	0.00E+00	0.0000
Beryllium	0.00E+00	0.00E+00	0.0000
Cadmium	0.00E+00	0.00E+00	0.0000
Chromium	0.00E+00	0.00E+00	0.0000
Cobalt	0.00E+00	0.00E+00	0.0000
Manganese	0.00E+00	0.00E+00	0.0000
Mercury	0.00E+00	0.00E+00	0.0000
Nickel	0.00E+00	0.00E+00	0.0000
Selenium	0.00E+00	0.00E+00	0.0000
Total HAP		**1.78**	**7.80**

[g] Based on AP-42 Table 3.2-1 "Uncontrolled Emission Factors for 2-Stroke Lean Burn Engines" (7/00).

[h] Emission Rate (lb/hr) = (Emission Factor lb/MMBtu) * (Heat Input MMBtu/hr)

[i] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

TITLE V RENEWAL
ANR PIPELNE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Unit ID No.: **EU-LI002**
Description of Unit: **Compressor Engine 2**

Potential Greenhouse Gas (GHG) Emission Calculations[2]

Pollutant	Uncontrolled Emission Factor[2]	Factor Units[2]	Emissions (lb/hr)	Emissions (TPY)	Global Warming Potential (GWP)[2]	CO2e Emissions (lb/hr)	CO2e Emissions (TPY)
CO_2	53.06	kg CO_2/MMBtu	2,620.29	11,476.88	1.00	2,620.29	11,476.88
CH_4	0.001	kg CH_4/MMBtu	0.05	0.22	25.00	1.23	5.41
N_2O	0.0001	kg N_2O/MMBtu	0.00	0.02	298.00	1.47	6.45
TOTAL GHGs	--	--	**2,620.35**	**11,477.11**	--	--	--
TOTAL GHGs (CO_2e)	--	--	--	--	--	**2,623.00**	**11,488.73**

[1] Heat input based on fuel consumption and permitted HP.
[2] Based on 40 CFR 98 Subpart C, 98.33(a)(1)(i), Tier 1 Methodology, Equation C-1 and using source specific heat input.

GHG Emissions (lb/hr) = EF_{GHG} (kg/MMBtu) * 2.204623 lb/kg * Source Specific Heat Input (MMbtu/hr)
GHG Emissions (TPY) = GHG Emissions (lb/hr) * Annual Hoperating Hours (hr/yr) * 1 Ton/2000 lb
CO_2e Emissions (TPY) = Σ (GHG Emissions (tpy) * GWP)

Where:

EF_{GHG} = Fuel-specific default CO_2, CH_4, or N_2O emission factors from Table C-1 for CO_2 (Natural gas - Weighted U.S. Average) and Table C-2 for CH_4 and N_2O (Natural Gas) of 40 CFR Part 98, Subpart C (kg/MMBtu)
Heat Input = Btu/hp-hr x Site-rated hp x (1 MMBtu/1,000,000 Btu) = MMBtu/hr
GWP = Global Warming Potentials, 40 CFR 98, Subpart A, Table A-1

TITLE V RENEWAL
ANR PIPELINE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Emission Unit ID	**EU-LI003**	
Unit ID No.	**EU00017**	
Description of Unit	**Compressor Engine 3**	
Manufacturer	Cooper-Bessemer 16W330	
Date of Construction/Modification	1/1/1974	
Stroke Cycle	2-Stroke	
Type of Burn	Lean-burn	
Fuel Used	Natural Gas	
Minimum Higher Heating Value (HHV)	918	Btu/scf
Maximum Higher Heating Value (HHV)	1,020	Btu/scf
Rated Horsepower (hp)	8,000	hp
Heat Rate (Btu/bhp-hr)	6,900	Btu/bhp-hr
Heat Input (MMBtu/hr)	55.2	MMBtu/hr
Maximum Hourly Fuel Consumption	60,131	scf/hr
Control Device	N/A	
Stack Designation	SVLI003	
Annual Hours of Operation	8,760	hr/yr
Annual Fuel Consumption	526.75	MMscf/yr

Emission Factors:

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Source
NOx	14.50	gm/hp-hr	a
CO	5.80	gm/hp-hr	a
NM/NE VOC	1.00	gm/hp-hr	a
PM (Filterable + Condensable)	4.83E-02	lb/MMBtu	b
PM10	3.84E-02	lb/MMBtu	b
SO2	5.88E-04	lb/MMBtu	b

[a] Initial Title V Operating Permit Application values.
[b] AP-42 Table 3.2-1 "Uncontrolled Emission Factors for 2-Stroke Lean Burn Engines" (7/00).

POTENTIAL EMISSIONS:

Pollutant	Emission Rate lb/hr	Calculation Methodology	Potential Emissions [e] ton/yr	Potential Emissions [f] lb/yr
NOx	255.73	c	1120.11	2,240,211.64
CO	102.29	c	448.04	896,084.66
NM/NEVOC	17.64	c	77.25	154,497.35
PM (Filterable + Condensable)	2.67	d	11.68	23,360.40
PM10	2.12	d	9.28	18,568.40
SO2	0.03	d	0.14	284.33

[c] Emission Rate (lb/hr) = (Emission Factor g/hp-hr) / (453.6 g/lb) * (Max Horsepower hp)
[d] Emission Rate (lb/hr) = (Emission Factorlb/MMBtu) * (Heat Input MMBtu/hr)
[e] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)
[f] Emission Rate (lb/yr)=Emission Rate (lb/hr) *Annual Hours of Operation (hrs/yr)

HAP Calculated Emissions:

Pollutant	Emission Factor (lb/MMBtu)[g]	Potential Emissions (lb/hr)[h]	Potential Emissions (tons/yr)[i]
HAPs:			
1,1,2,2-Tetrachloroethane	6.63E-05	3.66E-03	0.0160
1,1,2-Trichloroethane	5.27E-05	2.91E-03	0.0127
1,3-Butadiene	8.20E-04	4.53E-02	0.1983
1,3-Dichloropropene	4.38E-05	2.42E-03	0.0106
2,2,4-Trimethylpentane	8.46E-04	4.67E-02	0.2045
2-Methylnaphthalene	2.14E-05	1.18E-03	0.0052
3-Methylcholanthrene	0.00E+00	0.00E+00	0.0000
7,12-Dimethylbenz(a)anthracene	0.00E+00	0.00E+00	0.0000
Acenaphthene	1.33E-06	7.34E-05	0.0003
Acenaphthylene	3.17E-06	1.75E-04	0.0008
Acetaldehyde	7.76E-03	4.28E-01	1.8762
Acrolein	7.78E-03	4.29E-01	1.8810
Anthracene	7.18E-07	3.96E-05	0.0002
Benz(a)anthracene	3.36E-07	1.85E-05	0.0001
Benzene	1.94E-03	1.07E-01	0.4690
Benzo(a)pyrene	5.68E-09	3.14E-07	0.0000
Benzo(b)fluoranthene	8.51E-09	4.70E-07	0.0000
Benzo(e)pyrene	2.34E-08	1.29E-06	0.0000
Benzo(g,h,i)perylene	2.48E-08	1.37E-06	0.0000
Benzo(k)fluoranthene	4.26E-09	2.35E-07	0.0000
Biphenyl	3.95E-06	2.18E-04	0.0010
Carbon Tetrachloride	6.07E-05	3.35E-03	0.0147
Chlorobenzene	4.44E-05	2.45E-03	0.0107
Chloroform	4.71E-05	2.60E-03	0.0114
Chrysene	6.72E-07	3.71E-05	0.0002
Dichlorobenzene	0.00E+00	0.00E+00	0.0000
Ethylbenzene	1.08E-04	5.96E-03	0.0261
Ethylene Dibromide	7.34E-05	4.05E-03	0.0177
Fluoranthene	3.61E-07	1.99E-05	0.0001
Fluorene	1.69E-06	9.33E-05	0.0004
Formaldehyde	5.52E-02	3.05E+00	13.3460
Indeno(1,2,3-c,d)pyrene	9.93E-09	5.48E-07	0.0000
Methanol	2.48E-03	1.37E-01	0.5996
Methylene Chloride	1.47E-04	8.11E-03	0.0355
n-Hexane	4.45E-04	2.46E-02	0.1076
Naphthalene	9.63E-05	5.32E-03	0.0233
PAH	1.34E-04	7.40E-03	0.0324
Perylene	4.97E-09	2.74E-07	0.0000
Phenanthrene	3.53E-06	1.95E-04	0.0009
Phenol	4.21E-05	2.32E-03	0.0102
Propylene Oxide	0.00E+00	0.00E+00	0.0000
Pyrene	5.84E-07	3.22E-05	0.0001
Styrene	5.48E-05	3.02E-03	0.0132
Tetrachloroethane	0.00E+00	0.00E+00	0.0000
Toluene	9.63E-04	5.32E-02	0.2328
Vinyl Chloride	2.47E-05	1.36E-03	0.0060
Xylene	2.68E-04	1.48E-02	0.0648
Arsenic	0.00E+00	0.00E+00	0.0000
Beryllium	0.00E+00	0.00E+00	0.0000
Cadmium	0.00E+00	0.00E+00	0.0000
Chromium	0.00E+00	0.00E+00	0.0000
Cobalt	0.00E+00	0.00E+00	0.0000
Manganese	0.00E+00	0.00E+00	0.0000
Mercury	0.00E+00	0.00E+00	0.0000
Nickel	0.00E+00	0.00E+00	0.0000
Selenium	0.00E+00	0.00E+00	0.0000
Total HAP		**4.39**	**19.23**

[g] Based on AP-42 Table 3.2-1 "Uncontrolled Emission Factors for 2-Stroke Lean Burn Engines" (7/00).

[h] Emission Rate (lb/hr) = (Emission Factor lb/MMBtu) * (Heat Input MMBtu/hr)

[i] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

TITLE V RENEWAL
ANR PIPELNE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Unit ID No.: **EU-LI003**
Description of Unit: **Compressor Engine 3**

Potential Greenhouse Gas (GHG) Emission Calculations[2]

Pollutant	Uncontrolled Emission Factor[2]	Factor Units[2]	Emissions (lb/hr)	Emissions (TPY)	Global Warming Potential (GWP)[2]	CO2e Emissions (lb/hr)	CO2e Emissions (TPY)
CO_2	53.06	kg CO_2/MMBtu	6,457.15	28,282.30	1.00	6,457.15	28,282.30
CH_4	0.001	kg CH_4/MMBtu	0.12	0.53	25.00	3.04	13.33
N_2O	0.0001	kg N_2O/MMBtu	0.01	0.05	298.00	3.63	15.88
TOTAL GHGs	--	--	**6,457.28**	**28,282.89**	--	--	--
TOTAL GHGs (CO_2e)	--	--	--	--	--	**6,463.82**	**28,311.51**

[1] Heat input based on fuel consumption and permitted HP.
[2] Based on 40 CFR 98 Subpart C, 98.33(a)(1)(i), Tier 1 Methodology, Equation C-1 and using source specific heat input.

GHG Emissions (lb/hr) = EF_{GHG} (kg/MMBtu) * 2.204623 lb/kg * Source Specific Heat Input (MMbtu/hr)
GHG Emissions (TPY) = GHG Emissions (lb/hr) * Annual Hoperating Hours (hr/yr) * 1 Ton/2000 lb
CO_2e Emissions (TPY) = Σ (GHG Emissions (tpy) * GWP)

Where:

EF_{GHG} = Fuel-specific default CO_2, CH_4, or N_2O emission factors from Table C-1 for CO_2 (Natural gas - Weighted U.S. Average) and Table C-2 for CH_4 and N_2O (Natural Gas) of 40 CFR Part 98, Subpart C (kg/MMBtu)
Heat Input = Btu/hp-hr x Site-rated hp x (1 MMBtu/1,000,000 Btu) = MMBtu/hr
GWP = Global Warming Potentials, 40 CFR 98, Subpart A, Table A-1

TITLE V RENEWAL
ANR PIPELINE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Emission Unit ID	**EU-LI006**	
Unit ID No.	**--**	
Description of Unit	**Natural Gas Fired Boiler**	
Manufacturer	Kewanee	
Date of Construction/Modification	1970	
Fuel Used	Natural Gas	
Minimum Higher Heating Value (HHV)	918	Btu/scf
Maximum Higher Heating Value (HHV)	1,020	Btu/scf
Rated Horsepower (hp)	N/A	hp
Heat Input (MMBtu/hr)	4.19	MMBtu/hr
Maximum Hourly Fuel Consumption	4,103	scf/hr
Control Device	N/A	
Stack Designation	N/A	
Annual Hours of Operation	8,760	hr/yr
Annual Fuel Consumption	35.94	MMscf/yr

Emission Factors:

Pollutant	Emission Factor (lb/MMscf)	Emission Factor Source
NOx	100	a
CO	84	a
NM/NE VOC	5.5	b
PM (Filterable + Condensable)	7.6	b
SO2	0.6	b

[a] AP-42 Table 1.4-1 "Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion" (7/98).
[b] AP-42 Table 1.4-2 "Emission Factors for Criteria Pollutants and Greenhouse Gasses from Natural Gas Combustion" (7/98).

POTENTIAL EMISSIONS:

Pollutant	Emission Rate lb/hr	Calculation Methodology	Potential Emissions [d] ton/yr	Potential Emissions [e] lb/yr
NOx	0.41	c	1.80	3,594.18
CO	0.34	c	1.51	3,019.11
NM/NEVOC	0.02	c	0.10	197.68
PM (Filterable + Condensable)	0.03	c	0.14	273.16
SO2	0.00	c	0.01	21.57

Sample Calculation:
[c] Emission Rate (lb/hr) = (Emission Factor lb/MMscf) * (Max. Hourly Fuel Consumption scf/hr)/1000000
[d] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)
[e] Emission Rate (lb/yr)=Emission Rate (lb/hr) *Annual Hours of Operation (hrs/yr)

HAP Calculated Emissions:

Pollutant	Emission Factor (lb/MMscf)[f]	Potential Emissions (lb/hr)[g]	Potential Emissions (tons/yr)[h]
HAPs:			
1,1,2,2-Tetrachloroethane	0.00E+00	0.00E+00	0.00E+00
1,1,2-Trichloroethane	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00
1,3-Dichloropropene	0.00E+00	0.00E+00	0.00E+00
2,2,4-Trimethylpentane	0.00E+00	0.00E+00	0.00E+00
2-Methylnaphthalene	2.40E-05	9.85E-08	4.31E-07
3-Methylcholanthrene	1.80E-06	7.39E-09	3.23E-08
7,12-Dimethylbenz(a)anthracene	1.60E-05	6.56E-08	2.88E-07
Acenaphthene	1.80E-06	7.39E-09	3.23E-08
Acenaphthylene	1.80E-06	7.39E-09	3.23E-08
Acetaldehyde	0.00E+00	0.00E+00	0.00E+00
Acrolein	0.00E+00	0.00E+00	0.00E+00
Anthracene	2.40E-06	9.85E-09	4.31E-08
Benz(a)anthracene	1.80E-06	7.39E-09	3.23E-08
Benzene	2.10E-03	8.62E-06	3.77E-05
Benzo(a)pyrene	1.20E-06	4.92E-09	2.16E-08
Benzo(b)fluoranthene	1.80E-06	7.39E-09	3.23E-08
Benzo(e)pyrene	0.00E+00	0.00E+00	0.00E+00
Benzo(g,h,i)perylene	1.20E-06	4.92E-09	2.16E-08
Benzo(k)fluoranthene	1.80E-06	7.39E-09	3.23E-08
Biphenyl	0.00E+00	0.00E+00	0.00E+00
Carbon Tetrachloride	0.00E+00	0.00E+00	0.00E+00
Chlorobenzene	0.00E+00	0.00E+00	0.00E+00
Chloroform	0.00E+00	0.00E+00	0.00E+00
Chrysene	1.80E-06	7.39E-09	3.23E-08
Dichlorobenzene	1.20E-03	4.92E-06	2.16E-05
Ethylbenzene	0.00E+00	0.00E+00	0.00E+00
Ethylene Dibromide	0.00E+00	0.00E+00	0.00E+00
Fluoranthene	3.00E-06	1.23E-08	5.39E-08
Fluorene	2.80E-06	1.15E-08	5.03E-08
Formaldehyde	7.50E-02	3.08E-04	1.35E-03
Indeno(1,2,3-c,d)pyrene	1.80E-06	7.39E-09	3.23E-08
Methanol	0.00E+00	0.00E+00	0.00E+00
Methylene Chloride	0.00E+00	0.00E+00	0.00E+00
n-Hexane	1.80E+00	7.39E-03	3.23E-02
Naphthalene	6.10E-04	2.50E-06	1.10E-05
PAH	2.14E-05	8.78E-08	3.85E-07
Perylene	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	1.70E-05	6.98E-08	3.06E-07
Phenol	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	0.00E+00	0.00E+00	0.00E+00
Pyrene	5.00E-06	2.05E-08	8.99E-08
Styrene	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethane	0.00E+00	0.00E+00	0.00E+00
Toluene	3.40E-03	1.40E-05	6.11E-05
Vinyl Chloride	0.00E+00	0.00E+00	0.00E+00
Xylene	0.00E+00	0.00E+00	0.00E+00
Arsenic	2.00E-04	8.21E-07	3.59E-06
Beryllium	1.20E-05	4.92E-08	2.16E-07
Cadmium	1.10E-03	4.51E-06	1.98E-05
Chromium	1.40E-03	5.74E-06	2.52E-05
Cobalt	8.40E-05	3.45E-07	1.51E-06
Manganese	3.80E-04	1.56E-06	6.83E-06
Mercury	2.60E-04	1.07E-06	4.67E-06
Nickel	2.10E-03	8.62E-06	3.77E-05
Selenium	2.40E-05	9.85E-08	4.31E-07
Total HAP		**0.01**	**0.03**

[f] AP-42 Table 1.4-3 "Emission Factors for Speciated Organic Compounds from Natural Gas Combustion" (7/98) and Table 1.4-4 "Emission Factors for Metals from Natural Gas Combustion" (7/98).

[g] Emission Rate (lb/hr) = (Emission Factor lb/MMscf) * (Maximum Hourly Fuel Consumption scf/hr) * (MM/1,000,000)

[h] Emission Rate (ton/yr) = (Emission Rate lb/hr) * (Annual Operation hrs/yr) * (1 ton/2000 lb)

TITLE V RENEWAL
ANR PIPELNE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Unit ID No.: **EU-LI006**
Description of Unit: **Natural Gas Fired Boiler A**

Potential Greenhouse Gas (GHG) Emission Calculations[2]

Pollutant	Uncontrolled Emission Factor[2]	Factor Units[2]	Emissions (lb/hr)	Emissions (TPY)	Global Warming Potential (GWP)[2]	CO2e Emissions (lb/hr)	CO2e Emissions (TPY)
CO_2	53.06	kg CO_2/MMBtu	489.55	2,144.23	1.00	489.55	2,144.23
CH_4	0.001	kg CH_4/MMBtu	0.01	0.04	25.00	0.23	1.01
N_2O	0.0001	kg N_2O/MMBtu	0.00	0.00	298.00	0.27	1.20
TOTAL GHGs	--	--	**489.56**	**2,144.27**	--	--	--
TOTAL GHGs (CO_2e)	--	--	--	--	--	**490.06**	**2,146.44**

[1] Heat input based on fuel consumption and permitted HP.
[2] Based on 40 CFR 98 Subpart C, 98.33(a)(1)(i), Tier 1 Methodology, Equation C-1 and using source specific heat input.

GHG Emissions (lb/hr) = EF_{GHG} (kg/MMBtu) * 2.204623 lb/kg * Source Specific Heat Input (MMbtu/hr)
GHG Emissions (TPY) = GHG Emissions (lb/hr) * Annual Hoperating Hours (hr/yr) * 1 Ton/2000 lb
CO_2e Emissions (TPY) = Σ (GHG Emissions (tpy) * GWP)

Where:

EF_{GHG} = Fuel-specific default CO_2, CH_4, or N_2O emission factors from Table C-1 for CO_2 (Natural gas - Weighted U.S. Average) and Table C-2 for CH_4 and N_2O (Natural Gas) of 40 CFR Part 98, Subpart C (kg/MMBtu)
Heat Input = Btu/hp-hr x Site-rated hp x (1 MMBtu/1,000,000 Btu) = MMBtu/hr
GWP = Global Warming Potentials, 40 CFR 98, Subpart A, Table A-1

TITLE V RENEWAL
ANR PIPELINE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Emission Unit ID	**EU-LI009**	
Unit ID No.	**--**	
Description of Unit	**Dehydration Furnace**	
Manufacturer		
Date of Construction/Modification	2018	
Fuel Used	Natural Gas	
Minimum Higher Heating Value (HHV)	918	Btu/scf
Maximum Higher Heating Value (HHV)	1,020	Btu/scf
Rated Horsepower (hp)	N/A	hp
Heat Input (MMBtu/hr)	6.63	MMBtu/hr
Maximum Hourly Fuel Consumption	6,503	scf/hr
Annual Hours of Operation	8,760	hr/yr
Annual Fuel Consumption	56.97	MMscf/yr

Emission Factors:

Pollutant	Emission Factor (lb/MMscf)	Emission Factor Source
NOx	100	a
CO	84	a
NM/NE VOC	5.5	b
PM (Filterable + Condensable)	7.6	b
SO2	0.6	b

[a] AP-42 Table 1.4-1 "Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion" (7/98).

[b] AP-42 Table 1.4-2 "Emission Factors for Criteria Pollutants and Greenhouse Gasses from Natural Gas Combustion" (7/98).

POTENTIAL EMISSIONS:

Pollutant	Emission Rate lb/hr	Calculation Methodology	Potential Emissions [d] ton/yr	Potential Emissions [e] lb/yr
NOx	0.65	c	2.85	5,696.58
CO	0.55	c	2.39	4,785.12
NM/NEVOC	0.04	c	0.16	313.31
PM (Filterable + Condensable)	0.05	c	0.22	432.94
SO2	0.00	c	0.02	34.18

Sample Calculation:

[c] Emission Rate (lb/hr) = (Emission Factor lb/MMscf) * (Max. Hourly Fuel Consumption scf/hr)/1000000

[d] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

[e] Emission Rate (lb/yr)=Emission Rate (lb/hr) *Annual Hours of Operation (hrs/yr)

HAP Calculated Emissions:

Pollutant	Emission Factor (lb/MMscf)[f]	Potential Emissions (lb/hr)[g]	Potential Emissions (tons/yr)[h]
HAPs:			
1,1,2,2-Tetrachloroethane	0.00E+00	0.00E+00	0.00E+00
1,1,2-Trichloroethane	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00
1,3-Dichloropropene	0.00E+00	0.00E+00	0.00E+00
2,2,4-Trimethylpentane	0.00E+00	0.00E+00	0.00E+00
2-Methylnaphthalene	2.40E-05	1.56E-07	6.84E-07
3-Methylcholanthrene	1.80E-06	1.17E-08	5.13E-08
7,12-Dimethylbenz(a)anthracene	1.60E-05	1.04E-07	4.56E-07
Acenaphthene	1.80E-06	1.17E-08	5.13E-08
Acenaphthylene	1.80E-06	1.17E-08	5.13E-08
Acetaldehyde	0.00E+00	0.00E+00	0.00E+00
Acrolein	0.00E+00	0.00E+00	0.00E+00
Anthracene	2.40E-06	1.56E-08	6.84E-08
Benz(a)anthracene	1.80E-06	1.17E-08	5.13E-08
Benzene	2.10E-03	1.37E-05	5.98E-05
Benzo(a)pyrene	1.20E-06	7.80E-09	3.42E-08
Benzo(b)fluoranthene	1.80E-06	1.17E-08	5.13E-08
Benzo(e)pyrene	0.00E+00	0.00E+00	0.00E+00
Benzo(g,h,i)perylene	1.20E-06	7.80E-09	3.42E-08
Benzo(k)fluoranthene	1.80E-06	1.17E-08	5.13E-08
Biphenyl	0.00E+00	0.00E+00	0.00E+00
Carbon Tetrachloride	0.00E+00	0.00E+00	0.00E+00
Chlorobenzene	0.00E+00	0.00E+00	0.00E+00
Chloroform	0.00E+00	0.00E+00	0.00E+00
Chrysene	1.80E-06	1.17E-08	5.13E-08
Dichlorobenzene	1.20E-03	7.80E-06	3.42E-05
Ethylbenzene	0.00E+00	0.00E+00	0.00E+00
Ethylene Dibromide	0.00E+00	0.00E+00	0.00E+00
Fluoranthene	3.00E-06	1.95E-08	8.54E-08
Fluorene	2.80E-06	1.82E-08	7.98E-08
Formaldehyde	7.50E-02	4.88E-04	2.14E-03
Indeno(1,2,3-c,d)pyrene	1.80E-06	1.17E-08	5.13E-08
Methanol	0.00E+00	0.00E+00	0.00E+00
Methylene Chloride	0.00E+00	0.00E+00	0.00E+00
n-Hexane	1.80E+00	1.17E-02	5.13E-02
Naphthalene	6.10E-04	3.97E-06	1.74E-05
PAH	2.14E-05	1.39E-07	6.10E-07
Perylene	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	1.70E-05	1.11E-07	4.84E-07
Phenol	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	0.00E+00	0.00E+00	0.00E+00
Pyrene	5.00E-06	3.25E-08	1.42E-07
Styrene	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethane	0.00E+00	0.00E+00	0.00E+00
Toluene	3.40E-03	2.21E-05	9.68E-05
Vinyl Chloride	0.00E+00	0.00E+00	0.00E+00
Xylene	0.00E+00	0.00E+00	0.00E+00
Arsenic	2.00E-04	1.30E-06	5.70E-06
Beryllium	1.20E-05	7.80E-08	3.42E-07
Cadmium	1.10E-03	7.15E-06	3.13E-05
Chromium	1.40E-03	9.10E-06	3.99E-05
Cobalt	8.40E-05	5.46E-07	2.39E-06
Manganese	3.80E-04	2.47E-06	1.08E-05
Mercury	2.60E-04	1.69E-06	7.41E-06
Nickel	2.10E-03	1.37E-05	5.98E-05
Selenium	2.40E-05	1.56E-07	6.84E-07
Total HAP		**1.23E-02**	**0.054**

[f] AP-42 Table 1.4-3 "Emission Factors for Speciated Organic Compounds from Natural Gas Combustion" (7/98) and Table 1.4-4 "Emission Factors for Metals from Natural Gas Combustion" (7/98).

[g] Emission Rate (lb/hr) = (Emission Factor lb/MMscf) * (Maximum Hourly Fuel Consumption scf/hr) * (MM/1,000,000)

[h] Emission Rate (ton/yr) = (Emission Rate lb/hr) * (Annual Operation hrs/yr) * (1 ton/2000 lb)

TITLE V RENEWAL
ANR PIPELNE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Unit ID No.: **EU-LI009**
Description of Unit: **Dehydration Furnace**

Potential Greenhouse Gas (GHG) Emission Calculations[2]

Pollutant	Uncontrolled Emission Factor[2]	Factor Units[2]	Emissions (lb/hr)	Emissions (TPY)	Global Warming Potential (GWP)[2]	CO2e Emissions (lb/hr)	CO2e Emissions (TPY)
CO_2	53.06	kg CO_2/MMBtu	775.91	3,398.49	1.00	775.91	3,398.49
CH_4	0.001	kg CH_4/MMBtu	0.01	0.06	25.00	0.37	1.60
N_2O	0.0001	kg N_2O/MMBtu	0.00	0.01	298.00	0.44	1.91
TOTAL GHGs	--	--	**775.93**	**3,398.56**	--	--	--
TOTAL GHGs (CO_2e)	--	--	--	--	--	**776.71**	**3,402.00**

[1] Heat input based on fuel consumption and permitted HP.
[2] Based on 40 CFR 98 Subpart C, 98.33(a)(1)(i), Tier 1 Methodology, Equation C-1 and using source specific heat input.

GHG Emissions (lb/hr) = EF_{GHG} (kg/MMBtu) * 2.204623 lb/kg * Source Specific Heat Input (MMbtu/hr)
GHG Emissions (TPY) = GHG Emissions (lb/hr) * Annual Hoperating Hours (hr/yr) * 1 Ton/2000 lb
CO_2e Emissions (TPY) = Σ (GHG Emissions (tpy) * GWP)

Where:

EF_{GHG} = Fuel-specific default CO_2, CH_4, or N_2O emission factors from Table C-1 for CO_2 (Natural gas - Weighted U.S. Average) and Table C-2 for CH_4 and N_2O (Natural Gas) of 40 CFR Part 98, Subpart C (kg/MMBtu)
Heat Input = Btu/hp-hr x Site-rated hp x (1 MMBtu/1,000,000 Btu) = MMBtu/hr
GWP = Global Warming Potentials, 40 CFR 98, Subpart A, Table A-1

TITLE V RENEWAL
ANR PIPELINE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Emission Unit ID	**EU-LI010**	
Unit ID No.		
Description of Unit	**Emergency Generator**	
Manufacturer	Caterpillar G3412C	
Date of Construction/Modification	2019	
Stroke Cycle	4-Stroke	
Type of Burn	Lean-Burn	
Fuel Used	Natural Gas	
Low Heating Value (LHV)	905	Btu/scf
Higher Heating Value (HHV)	1,020	Btu/scf
Brake Specific Fuel Consumption	7216	Btu/Bhp-hr
Rated Horsepower (hp)	755	hp
Heat Input (MMBtu/hr)	5.45	MMBtu/hr
Maximum Hourly Fuel Consumption	6,020	scf/hr
Control Device	Catalyst	
Stack Designation	N/A	
Annual Hours of Operation	500	hr/yr
Annual Fuel Consumption	3.01	MMscf/yr

Emission Factors:

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Source
NOx	2.00	g/bhp-hr	a
CO	4.00	g/bhp-hr	a
NM/NE VOC	1.00	g/bhp-hr	a
PM (Filterable + Condensable)	0.019	lb/MMBtu	b
PM10	0.010	lb/MMBtu	b
SO2	0.001	lb/MMBtu	b

[a] NSPS Supbart JJJJ Limitation

[b] AP-42 Table 3.2-3 "Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines" (7/00).

POTENTIAL EMISSIONS:

Pollutant	Emission Rate lb/hr	Calculation Methodology	Potential Emissions [c] ton/yr	Potential Emissions [d] lb/yr
NOx	3.33	b	0.83	1,664.49
CO	6.66	b	1.66	3,328.98
NM/NEVOC	1.66	b	0.42	832.25
PM (Filterable + Condensable)	0.11	b	0.03	52.87
PM10	0.05	b	0.01	25.88
SO2	0.00	b	0.00	1.60

Sample Calculation:

[b] Emission Rate (lb/hr) = (Emission Factor lb/MMBtu) * (Heat Input MMBtu/hr)

[c] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

[d] Emission Rate (lb/yr)=Emission Rate (lb/hr) *Annual Hours of Operation (hrs/yr)

HAP Calculated Emissions:

Pollutant	Emission Factor (lb/MMBtu)[e]	Potential Emissions (lb/hr)[f]	Potential Emissions (tons/yr)[g]
HAPs:			
1,1,2,2-Tetrachloroethane	2.53E-05	1.38E-04	0.0000
1,1,2-Trichloroethane	1.53E-05	8.34E-05	0.0000
1,3-Butadiene	6.63E-04	3.61E-03	0.0009
1,3-Dichloropropene	1.27E-05	6.92E-05	0.0000
2,2,4-Trimethylpentane	0.00E+00	0.00E+00	0.0000
2-Methylnaphthalene	0.00E+00	0.00E+00	0.0000
3-Methylcholanthrene	0.00E+00	0.00E+00	0.0000
7,12-Dimethylbenz(a)anthracene	0.00E+00	0.00E+00	0.0000
Acenaphthene	0.00E+00	0.00E+00	0.0000
Acenaphthylene	0.00E+00	0.00E+00	0.0000
Acetaldehyde	2.79E-03	1.52E-02	0.0038
Acrolein	2.63E-03	1.43E-02	0.0036
Anthracene	0.00E+00	0.00E+00	0.0000
Benz(a)anthracene	0.00E+00	0.00E+00	0.0000
Benzene	1.58E-03	8.61E-03	0.0022
Benzo(a)pyrene	0.00E+00	0.00E+00	0.0000
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.0000
Benzo(e)pyrene	0.00E+00	0.00E+00	0.0000
Benzo(g,h,i)perylene	0.00E+00	0.00E+00	0.0000
Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.0000
Biphenyl	0.00E+00	0.00E+00	0.0000
Carbon Tetrachloride	1.77E-05	9.64E-05	0.0000
Chlorobenzene	1.29E-05	7.03E-05	0.0000
Chloroform	1.37E-05	7.46E-05	0.0000
Chrysene	0.00E+00	0.00E+00	0.0000
Dichlorobenzene	0.00E+00	0.00E+00	0.0000
Ethylbenzene	2.48E-05	1.35E-04	0.0000
Ethylene Dibromide	2.13E-05	1.16E-04	0.0000
Fluoranthene	0.00E+00	0.00E+00	0.0000
Fluorene	0.00E+00	0.00E+00	0.0000
Formaldehyde	2.05E-02	1.12E-01	0.0279
Indeno(1,2,3-c,d)pyrene	0.00E+00	0.00E+00	0.0000
Methanol	3.06E-03	1.67E-02	0.0042
Methylene Chloride	4.12E-05	2.24E-04	0.0001
n-Hexane	0.00E+00	0.00E+00	0.0000
Naphthalene	9.71E-05	5.29E-04	0.0001
PAH	1.41E-04	7.68E-04	0.0002
Perylene	0.00E+00	0.00E+00	0.0000
Phenanthrene	0.00E+00	0.00E+00	0.0000
Phenol	0.00E+00	0.00E+00	0.0000
Propylene Oxide	0.00E+00	0.00E+00	0.0000
Pyrene	0.00E+00	0.00E+00	0.0000
Styrene	1.19E-05	6.48E-05	0.0000
Tetrachloroethane	0.00E+00	0.00E+00	0.0000
Toluene	5.58E-04	3.04E-03	0.0008
Vinyl Chloride	7.18E-06	3.91E-05	0.0000
Xylene	1.94E-04	1.06E-03	0.0003
Arsenic	0.00E+00	0.00E+00	0.0000
Beryllium	0.00E+00	0.00E+00	0.0000
Cadmium	0.00E+00	0.00E+00	0.0000
Chromium	0.00E+00	0.00E+00	0.0000
Cobalt	0.00E+00	0.00E+00	0.0000
Manganese	0.00E+00	0.00E+00	0.0000
Mercury	0.00E+00	0.00E+00	0.0000
Nickel	0.00E+00	0.00E+00	0.0000
Selenium	0.00E+00	0.00E+00	0.0000
Total HAP		**0.18**	**0.04**

[e] Based on AP-42 Table 3.2-3 "Uncontrolled Emission Factors for 4-Stroke Rich Burn Engines" (7/00).

[f] Emission Rate (lb/hr) = (Emission Factor lb/MMBtu) * (Heat Input MMBtu/hr)

[g] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

TITLE V RENEWAL
ANR PIPELNE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Unit ID No.: **EU-LI010**
Description of Unit: **Emergency Generator**

Potential Greenhouse Gas (GHG) Emission Calculations[2]

Pollutant	Uncontrolled Emission Factor[2]	Factor Units[2]	Emissions (lb/hr)	Emissions (TPY)	Global Warming Potential (GWP)[2]	CO2e Emissions (lb/hr)	CO2e Emissions (TPY)
CO_2	53.06	kg CO_2/MMBtu	637.30	159.33	1.00	637.30	159.33
CH_4	0.001	kg CH_4/MMBtu	0.01	0.00	25.00	0.30	0.08
N_2O	0.0001	kg N_2O/MMBtu	0.00	0.00	298.00	0.36	0.09
TOTAL GHGs	--	--	**637.31**	**159.33**	--	--	--
TOTAL GHGs (CO_2e)	--	--	--	--	--	**637.96**	**159.49**

[1] Heat input based on fuel consumption and permitted HP.
[2] Based on 40 CFR 98 Subpart C, 98.33(a)(1)(i), Tier 1 Methodology, Equation C-1 and using source specific heat input.

GHG Emissions (lb/hr) = EF_{GHG} (kg/MMBtu) * 2.204623 lb/kg * Source Specific Heat Input (MMbtu/hr)
GHG Emissions (TPY) = GHG Emissions (lb/hr) * Annual Hoperating Hours (hr/yr) * 1 Ton/2000 lb
CO_2e Emissions (TPY) = Σ (GHG Emissions (tpy) * GWP)

Where:

EF_{GHG} = Fuel-specific default CO_2, CH_4, or N_2O emission factors from Table C-1 for CO_2 (Natural gas - Weighted U.S. Average) and Table C-2 for CH_4 and N_2O (Natural Gas) of 40 CFR Part 98, Subpart C (kg/MMBtu)
Heat Input = Btu/hp-hr x Site-rated hp x (1 MMBtu/1,000,000 Btu) = MMBtu/hr
GWP = Global Warming Potentials, 40 CFR 98, Subpart A, Table A-1

Appendix C Mark-Up of Current Title V Permit, Lincoln Compressor Station ROP NO. MI-ROP-N5586-2019

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
AIR QUALITY DIVISION

EFFECTIVE DATE: September 23, 2019

ISSUED TO

ANR Pipeline Company – Lincoln Compressor Station

State Registration Number (SRN): N5586

LOCATED AT

3991 South Hickory, Lake George, Clare County, Michigan 48633

RENEWABLE OPERATING PERMIT

Permit Number: MI-ROP-N5586-2019

Expiration Date: September 23, 2024

Administratively Complete ROP Renewal Application Due Between
March 23, 2023 and March 23, 2024

This Renewable Operating Permit (ROP) is issued in accordance with and subject to Section 5506(3) of Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451). Pursuant to Rule 210(1) of the administrative rules promulgated under Act 451, this ROP constitutes the permittee's authority to operate the stationary source identified above in accordance with the general conditions, special conditions and attachments contained herein. Operation of the stationary source and all emission units listed in the permit are subject to all applicable future or amended rules and regulations pursuant to Act 451 and the federal Clean Air Act.

Michigan Department of Environment, Great Lakes, and Energy

_____

Chris Hare, Bay City District Supervisor

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AUTHORITY AND ENFORCEABILITY

For the purpose of this permit, the **permittee** is defined as any person who owns or operates an emission unit at a stationary source for which this permit has been issued. The **department** is defined in Rule 104(d) as the Director of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) or his or her designee.

The permittee shall comply with all specific details in the permit terms and conditions and the cited underlying applicable requirements. All terms and conditions in this ROP are both federally enforceable and state enforceable unless otherwise footnoted. Certain terms and conditions are applicable to most stationary sources for which an ROP has been issued. These general conditions are included in Part A of this ROP. Other terms and conditions may apply to a specific emission unit, several emission units which are represented as a flexible group, or the entire stationary source which is represented as a Source-Wide group. Special conditions are identified in Parts B, C, D and/or the appendices.

In accordance with Rule 213(2)(a), all underlying applicable requirements will be identified for each ROP term or condition. All terms and conditions that are included in a PTI, are streamlined or subsumed, or are state only enforceable will be noted as such.

In accordance with Section 5507 of Act 451, the permittee has included in the ROP application a compliance certification, a schedule of compliance, and a compliance plan. For applicable requirements with which the source is in compliance, the source will continue to comply with these requirements. For applicable requirements with which the source is not in compliance, the source will comply with the detailed schedule of compliance requirements that are incorporated as an appendix in this ROP. Furthermore, for any applicable requirements effective after the date of issuance of this ROP, the stationary source will meet the requirements on a timely basis, unless the underlying applicable requirement requires a more detailed schedule of compliance.

Issuance of this permit does not obviate the necessity of obtaining such permits or approvals from other units of government as required by law.

A. GENERAL CONDITIONS

Permit Enforceability

- All conditions in this permit are both federally enforceable and state enforceable unless otherwise noted. **(R 336.1213(5))**

- Those conditions that are hereby incorporated in a state-only enforceable Source-Wide PTI pursuant to Rule 201(2)(d) are designated by footnote one. **(R 336.1213(5)(a), R 336.1214a(5))**

- Those conditions that are hereby incorporated in a federally enforceable Source-Wide PTI pursuant to Rule 201(2)(c) are designated by footnote two. **(R 336.1213(5)(b), R 336.1214a(3))**

General Provisions

1. The permittee shall comply with all conditions of this ROP. Any ROP noncompliance constitutes a violation of Act 451, and is grounds for enforcement action, for ROP revocation or revision, or for denial of the renewal of the ROP. All terms and conditions of this ROP that are designated as federally enforceable are enforceable by the Administrator of the United States Environmental Protection Agency (USEPA) and by citizens under the provisions of the federal Clean Air Act (CAA). Any terms and conditions based on applicable requirements which are designated as "state-only" are not enforceable by the USEPA or citizens pursuant to the CAA. **(R 336.1213(1)(a))**

2. It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this ROP. **(R 336.1213(1)(b))**

3. This ROP may be modified, revised, or revoked for cause. The filing of a request by the permittee for a permit modification, revision, or termination, or a notification of planned changes or anticipated noncompliance does not stay any ROP term or condition. This does not supersede or affect the ability of the permittee to make changes, at the permittee's own risk, pursuant to Rule 215 and Rule 216. **(R 336.1213(1)(c))**

4. The permittee shall allow the department, or an authorized representative of the department, upon presentation of credentials and other documents as may be required by law and upon stating the authority for and purpose of the investigation, to perform any of the following activities: **(R 336.1213(1)(d))**
   a. Enter, at reasonable times, a stationary source or other premises where emissions-related activity is conducted or where records must be kept under the conditions of the ROP.
   b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of the ROP.
   c. Inspect, at reasonable times, any of the following:
      i. Any stationary source.
      ii. Any emission unit.
      iii. Any equipment, including monitoring and air pollution control equipment.
      iv. Any work practices or operations regulated or required under the ROP.
   d. As authorized by Section 5526 of Act 451, sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the ROP or applicable requirements.

5. The permittee shall furnish to the department, within a reasonable time, any information the department may request, in writing, to determine whether cause exists for modifying, revising, or revoking the ROP or to determine compliance with this ROP. Upon request, the permittee shall also furnish to the department copies of any records that are required to be kept as a term or condition of this ROP. For information which is claimed by the permittee to be confidential, consistent with the requirements of the 1976 PA 442, MCL §15.231 et seq., and known as the Freedom of Information Act, the person may also be required to furnish the records directly to the USEPA together with a claim of confidentiality. **(R 336.1213(1)(e))**

6. A challenge by any person, the Administrator of the USEPA, or the department to a particular condition or a part of this ROP shall not set aside, delay, stay, or in any way affect the applicability or enforceability of any other condition or part of this ROP. **(R 336.1213(1)(f))**

7. The permittee shall pay fees consistent with the fee schedule and requirements pursuant to Section 5522 of Act 451. **(R 336.1213(1)(g))**

8. This ROP does not convey any property rights or any exclusive privilege. **(R 336.1213(1)(h))**

Equipment & Design

9. Any collected air contaminants shall be removed as necessary to maintain the equipment at the required operating efficiency. The collection and disposal of air contaminants shall be performed in a manner so as to minimize the introduction of contaminants to the outer air. Transport of collected air contaminants in Priority I and II areas requires the use of material handling methods specified in Rule 370(2).[2] **(R 336.1370)**

10. Any air cleaning device shall be installed, maintained, and operated in a satisfactory manner and in accordance with the Michigan Air Pollution Control rules and existing law. **(R 336.1910)**

Emission Limits

11. Unless otherwise specified in this ROP, the permittee shall comply with Rule 301, which states, in part, "Except as provided in Subrules 2, 3, and 4 of this rule, a person shall not cause or permit to be discharged into the outer air from a process or process equipment a visible emission of a density greater than the most stringent of the following:"[2] **(R 336.1301(1))**
    a. A 6-minute average of 20% opacity, except for one 6-minute average per hour of not more than 27% opacity.
    b. A limit specified by an applicable federal new source performance standard.

    The grading of visible emissions shall be determined in accordance with Rule 303.

12. The permittee shall not cause or permit the emission of an air contaminant or water vapor in quantities that cause, alone or in reaction with other air contaminants, either of the following:
    a. Injurious effects to human health or safety, animal life, plant life of significant economic value, or property.[1] **(R 336.1901(a))**
    b. Unreasonable interference with the comfortable enjoyment of life and property.[1] **(R 336.1901(b))**

Testing/Sampling

13. The department may require the owner or operator of any source of an air contaminant to conduct acceptable performance tests, at the owner's or operator's expense, in accordance with Rule 1001 and Rule 1003, under any of the conditions listed in Rule 1001(1).[2] **(R 336.2001)**

14. Any required performance testing shall be conducted in accordance with Rule 1001(2), Rule 1001(3) and Rule 1003. **(R 336.2001(2), R 336.2001(3), R 336.2003(1))**

15. Any required test results shall be submitted to the Air Quality Division (AQD) in the format prescribed by the applicable reference test method within 60 days following the last date of the test. **(R 336.2001(5))**

Monitoring/Recordkeeping

16. Records of any periodic emission or parametric monitoring required in this ROP shall include the following information specified in Rule 213(3)(b)(i), where appropriate. **(R 336.1213(3)(b))**
    a. The date, location, time, and method of sampling or measurements.
    b. The dates the analyses of the samples were performed.
    c. The company or entity that performed the analyses of the samples.
    d. The analytical techniques or methods used.
    e. The results of the analyses.
    f. The related process operating conditions or parameters that existed at the time of sampling or measurement.

17. All required monitoring data, support information and all reports, including reports of all instances of deviation from permit requirements, shall be kept and furnished to the department upon request for a period of not less than 5 years from the date of the monitoring sample, measurement, report or application. Support information includes all calibration and maintenance records and all original strip-chart recordings, or other original data records, for continuous monitoring instrumentation and copies of all reports required by the ROP. **(R 336.1213(1)(e), R 336.1213(3)(b)(ii))**

Certification & Reporting

18. Except for the alternate certification schedule provided in Rule 213(3)(c)(iii)(B), any document required to be submitted to the department as a term or condition of this ROP shall contain an original certification by a Responsible Official which states that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete. **(R 336.1213(3)(c))**

19. A Responsible Official shall certify to the appropriate AQD District Office and to the USEPA that the stationary source is and has been in compliance with all terms and conditions contained in the ROP except for deviations that have been or are being reported to the appropriate AQD District Office pursuant to Rule 213(3)(c). This certification shall include all the information specified in Rule 213(4)(c)(i) through (v) and shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the certification are true, accurate, and complete. The USEPA address is: USEPA, Air Compliance Data - Michigan, Air and Radiation Division, 77 West Jackson Boulevard, Chicago, Illinois 60604-3507. **(R 336.1213(4)(c))**

20. The certification of compliance shall be submitted annually for the term of this ROP as detailed in the special conditions, or more frequently if specified in an applicable requirement or in this ROP. **(R 336.1213(4)(c))**

21. The permittee shall promptly report any deviations from ROP requirements and certify the reports. The prompt reporting of deviations from ROP requirements is defined in Rule 213(3)(c)(ii) as follows, unless otherwise described in this ROP. **(R 336.1213(3)(c))**
    a. For deviations that exceed the emissions allowed under the ROP, prompt reporting means reporting consistent with the requirements of Rule 912 as detailed in Condition 25. All reports submitted pursuant to this paragraph shall be promptly certified as specified in Rule 213(3)(c)(iii).
    b. For deviations which exceed the emissions allowed under the ROP and which are not reported pursuant to Rule 912 due to the duration of the deviation, prompt reporting means the reporting of all deviations in the semiannual reports required by Rule 213(3)(c)(i). The report shall describe reasons for each deviation and the actions taken to minimize or correct each deviation.
    c. For deviations that do not exceed the emissions allowed under the ROP, prompt reporting means the reporting of all deviations in the semiannual reports required by Rule 213(3)(c)(i). The report shall describe the reasons for each deviation and the actions taken to minimize or correct each deviation.

For reports required pursuant to Rule 213(3)(c)(ii), prompt certification of the reports is described in Rule 213(3)(c)(iii) as either of the following: **(R 336.1213(3)(c))**

a. Submitting a certification by a Responsible Official with each report which states that, based on information and belief formed after reasonable inquiry, the statements and information in the report are true, accurate, and complete.
b. Submitting, within 30 days following the end of a calendar month during which one or more prompt reports of deviations from the emissions allowed under the ROP were submitted to the department pursuant to Rule 213(3)(c)(ii), a certification by a Responsible Official which states that; "based on information and belief formed after reasonable inquiry, the statements and information contained in each of the reports submitted during the previous month were true, accurate, and complete." The certification shall include a listing of the reports that are being certified. Any report submitted pursuant to Rule 213(3)(c)(ii) that will be certified on a monthly basis pursuant to this paragraph shall include a statement that certification of the report will be provided within 30 days following the end of the calendar month.

23. Semiannually for the term of the ROP as detailed in the special conditions, or more frequently if specified, the permittee shall submit certified reports of any required monitoring to the appropriate AQD District Office. All instances of deviations from ROP requirements during the reporting period shall be clearly identified in the reports. **(R 336.1213(3)(c)(i))**

24. On an annual basis, the permittee shall report the actual emissions, or the information necessary to determine the actual emissions, of each regulated air pollutant as defined in Rule 212(6) for each emission unit utilizing the emissions inventory forms provided by the department. **(R 336.1212(6))**

25. The permittee shall provide notice of an abnormal condition, start-up, shutdown, or malfunction that results in emissions of a hazardous or toxic air pollutant which continue for more than one hour in excess of any applicable standard or limitation, or emissions of any air contaminant continuing for more than two hours in excess of an applicable standard or limitation, as required in Rule 912, to the appropriate AQD District Office. The notice shall be provided not later than two business days after the start-up, shutdown, or discovery of the abnormal conditions or malfunction. Notice shall be by any reasonable means, including electronic, telephonic, or oral communication. Written reports, if required under Rule 912, must be submitted to the appropriate AQD District Supervisor within 10 days after the start-up or shutdown occurred, within 10 days after the abnormal conditions or malfunction has been corrected, or within 30 days of discovery of the abnormal conditions or malfunction, whichever is first. The written reports shall include all of the information required in Rule 912(5) and shall be certified by a Responsible Official in a manner consistent with the CAA.[2] **(R 336.1912)**

Permit Shield

26. Compliance with the conditions of the ROP shall be considered compliance with any applicable requirements as of the date of ROP issuance if either of the following provisions is satisfied. **(R 336.1213(6)(a)(i), R 336.1213(6)(a)(ii))**
    a. The applicable requirements are included and are specifically identified in the ROP.
    b. The permit includes a determination or concise summary of the determination by the department that other specifically identified requirements are not applicable to the stationary source.

    Any requirements identified in Part E of this ROP have been identified as non-applicable to this ROP and are included in the permit shield.

27. Nothing in this ROP shall alter or affect any of the following:
    a. The provisions of Section 303 of the CAA, emergency orders, including the authority of the USEPA under Section 303 of the CAA. **(R 336.1213(6)(b)(i))**
    b. The liability of the owner or operator of this source for any violation of applicable requirements prior to or at the time of this ROP issuance. **(R 336.1213(6)(b)(ii))**
    c. The applicable requirements of the acid rain program, consistent with Section 408(a) of the CAA. **(R 336.1213(6)(b)(iii))**

d. The ability of the USEPA to obtain information from a source pursuant to Section 114 of the CAA. **(R 336.1213(6)(b)(iv))**

28. The permit shield shall not apply to provisions incorporated into this ROP through procedures for any of the following:
    a. Operational flexibility changes made pursuant to Rule 215. **(R 336.1215(5))**
    b. Administrative Amendments made pursuant to Rule 216(1)(a)(i)-(iv). **(R 336.1216(1)(b)(iii))**
    c. Administrative Amendments made pursuant to Rule 216(1)(a)(v) until the amendment has been approved by the department. **(R 336.1216(1)(c)(iii))**
    d. Minor Permit Modifications made pursuant to Rule 216(2). **(R 336.1216(2)(f))**
    e. State-Only Modifications made pursuant to Rule 216(4) until the changes have been approved by the department. **(R 336.1216(4)(e))**

29. Expiration of this ROP results in the loss of the permit shield. If a timely and administratively complete application for renewal is submitted not more than 18 months, but not less than 6 months, before the expiration date of the ROP, but the department fails to take final action before the end of the ROP term, the existing ROP does not expire until the renewal is issued or denied, and the permit shield shall extend beyond the original ROP term until the department takes final action. **(R 336.1217(1)(c), R 336.1217(1)(a))**

Revisions

30. For changes to any process or process equipment covered by this ROP that do not require a revision of the ROP pursuant to Rule 216, the permittee must comply with Rule 215. **(R 336.1215, R 336.1216)**

31. A change in ownership or operational control of a stationary source covered by this ROP shall be made pursuant to Rule 216(1). **(R 336.1219(2))**

32. For revisions to this ROP, an administratively complete application shall be considered timely if it is received by the department in accordance with the time frames specified in Rule 216. **(R 336.1210(10))**

33. Pursuant to Rule 216(1)(b)(iii), Rule 216(2)(d) and Rule 216(4)(d), after a change has been made, and until the department takes final action, the permittee shall comply with both the applicable requirements governing the change and the ROP terms and conditions proposed in the application for the modification. During this time period, the permittee may choose to not comply with the existing ROP terms and conditions that the application seeks to change. However, if the permittee fails to comply with the ROP terms and conditions proposed in the application during this time period, the terms and conditions in the ROP are enforceable. **(R 336.1216(1)(c)(iii), R 336.1216(2)(d), R 336.1216(4)(d))**

Reopenings

34. A ROP shall be reopened by the department prior to the expiration date and revised by the department under any of the following circumstances:
    a. If additional requirements become applicable to this stationary source with three or more years remaining in the term of the ROP, but not if the effective date of the new applicable requirement is later than the ROP expiration date. **(R 336.1217(2)(a)(i))**
    b. If additional requirements pursuant to Title IV of the CAA become applicable to this stationary source. **(R 336.1217(2)(a)(ii))**
    c. If the department determines that the ROP contains a material mistake, information required by any applicable requirement was omitted, or inaccurate statements were made in establishing emission limits or the terms or conditions of the ROP. **(R 336.1217(2)(a)(iii))**
    d. If the department determines that the ROP must be revised to ensure compliance with the applicable requirements. **(R 336.1217(2)(a)(iv))**

Renewals

35. For renewal of this ROP, an administratively complete application shall be considered timely if it is received by the department not more than 18 months, but not less than 6 months, before the expiration date of the ROP. **(R 336.1210(9))**

Stratospheric Ozone Protection

36. If the permittee is subject to Title 40 of the Code of Federal Regulations (CFR), Part 82 and services, maintains, or repairs appliances except for motor vehicle air conditioners (MVAC), or disposes of appliances containing refrigerant, including MVAC and small appliances, or if the permittee is a refrigerant reclaimer, appliance owner or a manufacturer of appliances or recycling and recovery equipment, the permittee shall comply with all applicable standards for recycling and emissions reduction pursuant to 40 CFR Part 82, Subpart F.

37. If the permittee is subject to 40 CFR Part 82 and performs a service on motor (fleet) vehicles when this service involves refrigerant in the MVAC, the permittee is subject to all the applicable requirements as specified in 40 CFR Part 82, Subpart B, Servicing of Motor Vehicle Air Conditioners. The term "motor vehicle" as used in Subpart B does not include a vehicle in which final assembly of the vehicle has not been completed by the original equipment manufacturer. The term MVAC as used in Subpart B does not include the air-tight sealed refrigeration system used for refrigerated cargo or an air conditioning system on passenger buses using Hydrochlorofluorocarbon-22 refrigerant.

Risk Management Plan

38. If subject to Section 112(r) of the CAA and 40 CFR Part 68, the permittee shall register and submit to the USEPA the required data related to the risk management plan for reducing the probability of accidental releases of any regulated substances listed pursuant to Section 112(r)(3) of the CAA as amended in 40 CFR 68.130. The list of substances, threshold quantities, and accident prevention regulations promulgated under 40 CFR Part 68, do not limit in any way the general duty provisions under Section 112(r)(1).

39. If subject to Section 112(r) of the CAA and 40 CFR Part 68, the permittee shall comply with the requirements of 40 CFR Part 68, no later than the latest of the following dates as provided in 40 CFR 68.10(a):
    a. June 21, 1999,
    b. Three years after the date on which a regulated substance is first listed under 40 CFR 68.130, or
    c. The date on which a regulated substance is first present above a threshold quantity in a process.

40. If subject to Section 112(r) of the CAA and 40 CFR Part 68, the permittee shall submit any additional relevant information requested by any regulatory agency necessary to ensure compliance with the requirements of 40 CFR Part 68.

41. If subject to Section 112(r) of the CAA and 40 CFR Part 68, the permittee shall annually certify compliance with all applicable requirements of Section 112(r) as detailed in Rule 213(4)(c)). **(40 CFR Part 68)**

Emission Trading

42. Emission averaging and emission reduction credit trading are allowed pursuant to any applicable interstate or regional emission trading program that has been approved by the Administrator of the USEPA as a part of Michigan's State Implementation Plan. Such activities must comply with Rule 215 and Rule 216. **(R 336.1213(12))**

Permit to Install (PTI)

43. The process or process equipment included in this permit shall not be reconstructed, relocated, or modified unless a PTI authorizing such action is issued by the department, except to the extent such action is exempt from the PTI requirements by any applicable rule.[2] **(R 336.1201(1))**

44. The department may, after notice and opportunity for a hearing, revoke PTI terms or conditions if evidence indicates the process or process equipment is not performing in accordance with the terms and conditions of the PTI or is violating the department's rules or the CAA.[2] **(R 336.1201(8), Section 5510 of Act 451)**

45. The terms and conditions of a PTI shall apply to any person or legal entity that now or hereafter owns or operates the process or process equipment at the location authorized by the PTI. If a new owner or operator submits a written request to the department pursuant to Rule 219 and the department approves the request, this PTI will be amended to reflect the change of ownership or operational control. The request must include all of the information required by Subrules (1)(a), (b) and (c) of Rule 219. The written request shall be sent to the appropriate AQD District Supervisor, EGLE.[2] **(R 336.1219)**

46. If the installation, reconstruction, relocation, or modification of the equipment for which PTI terms and conditions have been approved has not commenced within 18 months of the original PTI issuance date, or has been interrupted for 18 months, the applicable terms and conditions from that PTI, as incorporated into the ROP, shall become void unless otherwise authorized by the department. Furthermore, the person to whom that PTI was issued, or the designated authorized agent, shall notify the department via the Supervisor, Permit Section, EGLE, AQD, P. O. Box 30260, Lansing, Michigan 48909, if it is decided not to pursue the installation, reconstruction, relocation, or modification of the equipment allowed by the terms and conditions from that PTI.[2] **(R 336.1201(4))**

Footnotes:
[1]This condition is state-only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

B. SOURCE-WIDE CONDITIONS

Part B outlines the Source-Wide Terms and Conditions that apply to this stationary source. The permittee is subject to these special conditions for the stationary source in addition to the general conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply to this source, NA (not applicable) has been used in the table. If there are no Source-Wide Conditions, this section will be left blank.

SOURCE-WIDE CONDITIONS

DESCRIPTION

Any emission unit that emits air contaminants and is exempt from the requirements of Rule 201 pursuant to Rule 278, Rule 278a and Rule 285(mm).

POLLUTION CONTROL EQUIPMENT

NA

I. EMISSION LIMIT(S)

NA

II. MATERIAL LIMIT(S)

NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. For venting of natural gas for routine maintenance or relocation of transmission and distribution systems in amounts greater than 1,000,000 standard cubic feet, the permittee shall, at a minimum, implement measures to assure safety of employees and the public and minimize impacts to the environment. **(R 336.1285(mm)(ii)(B))**

2. For venting of field gas for routine maintenance or relocation of gathering pipelines in amounts greater than 1,000,000 standard cubic feet, the permittee shall, at a minimum, implement measures to assure safety of employees and the public and minimize impacts to the environment. **(R 336.1285(mm)(iii)(B))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. For venting of natural gas for routine maintenance or relocation of transmission and distribution systems in amounts greater than 1,000,000 standard cubic feet, the permittee shall notify the AQD District Supervisor prior to a scheduled pipeline venting. **(R 336.1285(2)(mm)(ii)(A))**

5. For venting of natural gas for routine maintenance or relocation of transmission and distribution systems in amounts greater than 1,000,000 standard cubic feet, the permittee shall provide necessary notification in accordance with the Michigan gas safety standards, the federal pipeline and hazardous materials safety administration standards, and the federal energy regulatory commission standards, as applicable. The permittee is not required to copy the AQD on the notifications. **(R 336.1285(mm)(ii)(B))**

6. For venting of field gas for routine maintenance or relocation of gathering pipelines in amounts greater than 1,000,000 standard cubic feet, the permittee shall notify the AQD District Supervisor prior to a scheduled pipeline venting. **(R 336.1285(mm)(iii)(A))**

7. For venting of field gas for routine maintenance or relocation of gathering pipelines in amounts greater than 1,000,000 standard cubic feet, the permittee shall provide necessary notification in accordance with the Michigan Department of Environment, Great Lakes, and Energy, Office of Geological Survey, and the Michigan Public Service Commission Standards, as applicable. The permittee is not required to copy the AQD on the notifications. **(R 336.1285(mm)(iii)(B))**

8. For emergency venting of natural gas or field gases in amounts greater than 1,000,000 standard cubic feet per event, the permittee shall notify the pollution emergency alert system (PEAS) within 24 hours of an emergency pipeline venting. For purposes of this requirement, an emergency is considered an unforeseen event that disrupts normal operating conditions and poses a threat to human life, health, property, or the environment if not controlled immediately. **(R 336.1285(mm)(iv))**

See Appendix 8

VIII. STACK/VENT RESTRICTION(S)

NA

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

C. EMISSION UNIT SPECIAL CONDITIONS

Part C outlines terms and conditions that are specific to individual emission units listed in the Emission Unit Summary Table. The permittee is subject to the special conditions for each emission unit in addition to the General Conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply, NA (not applicable) has been used in the table. If there are no conditions specific to individual emission units, this section will be left blank.

EMISSION UNIT SUMMARY TABLE

The descriptions provided below are for informational purposes and do not constitute enforceable conditions.

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date/ Modification Date	Flexible Group ID
EU-LI001	Clark TLAD8, 3200 hp, 2-stroke, lean-burn, natural gas-fired reciprocating internal combustion compressor engine.	01/01/1971	FG-LIREC
EU-LI002	Clark TLAD8, 3200 hp, 2-stroke, lean-burn, natural gas-fired reciprocating internal combustion compressor engine.	01/01/1971	FG-LIREC
EU-LI003	Cooper-Bessemer 16W330, 8000 hp, 2-stroke, lean-burn, natural gas-fired reciprocating internal combustion compressor engine.	01/01/1974	FG-LIREC
~~EU-LI004~~ EU-LI010	~~General Electric 200kw generator driven by a G379 Engine, 4-stroke rich burn, rated at 330hp, with a heat input of approximately 3.2 MMBTU/hr.~~ Caterpillar 4SLB 755 hp Emergency Generator	~~Caterpillar 1974~~ 2019	FG-RICEMACT
~~EU-LI006~~ EU-LI011 EU-LI012	~~Kewanee Boiler 4.185 MMBTU/hr~~ Two (2) 5.0 MMBtu/hr boilers.	~~1970~~ 10/28/2021	FG-BOILERMACT ~~EXISTING~~ New
EU-LI009	Dry bed dehydrator furnace rated at 6.63 MMBTU/hr.	2018	FG-BOILERMACT NEW

D. FLEXIBLE GROUP CONDITIONS

Part D outlines the terms and conditions that apply to more than one emission unit. The permittee is subject to the special conditions for each flexible group in addition to the General Conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply, NA (not applicable) has been used in the table. If there are no special conditions that apply to more than one emission unit, this section will be left blank.

FLEXIBLE GROUP SUMMARY TABLE

The descriptions provided below are for informational purposes and do not constitute enforceable conditions.

Flexible Group ID	Flexible Group Description	Associated Emission Unit IDs
FG-LIREC	Natural gas-fired, reciprocating internal combustion engines used to compress natural gas for injection into or for withdrawal from a natural gas storage field.	EU-LI001 EU-LI002 EU-LI003
FG-RICEMACT~~Any existing emergency spark ignition engine < 500 HP that commenced construction or reconstruction before June 12, 2006, subject to 40 CFR Part 63, Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Major Sources: Reciprocating Internal Combustion Engines.~~ New generator >500 hp manufactured after June 12, 2006 subject to 40 CFR 63 Subpart ZZZZ.		EU-LI004 EU-LI010 This unit is subject to 40 CFR 60 NSPS JJJJ.
~~FG-BOILERMACT EXISTING~~	~~Any existing emission unit designed to burn Gas 1 Subcategory fuels (natural gas only) subject to 40 CFR Part 63, Subpart DDDDD - National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters.~~	~~EU-LI006~~
FG-BOILERMACT NEW	Any new emission unit designed to burn Gas 1 Subcategory fuels subject to 40 CFR Part 63, Subpart DDDDD - National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters.	EU-LI009 EU-LI011 and EU LI012

FG-LIREC
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Natural gas-fired, reciprocating internal combustion engines used to compress natural gas for injection into or for withdrawal from a natural gas storage field.

Emission Units: EU-LI001, EU-LI002, EU-LI003

POLLUTION CONTROL EQUIPMENT

NA

I. EMISSION LIMIT(S)

NA

II. MATERIAL LIMIT(S)

NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. Permittee shall only fire pipeline quality natural gas in the compressor engines at this facility. **(R 336.1301(1))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall monitor and record the natural gas consumption rate for each emission unit listed in FGLIREC for each calendar month. **(R 336.1213(3)(b))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8

VIII. STACK/VENT RESTRICTION(S)

NA

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-RICEMACT
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Any new ~~existing~~ emergency spark ignition engine ~~< 500 HP~~ >500 hp that commenced construction or reconstruction after ~~before~~ June 12, 2006, subject to 40 CFR Part 63, Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Major Sources: Reciprocating Internal Combustion Engines.

Emission Unit: ~~EU-LI004~~ EU-LI010

This needs to be updated to reflect applicable 40 CFR 63 ZZZZ and 40 CFR 60 NSPS JJJJ federal regulations for a new emergency generator installed in 2019. It is a 755 hp Caterpillar G3412C 4 cycle lean burn unit.

POLLUTION CONTROL EQUIPMENT

NA

I. EMISSION LIMIT(S)

NA

II. MATERIAL LIMIT(S)

NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. Any stationary RICE shall be installed, maintained, and operated in a satisfactory manner. The permittee shall meet the following work practice standards as specified in 40 CFR 63.6602 and Table 2c, Item 1 of 40 CFR Part 63, Subpart ZZZZ:
   a. Change oil and filter every 500 hours of operation or annually, whichever comes first, except as allowed in SC III.4;
   b. Inspect the air cleaner every 1,000 hours of operation or annually, whichever comes first; and
   c. Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.

   If the affected source is being operated during an emergency and it is not possible to shut down the engine to perform the work practice standards on the schedule required, the work practice standard can be delayed until the emergency is over. The work practice should be performed as soon as practicable after the emergency has ended or the unacceptable risk under Federal, State or local law has been abated. Sources must report any failure to perform the work practice on the schedule required and the Federal, State or local law or which the risk was deemed unacceptable. **(40 CFR 63.6602, 40 CFR Part 63, Subpart ZZZZ Table 2c, Item 6)**

2. The permittee must be in compliance with the emission limitations and operating limitations in this subpart that apply to the source at all times. **(40 CFR 63.6605(a))**

3. The permittee, at all times, must operate and maintain any affected source, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. The general duty to minimize emissions does not require you to make any further efforts to reduce emissions if levels required by this standard have been achieved. Determination of whether such operation and maintenance procedures are being used will be based on information available to the Administrator which may include, but is not limited to, monitoring results, review of operation and maintenance procedures, review of operation and maintenance records, and inspection of the source. **(40 CFR 63.6605(b))**

4. The permittee may utilize an oil analysis program in order to extend the specified oil change requirement. The oil analysis must be performed at the same frequency as oil changes are required in Table 2c. **(40 CFR 63.6625(j))**

5. If the results of oil analysis exceed limits as specified below, the permittee must change the oil within two days or before commencing operation, whichever is later:
   a. Total Acid Number is less than 30 percent of the Total Acid Number of the oil when new;
   b. Viscosity of the oil has changed by more than 20% from the viscosity of the oil when new;
   c. Percent water content (by volume) is greater than 0.5%. **(40 CFR 63.6625(j))**

6. The permittee shall maintain and operate the stationary RICE per the manufacturer's emission related written instructions or develop a maintenance plan which must provide for the maintenance and operation of the engine in a manner consistent with good air pollution control practices for minimizing emissions. **(40 CFR 63.6625(e), 40 CFR 63.6640(a), 40 CFR Part 63, Subpart ZZZZ, Table 6 Item 9)**

7. The permittee shall minimize the time spent at idle during startup and minimize the startup time of the stationary RICE to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes, after which time the emission standards applicable to all times other than startup apply. **(40 CFR 63.6625(h))**

8. The permittee shall not exceed 100 hours per year for maintenance checks and readiness testing. The permittee may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that Federal, State, or local standards require maintenance and testing of emergency RICE beyond 100 hours per year. **(40 CFR 63.6640(f)(1)(ii))**

9. The permittee may operate the stationary RICE for non-emergency situations for up to 50 hours per year as allowed in 40 CFR 63.6640 (f)(1)(iii). **(40 CFR 63.6640(f)(1)(iii))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall equip and maintain the stationary RICE with a non-resettable hour meter to track the hours of operation. **(40 CFR 63.6625(f))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. If using an oil analysis program, the permittee shall, at a minimum analyze the Total Acid Number, Viscosity, and percent water content. **(40 CFR 63.6625(i))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall keep the following records:
   a. Records of the occurrence and duration of each malfunction of operation or the air pollution control monitoring equipment; **(40 CFR 63.6655(a)(2), 40 CFR 63.6660)**
   b. Records of actions taken during periods of malfunction to minimize emissions, including corrective actions to restore malfunctioning process and air pollution control and monitoring equipment to its normal or usual manner of operation; **(40 CFR 63.6655(a)(5), 40 CFR 63.6660, 40 CFR 63.6605(b))**
   c. Records to demonstrate continuous compliance with operating limitations in SC III.1; **(40 CFR 63.6655(d), 40 CFR 63.6660)**
   d. Records of the maintenance conducted to demonstrate the stationary RICE was operated and maintained according to the manufacturer's emission related written instructions or developed maintenance plan; **(40 CFR 63.6655(e), 40 CFR 63.6660)**
   e. Records of hours of operation recorded through the non-resettable hour meter. The permittee shall document how many hours were spent during emergency operation; including what classified the operation as emergency and how many hours were spent during non-emergency operation. **(40 CFR 63.6655(f), 40 CFR 63.6660)**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8

VIII. STACK/VENT RESTRICTION(S)

NA

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR Part 63, Subpart A and Subpart ZZZZ, for Stationary Reciprocating Internal Combustion Engines by the initial compliance date of October 19, 2013. **(40 CFR 63.6595(a)(1), 40 CFR Part 63, Subparts A and ZZZZ)**

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-BOILERMACTEXISTING
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Any existing emission unit designed to burn Gas 1 Subcategory fuels (natural gas only) subject to 40 CFR Part 63, Subpart DDDDD - National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters.

Emission Units: EU-LI006

The collection at a major source of all existing industrial, commercial, and institutional boilers and process heaters within the units designed to burn gas 1 fuel subcategory as defined in 40 CFR 63.7575. At the time of permit renewal:

Less than 5 MMBTU/hr	~~EU-LI006~~
Equal to or greater than 5 MMBTU/hr and less than 10 MMBTU/hr	NA
Equal to or greater than 10 MMBTU/hr	NA

POLLUTION CONTROL EQUIPMENT

This flexible group should be deleted. There are no units that are applicable to these regulations onsite.

NA

I. EMISSION LIMIT(S)

NA

II. MATERIAL LIMIT(S)

1. The permittee shall only burn natural gas as defined in 40 CFR 63.7575. **(40 CFR 63.7499(l))**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee must meet the tune-up and Energy Assessment work practice standards for each applicable boiler or process heater at the source. **(40 CFR 63.7500(a)(1), 40 CFR Part 63, Subpart DDDDD, Table 3, Nos. 1-4)**

2. The permittee must operate and maintain affected sources in a manner consistent with safety and good air pollution control practices for minimizing emissions. Determination of whether such operation and maintenance procedures are being used will be based on information available to the Administrator that may include, but is not limited to, monitoring results, review of operation and maintenance procedures, review of operation and maintenance records, and inspection of the source. **(40 CFR 63.7500(a)(3))**

3. The permittee may obtain approval from the Administrator to use an alternative to the work practice standards noted in SC III.1 and/or SC III.2. **(40 CFR 63.7500(b))**

4. The permittee must:
   a. Complete a tune-up every 5 years (61 months) for boilers/process heaters less than or equal to 5 million BTU per hour; **(40 CFR 63.7500(e), 40 CFR 63.7515(d))**
   b. Complete a tune-up every 2 years (25 months) for boilers greater than 5 million BTU per hour and less than 10 million BTU per hour; **(40 CFR 63.7500(e), 40 CFR 63.7515(d))**
   c. Complete a tune-up annually (13 months) for boilers greater than 10 million BTU per hour; **(40 CFR 63.7540(a)(10), 40 CFR 63.7515(d))**
   d. Conduct the tune-up within 30 calendar days of startup, if the unit is not operating on the required date for a tune-up; **(40 CFR 63.7540(a)(13))**
   e. Follow the procedures described in SC IX 4.a through 4.f for all initial and subsequent tune ups; **(40 CFR 63.7540(a)(10), 40 CFR Part 63, Subpart DDDDD, Table 3)**

f. Complete the Initial tune ups on all affected units no later than January 31, 2016, except as provided in 40 CFR 63.7510(j) and 40 CFR 63.7540(a)(13). **(40 CFR 63.7510(j) and 40 CFR 63.7540(a)(13))**

5. The permittee must complete the one-time energy assessment no later than January 31, 2016. **(40 CFR 63.7510(e))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee must keep a copy of each notification and report submitted to comply with 40 CFR Part 63, Subpart DDDDD, including all documentation supporting any Initial Notification or Notification of Compliance Status or semiannual compliance report that the permittee submitted, according to the requirements in 40 CFR 63.10(b)(2)(xiv). **(40 CFR 63.7555(a)(1))**

2. The permittee must keep each record on site, or they must be accessible from on-site (for example, through a computer network), for at least 2 years after the date of each occurrence, measurement, maintenance, corrective action, report, or record. The permittee can keep the records off site for the remaining 3 years. **(40 CFR 63.7560(a), (b), and (c))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. The permittee must submit a Notification of Compliance Status that includes each boiler or process heater before the close of business on the 60th day following the completion of the initial compliance demonstrations for all boiler or process heaters at the facility. The Notification of Compliance Status report must contain the following information and must be submitted within 60 days of January 31, 2016: **(40 CFR 63.7545(e))**
   a. A description of the affected unit(s) including identification of which subcategories the unit is in, the design heat input capacity of the unit, a description of the add-on controls used on the unit to comply with 40 CFR Part 63, Subpart DDDDD, description of the fuel(s) burned. **(40 CFR 63.7545(e)(1))**
   b. Certification(s) of compliance, as applicable, and signed by a responsible official: **(40 CFR 63.7545(e)(8))**
      i. "This facility completed the required initial tune-up for all of the boilers and process heaters covered by 40 CFR Part 63, Subpart DDDDD at this site according to the procedures in 40 CFR 63.7540(a)(10)(i) through (vi)." **(40 CFR 63.7545(e)(8)(i))**
      ii. "This facility has had an energy assessment performed according to 40 CFR 63.7530(e)." **(40 CFR 63.7545(e)(8)(ii))**
5. Unless the EPA Administrator has approved a different schedule for submission of reports under 40 CFR 63.10(a), the permittee must submit each report, according to paragraph (h) of 40 CFR 63.7550, stated in SC VII.7, by the date in Table 9 of 40 CFR Part 63, Subpart DDDDD and according to the requirements in paragraphs (b)(1) through (4) of 40 CFR 63.7550, as listed below. For units that are subject only to a requirement to conduct an annual tune-up according to 40 CFR 63.7540(a)(10), stated in SC IX.4.a, biennial tune-up

according to 40 CFR 63.7540(a)(11), stated in SC IX.4.b, or 5-year tune-up according to 40 CFR 63.7540(a)(12), stated in SC IX.4.c, and not subject to emission limits or operating limits, the permittee may submit only an annual, biennial, or 5-year compliance report, as applicable, as specified in paragraphs (b)(1) through (4) of 40 CFR 63.7550, as listed below, instead of a semi-annual compliance report. **(40 CFR 63.7550(b))**

a. The first semi-annual compliance report must cover the period beginning on January 31, 2016 and ending on December 31. When submitting an annual, biennial, or 5-year compliance report, the first compliance report must cover the period beginning on January 31, 2016 and ending on December 31 within 1, 2, or 5 years, as applicable, after the compliance date that is specified in 40 CFR 63.7495. **(40 CFR 63.7550(b)(1))**
b. The first semi-annual compliance report must be postmarked or submitted no later than September 15 or March 15, whichever date is the first date following the end of the first calendar half after January 31, 2016. The first annual, biennial, or 5-year compliance report must be postmarked or submitted no later than March 15. **(40 CFR 63.7550(b)(2), 40 CFR 63.7550(b)(5))**
c. Each subsequent semi-annual compliance report must cover the semiannual reporting period from January 1 through June 30 or the semiannual reporting period from July 1 through December 31. Annual, biennial, and 5-year compliance reports must cover the applicable 1-, 2-, or 5-year periods from January 1 to December 31. **(40 CFR 63.7550(b)(3))**
d. Each subsequent semi-annual compliance report must be postmarked or submitted no later than September 15 or March 15, whichever date is the first date following the end of the semiannual reporting period. Annual, biennial, and 5-year compliance reports must be postmarked or submitted no later than March 15. **(40 CFR 63.7550(b)(4), 40 CFR 63.7550(b)(5))**

6. The permittee must include the following information in the compliance report. **(40 CFR 63.7550(c), 40 CFR 63.7550(c)(1))**
   a. Company and Facility name and address; **(40 CFR 63.7550(c)(5)(i))**
   b. Process unit information, emissions limitations, and operating parameter limitations; **(40 CFR 63.7550(c)(5)(ii))**
   c. Date of report and beginning and ending dates of the reporting period; **(40 CFR 63.7550(c)(5)(iii))**
   d. Include the date of the most recent tune-up for each unit. Include the date of the most recent burner inspection if it was not done annually, biennially, or on a 5-year period and was delayed until the next scheduled or unscheduled unit shutdown; **(40 CFR 63.7550(c)(5)(xiv))**
   e. Statement by a responsible official with that official's name, title, and signature, certifying the truth, accuracy, and completeness of the content of the report. **(40 CFR 63.7550(c)(5)(xvii)**

7. The permittee must submit the reports according to the procedures specified in paragraph (h)(3) of 40 CFR 63.7550, as listed below: **(40 CFR 63.7550(h))**
   a. The permittee must submit all reports required by Table 9 of 40 CFR Part 63, Subpart DDDDD electronically to the EPA via the Compliance and Emissions Data Reporting Interface (CEDRI). (CEDRI can be accessed through the EPA's CDX.) The permittee must use the appropriate electronic report in CEDRI for 40 CFR Part 63, Subpart DDDDD. Instead of using the electronic report in CEDRI for 40 CFR Part 63, Subpart DDDDD, the permittee may submit an alternate electronic file consistent with the XML schema listed on the CEDRI Web site (*http://www.epa.gov/ttn/chief/cedri/index.html*), once the XML schema is available. If the reporting form specific to 40 CFR Part 63, Subpart DDDDD is not available in CEDRI at the time that the report is due, the permittee must submit the report to the Administrator at the appropriate address listed in 40 CFR 63.13. The permittee must begin submitting reports via CEDRI no later than 90-days after the form becomes available in CEDRI. **(40 CFR 63.7550(h)(3))**

See Appendix 8

VIII. STACK/VENT RESTRICTION(S)

NA

IX. OTHER REQUIREMENT(S)

1. The permittee must comply with 40 CFR Part 63, Subpart DDDDD no later than January 31, 2016, for existing boilers and process heaters, unless an extension has been granted per 40 CFR 63.6(i). **(40 CFR 63.7495(b))**

2. The permittee must be in compliance with the applicable work practice standards. **(40 CFR 63.7505(a))**

3. For affected sources (as defined in 40 CFR 63.7490) that have not operated since the previous compliance demonstration and more than one year has passed since the previous compliance demonstration, the permittee must complete a subsequent tune-up within 30 days of startup by following the procedures described in SC IX 4.a through 4.f. **(40 CFR 63.7515(g))**

4. The permittee must demonstrate continuous compliance with the tune-up requirement by completing the following: **(40 CFR 63.7540(a))**
   a. Inspect the burner and clean or replace any components of the burner as necessary (the permittee may perform the burner inspection any time prior to tune-up or delay the burner inspection until the next scheduled unit shutdown). At units where entry into a piece of process equipment or into a storage vessel is required to complete the tune-up inspections, inspections are required only during planned entries into the storage vessel or process equipment. **(40 CFR 63.7540(a)(10)(i))**
   b. Inspect the flame pattern, as applicable, and adjust the burner as necessary to optimize the flame pattern. The adjustment should be consistent with the manufacturer's specifications, if available. **(40 CFR 63.7540(a)(10)(ii))**
   c. Inspect the system controlling the air-to-fuel ratio, as applicable, and ensure that it is correctly calibrated and functioning properly (the permittee may delay the inspection until the next scheduled unit shutdown). Units that produce electricity for sale may delay the inspection until the first outage, not to exceed 36 months from the previous inspection. **(40 CFR 63.7540(a)(10)(iii))**
   d. Optimize total emissions of CO. This optimization should be consistent with the manufacturer's specifications, if available, and with any NOx requirement to which the unit is subject. **(40 CFR 63.7540(a)(10)(iv))**
   e. Measure the concentrations in the effluent stream of CO in parts per million, by volume, and oxygen in volume percent, before and after the adjustments are made (measurements may be either on a dry or wet basis, as long as it is the same basis before and after the adjustments are made). Measurements may be taken using a portable CO analyzer. **(40 CFR 63.7540(a)(10)(v))**
   f. Maintain on-site and submit, if requested by the Administrator, the most recent periodic report containing the information as listed below: **(40 CFR 63.7540(a)(10)(vi))**
      i. The concentrations of CO in the effluent stream in parts per million by volume, and oxygen in volume percent, measured at high fire or typical operating load, before and after the tune-up of the boiler or process heater; **(40 CFR 63.7540(a)(10)(vi)(A))**
      ii. A description of any corrective actions taken as a part of the tune-up; **(40 CFR 63.7540(a)(10)(vi)(B))**
      iii. The type and amount of fuel used over the 12 months prior to the tune-up, but only if the unit was physically and legally capable of using more than one type of fuel during that period. Units sharing a fuel meter may estimate the fuel used by each unit. **(40 CFR 63.7540(a)(10)(vi)(C))**

5. If the boiler or process heater has a heat input capacity of less than or equal to 5 million BTU per hour, the permittee may delay the burner inspection specified in SC IX.4.a until the next scheduled or unscheduled unit shutdown, but the permittee must inspect each burner at least once every 72 months. **(40 CFR 63.7540(a)(12))**

Footnotes:

[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).

[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-BOILERMACTNEW
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Any new emission unit designed to burn Gas 1 Subcategory fuels subject to 40 CFR Part 63, Subpart DDDDD - National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters.

Emission Units: EU-LI009

Less than 5 MMBTU/hr	NA
Equal to or greater than 5 MMBTU/hr and less than 10 MMBTU/hr	EU-LI009, EU-LI011 and EU-LI012
Equal to or greater than 10 MMBTU/hr	NA

POLLUTION CONTROL EQUIPMENT

NA

I. EMISSION LIMIT(S)

NA

II. MATERIAL LIMIT(S)

1. The permittee shall only burn fuels as allowed in the Unit designed to burn gas 1 subcategory definition in 40 CFR 63.7575. **(40 CFR 63.7499(l))**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee must meet the requirements in paragraphs (a)(1) and (3) of 40 CFR 63.7500, as listed below, except as provided in paragraphs (b) and (e) of 40 CFR 63.7500, stated in SC III.2 and SC III.3. The permittee must meet these requirements at all times the affected unit is operating: **(40 CFR 63.7500(a))**
   a. The permittee must meet each work practice standard in Table 3 of 40 CFR Part 63, Subpart DDDDD that applies to the boiler or process heater, for each boiler or process heater at the source. **(40 CFR 63.7500(a)(1))**
   b. At all times, the permittee must operate and maintain any affected source (as defined in 40 CFR 63.7490, stated in SC IX.1), including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. Determination of whether such operation and maintenance procedures are being used will be based on information available to the Administrator that may include, but is not limited to, monitoring results, review of operation and maintenance procedures, review of operation and maintenance records, and inspection of the source. **(40 CFR 63.7500(a)(3))**

2. As provided in 40 CFR 63.6(g), EPA may approve use of an alternative to the work practice standards. **(40 CFR 63.7500(b))**

3. Boilers and process heaters in the units designed to burn gas 1 fuels subcategory are not subject to the emission limits in Tables 1 and 2 or 11 through 13 of 40 CFR Part 63, Subpart DDDDD, or the operating limits in Table 4 of 40 CFR Part 63, Subpart DDDDD. Boilers and process heaters in the units designed to burn gas 1 fuel subcategory with a heat input capacity: **(40 CFR 63.7500(e))**
   a. Of less than or equal to 5 MMBTU per hour must complete a tune-up every 5 years as specified in 40 CFR 63.7540, stated in SC IX.8; **(40 CFR 63.7500(e))**

b. Greater than 5 MMBTU per hour and less than 10 MMBTU per hour must complete a tune-up every 2 years as specified in 40 CFR 63.7540, stated in SC IX.8. **(40 CFR 63.7500(e))**

4. The permittee must demonstrate initial compliance with the applicable work practice standards in Table 3 to 40 CFR Part 63, Subpart DDDDD within the applicable annual, biennial, or 5-year schedule as specified in 40 CFR 63.7515(d), stated in SC III.5, following the initial compliance date specified in 40 CFR 63.7495(a), stated in SC IX.3. Thereafter, the permittee is required to complete the applicable annual, biennial, or 5-year tune-up as specified in 40 CFR 63.7515(d), stated in SC III.5. **(40 CFR 63.7510(g))**

5. If the permittee is required to meet an applicable tune-up work practice standard, the permittee must:
   a. Conduct the first annual tune-up no later than 13 months after the initial startup of the new or reconstructed boiler or process heater, the first biennial tune-up no later than 25 months after the initial startup of the new or reconstructed boiler or process heater, or the first 5-year tune-up no later than 61 months after the initial startup of the new or reconstructed boiler or process heater;
   b. Conduct an annual performance tune-up according to 40 CFR 63.7540(a)(10), stated in SC IX.8.a; biennial performance tune-up according to 40 CFR 63.7540(a)(11), stated in SC IX.8.b; or 5-year performance tune-up according to 40 CFR 63.7540(a)(12), stated in SC IX.8.c. Each annual tune-up specified in 40 CFR 63.7540(a)(10) must be no more than 13 months after the previous tune-up. Each biennial tune-up specified in 40 CFR 63.7540(a)(11) must be conducted no more than 25 months after the previous tune-up. Each 5-year tune-up specified in 40 CFR 63.7540(a)(12) must be conducted no more than 61 months after the previous tune-up. **(40 CFR 63.7515(d))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(40 CFR 63.7560(b))**

1. The permittee must keep records according to paragraphs (a)(1) and (2) of 40 CFR 63.7555, as listed below: **(40 CFR 63.7555(a))**
   a. A copy of each notification and report that the permittee submitted to comply with 40 CFR Part 63, Subpart DDDDD, including all documentation supporting any Initial Notification or Notification of Compliance Status or semiannual compliance report that the permittee submitted, according to the requirements in 40 CFR 63.10(b)(2)(xiv); **(40 CFR 63.7555(a)(1))**
   b. Records of performance tests, fuel analyses, or other compliance demonstrations and performance evaluations as required in 40 CFR 63.10(b)(2)(viii). **(40 CFR 63.7555(a)(2))**

2. If the permittee operates a unit in the unit designed to burn gas 1 subcategory that is subject to 40 CFR Part 63, Subpart DDDDD, and the permittee uses an alternative fuel other than natural gas, refinery gas, gaseous fuel subject to another subpart under 40 CFR Part 63, other gas 1 fuel, or gaseous fuel subject to another subpart of 40 CFR Part 60, Part 61, Part 63, or Part 65, the permittee must keep records of the total hours per calendar year that alternative fuel is burned and the total hours per calendar year that the unit operated during periods of gas curtailment or gas supply emergencies. **(40 CFR 63.7555(h))**

3. The permittee's records must be in a form suitable and readily available for expeditious review, according to 40 CFR 63.10(b)(1). **(40 CFR 63.7560(a))**

4. As specified in 40 CFR 63.10(b)(1), the permittee must keep each record for 5 years following the date of each occurrence, measurement, maintenance, corrective action, report, or record. **(40 CFR 63.7560(b))**

5. The permittee must keep each record on site, or they must be accessible from on-site (for example, through a computer network), for at least 2 years after the date of each occurrence, measurement, maintenance, corrective

action, report, or record, according to 40 CFR 63.10(b)(1). The permittee can keep the records off site for the remaining 3 years. **(40 CFR 63.7560(c))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. The permittee must meet the notification requirements in 40 CFR 63.7545 according to the schedule in 40 CFR 63.7545, both stated in SC VII.6 through SC VII.9, and in Subpart A of 40 CFR Part 63. **(40 CFR 63.7495(d))**

5. The permittee must report each instance in which they did not meet each emission limit and operating limit in Tables 1 through 4 to this subpart that applies. These instances are deviations from the emission limits or operating limits, respectively, in this subpart. These deviations must be reported according to the requirements in 40 CFR 63.7550, cited in SC VII.11. **(40 CFR 63.7540(b))**

6. The permittee must submit to the Administrator all of the notifications in 40 CFR 63.7(b) and (c), 40 CFR 63.8(e), (f)(4) and (6), and 40 CFR 63.9(b) through (h) that apply to the permittee by the dates specified. **(40 CFR 63.7545(a))**

7. As specified in 40 CFR 63.9(b)(4) and (5), if the permittee starts up the new or reconstructed affected source on or after January 31, 2013, the permittee must submit an Initial Notification not later than 15 days after the actual date of startup of the affected source. **(40 CFR 63.7545(c))**

8. If the permittee operates a unit designed to burn natural gas, refinery gas, or other gas 1 fuels that is subject to 40 CFR Part 63, Subpart DDDDD, and the permittee intends to use a fuel other than natural gas, refinery gas, gaseous fuel subject to another subpart of 40 CFR Part 63, Part 60, Part 61, or Part 65, or other gas 1 fuel to fire the affected unit during a period of natural gas curtailment or supply interruption, as defined in 40 CFR 63.7575, the permittee must submit a notification of alternative fuel use within 48 hours of the declaration of each period of natural gas curtailment or supply interruption, as defined in 40 CFR 63.7575. The notification must include the information specified in paragraphs (f)(1) through (5) of 40 CFR 63.7545, as listed below:
   a. Company name and address; **(40 CFR 63.7545(f)(1))**
   b. Identification of the affected unit; **(40 CFR 63.7545(f)(2))**
   c. Reason the permittee is unable to use natural gas or equivalent fuel, including the date when the natural gas curtailment was declared, or the natural gas supply interruption began; **(40 CFR 63.7545(f)(3))**
   d. Type of alternative fuel that the permittee intends to use; **(40 CFR 63.7545(f)(4))**
   e. Dates when the alternative fuel use is expected to begin and end. **(40 CFR 63.7545(f)(5))**

9. If the permittee has switched fuels or made a physical change to the boiler or process heater and the fuel switch or physical change resulted in the applicability of a different subcategory, the permittee must provide notice of the date upon which the permittee switched fuels or made the physical change within 30-days of the switch/change. The notification must identify:
   a. The name of the owner or operator of the affected source, as defined in 40 CFR 63.7490, stated in SC IX.1, the location of the source, the boiler(s) and process heater(s) that have switched fuels, were physically changed, and the date of the notice; **(40 CFR 63.7545(h)(1))**
   b. The currently applicable subcategory under 40 CFR Part 63, Subpart DDDDD; **(40 CFR 63.7545(h)(2))**
   c. The date upon which the fuel switch or physical change occurred. **(40 CFR 63.7545(h)(3))**

10. The permittee must submit each report in Table 9 of 40 CFR Part 63, Subpart DDDDD that applies. **(40 CFR 63.7550(a))**

11. Unless the EPA Administrator has approved a different schedule for submission of reports under 40 CFR 63.10(a), the permittee must submit each report, according to paragraph (h) of 40 CFR 63.7550, stated in SC VII.13, by the date in Table 9 of 40 CFR Part 63, Subpart DDDDD and according to the requirements in paragraphs (b)(1) through (4) of 40 CFR 63.7550, as listed below. For units that are subject only to a requirement to conduct an annual tune-up according to 40 CFR 63.7540(a)(10), stated in SC IX.8.a, biennial tune-up according to 40 CFR 63.7540(a)(11), stated in SC IX.8.b, or 5-year tune-up according to 40 CFR 63.7540(a)(12), stated in SC IX.8.c, and not subject to emission limits or operating limits, the permittee may submit only an annual, biennial, or 5-year compliance report, as applicable, as specified in paragraphs (b)(1) through (4) of 40 CFR 63.7550, as listed below, instead of a semi-annual compliance report. **(40 CFR 63.7550(b))**
    a. The first semi-annual compliance report must cover the period beginning on the compliance date that is specified for each boiler or process heater in 40 CFR 63.7495, stated in SC IX.3, and ending on December 31 after the compliance date that is specified for the source in 40 CFR 63.7495, stated in SC IX.3. When submitting an annual, biennial, or 5-year compliance report, the first compliance report must cover the period beginning on the compliance date specified for each boiler or process heater in 40 CFR 63.7495 and ending on December 31 within 1, 2, or 5 years, as applicable, after the compliance date that is specified in 40 CFR 63.7495. **(40 CFR 63.7550(b)(1))**
    b. The first semi-annual compliance report must be postmarked or submitted no later than September 15 or March 15, whichever date is the first date following the end of the first calendar half after the compliance date that is specified for each boiler or process heater in 40 CFR 63.7495, stated in SC IX.3. The first annual, biennial, or 5-year compliance report must be postmarked or submitted no later than March 15. **(40 CFR 63.7550(b)(2), 40 CFR 63.7550(b)(5))**
    c. Each subsequent semi-annual compliance report must cover the semiannual reporting period from January 1 through June 30 or the semiannual reporting period from July 1 through December 31. Annual, biennial, and 5-year compliance reports must cover the applicable 1, 2, or 5-year periods from January 1 to December 31. **(40 CFR 63.7550(b)(3))**
    d. Each subsequent semi-annual compliance report must be postmarked or submitted no later than September 15 or March 15, whichever date is the first date following the end of the semiannual reporting period. Annual, biennial, and 5-year compliance reports must be postmarked or submitted no later than March 15. **(40 CFR 63.7550(b)(4), 40 CFR 63.7550(b)(5))**

12. A compliance report must contain the following information depending on how the permittee chooses to comply with the limits set in this rule:
    a. If the facility is subject to the requirements of a tune up the permittee must submit a compliance report with the information in paragraphs (c)(5)(i) through (iii), (xiv), and (xvii) of 40 CFR 63.7550; **(40 CFR 63.7550(c)(1))**
    b. 40 CFR 63.7550(c)(5) is as follows:
        i. Company and Facility name and address; **(40 CFR 63.7550(c)(5)(i))**
        ii. Process unit information, emissions limitations, and operating parameter limitations; **(40 CFR 63.7550(c)(5)(ii))**
        iii. Date of report and beginning and ending dates of the reporting period; **(40 CFR 63.7550(c)(5)(iii))**
        iv. Include the date of the most recent tune-up for each unit subject to only the requirement to conduct an annual tune-up according to 40 CFR 63.7540(a)(10), stated in SC IX.8.a, biennial tune-up according to 40 CFR 63.7540(a)(11), stated in SC IX.8.b, or 5-year tune-up according to 40 CFR 63.7540(a)(12), stated in SC IX.8.c. Include the date of the most recent burner inspection if it was not done annually, biennially, or on a 5-year period and was delayed until the next scheduled or unscheduled unit shutdown; **(40 CFR 63.7550(c)(5)(xiv))**
        v. Statement by a responsible official with that official's name, title, and signature, certifying the truth, accuracy, and completeness of the content of the report. **(40 CFR 63.7550(c)(5)(xvii))**

13. The permittee must submit the reports according to the procedures specified in paragraph (h)(3) of 40 CFR 63.7550, as listed below:
    a. The permittee must submit all reports required by Table 9 of 40 CFR Part 63, Subpart DDDDD electronically to the EPA via the Compliance and Emissions Data Reporting Interface (CEDRI). CEDRI can be accessed through the EPA's CDX. The permittee must use the appropriate electronic report in CEDRI for 40 CFR Part 63, Subpart DDDDD. Instead of using the electronic report in CEDRI for 40 CFR Part 63, Subpart DDDDD, the permittee may submit an alternate electronic file consistent with the XML schema listed on the CEDRI Web site (*http://www.epa.gov/ttn/chief/cedri/index.html*), once the XML schema is available.

If the reporting form specific to 40 CFR Part 63, Subpart DDDDD is not available in CEDRI at the time that the report is due, the permittee must submit the report to the Administrator at the appropriate address listed in 40 CFR 63.13. The permittee must begin submitting reports via CEDRI no later than 90 days after the form becomes available in CEDRI. **(40 CFR 63.7550(h)(3))**

See Appendix 8

VIII. STACK/VENT RESTRICTION(S)

NA

IX. OTHER REQUIREMENT(S)

1. 40 CFR Part 63, Subpart DDDDD applies to new or reconstructed affected sources as described in paragraph (a)(2) of 40 CFR 63.7490, as listed below: **(40 CFR 63.7490(a))**
   a. The affected source of 40 CFR Part 63, Subpart DDDDD is each new or reconstructed industrial, commercial, or institutional boiler or process heater, as defined in 40 CFR 63.7575, located at a major source. **(40 CFR 63.7490(a)(2))**

2. A boiler or process heater is:
   a. New if the permittee commences construction of the boiler or process heater after June 4, 2010, and the permittee meets the applicability criteria at the time the permittee commences construction; **(40 CFR 63.7490(b))**
   b. Reconstructed if the permittee meets the reconstruction criteria as defined in 40 CFR 63.2, the permittee commences reconstruction after June 4, 2010, and the permittee meets the applicability criteria at the time the permittee commence reconstruction. **(40 CFR 63.7490(c))**

3. If the permittee has a new or reconstructed boiler or process heater, the permittee must comply with 40 CFR Part 63, Subpart DDDDD by April 1, 2013, or upon startup of each boiler or process heater, whichever is later. **(40 CFR 63.7495(a))**

4. If the permittee has an area source that increases its emissions or its potential to emit such that it becomes a major source of HAP, paragraph (c)(2) of 40 CFR 63.7495, as listed below, applies to the permittee:
   a. Any new or reconstructed boiler or process heater at the existing source must be in compliance with this subpart upon startup. **(40 CFR 63.7495(c)(1))**

5. The permittee must be in compliance with the work practice standards of 40 CFR Part 63, Subpart DDDDD. **(40 CFR 63.7505(a))**

6. For affected sources, as defined in 40 CFR 63.7490, that switch subcategory consistent with 40 CFR 63.7545(h), stated in SC VII.9, after the initial compliance date, the permittee must demonstrate compliance within 60 days of the effective date of the switch, unless the compliance demonstration for this subcategory has been conducted within the previous 12 months. **(40 CFR 63.7510(k))**

7. For affected sources (as defined in 40 CFR 63.7490, stated in SC IX.1) that have not operated since the previous compliance demonstration and more than one year has passed since the previous compliance demonstration, the permittee must complete a subsequent tune-up by following the procedures described in 40 CFR 63.7540(a)(10)(i) through (vi), stated in SC IX.8.a, and the schedule described in 40 CFR 63.7540(a)(13), stated in SC IX.8.d, for units that are not operating at the time of their scheduled tune-up. **(40 CFR 63.7515(g))**

8. The permittee must demonstrate continuous compliance with the work practice standards in Table 3 of 40 CFR Part 63, Subpart DDDDD that apply according to the methods specified in paragraphs (a)(10) through (13) of 40 CFR 63.7540, as listed below:
   a. If the boiler or process heater has a heat input capacity of 10 MMBTU per hour or greater, the permittee must conduct an annual tune-up of the boiler or process heater to demonstrate continuous compliance as specified in paragraphs (a)(10)(i) through (vi) of 40 CFR 63.7540, as listed below. The tune-up must be conducted while burning the type of fuel or fuels in case of units that routinely burn a mixture) that provided the majority of the heat input to the boiler or process heater over the 12 months prior to the tune-up. This frequency does

not apply to units with continuous oxygen trim systems that maintain an optimum air to fuel ratio. **(40 CFR 63.7540(a)(10))**

i. As applicable, inspect the burner, and clean or replace any components of the burner as necessary (the permittee may perform the burner inspection any time prior to the tune-up or delay the burner inspection until the next scheduled unit shutdown). Units that produce electricity for sale may delay the burner inspection until the first outage, not to exceed 36 months from the previous inspection. At units where entry into a piece of process equipment or into a storage vessel is required to complete the tune-up inspections, inspections are required only during planned entries into the storage vessel or process equipment. **(40 CFR 63.7540(a)(10)(i))**

ii. Inspect the flame pattern, as applicable, and adjust the burner as necessary to optimize the flame pattern. The adjustment should be consistent with the manufacturer's specifications, if available. **(40 CFR 63.7540(a)(10)(ii))**

iii. Inspect the system controlling the air-to-fuel ratio, as applicable, and ensure that it is correctly calibrated and functioning properly (the permittee may delay the inspection until the next scheduled unit shutdown). Units that produce electricity for sale may delay the inspection until the first outage, not to exceed 36 months from the previous inspection. **(40 CFR 63.7540(a)(10)(iii))**

iv. Optimize total emissions of CO. This optimization should be consistent with the manufacturer's specifications, if available, and with any NO_X requirement to which the unit is subject. **(40 CFR 63.7540(a)(10)(iv))**

v. Measure the concentrations in the effluent stream of CO in parts per million, by volume, and oxygen in volume percent, before and after the adjustments are made (measurements may be either on a dry or wet basis, as long as it is the same basis before and after the adjustments are made). Measurements may be taken using a portable CO analyzer. **(40 CFR 63.7540(a)(10)(v))**

vi. Maintain on-site and submit, if requested by the Administrator, a report containing the information in paragraphs (a)(10)(vi)(A) through (C) of 40 CFR 63.7540, as listed below: **(40 CFR 63.7540(a)(10)(vi))**

(1) The concentrations of CO in the effluent stream in ppm by volume, and oxygen in volume percent, measured at high fire or typical operating load, before and after the tune-up of the boiler or process heater; **(40 CFR 63.7540(a)(10)(vi)(A))**

(2) A description of any corrective actions taken as a part of the tune-up; **40 CFR 63.7540(a)(10)(vi)(B))**

(3) The type and amount of fuel used over the 12 months prior to the tune-up, but only if the unit was physically and legally capable of using more than one type of fuel during that period. Units sharing a fuel meter may estimate the fuel used by each unit. **(40 CFR 63.7540(a)(10)(vi)(C))**

b. If the boiler or process heater has a heat input capacity of less than 10 MMBTU per hour (except as specified in paragraph (a)(12) of 40 CFR 63.7540), the permittee must conduct a biennial tune-up of the boiler or process heater as specified in paragraphs (a)(10)(i) through (vi) of 40 CFR 63.7540 to demonstrate continuous compliance. **(40 CFR 63.7540(a)(11))**

c. If the boiler or process heater has a continuous oxygen trim system that maintains an optimum air to fuel ratio, or a heat input capacity of less than or equal to 5 MMBTU per hour and the unit is in the units designed to burn gas 1 subcategory, the permittee must conduct a tune-up of the boiler or process heater every 5 years as specified in paragraphs (a)(10)(i) through (vi) of 40 CFR 63.7540 to demonstrate continuous compliance. The permittee may delay the burner inspection specified in paragraph (a)(10)(i) of 40 CFR 63.7540 until the next scheduled or unscheduled unit shutdown, but the permittee must inspect each burner at least once every 72 months. If an oxygen trim system is utilized on a unit without emission standards to reduce the tune-up frequency to once every 5 years, set the oxygen level no lower than the oxygen concentration measured during the most recent tune-up. **(40 CFR 63.7540(a)(12))**

d. If the unit is not operating on the required date for a tune-up, the tune-up must be conducted within 30 calendar days of startup. **(40 CFR 63.7540(a)(13))**

9. Table 10 of 40 CFR Part 63, Subpart DDDDD shows which parts of the General Provisions in 40 CFR 63.1 through 63.15 applies to the permittee. **(40 CFR 63.7565)**

Footnotes:

[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).

[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

E. NON-APPLICABLE REQUIREMENTS

At the time of the ROP issuance, the AQD has determined that no non-applicable requirements have been identified for incorporation into the permit shield provision set forth in the General Conditions in Part A pursuant to Rule 213(6)(a)(ii).

APPENDICES

Appendix 1. Acronyms and Abbreviations

Common Acronyms		Pollutant / Measurement Abbreviations	
AQD	Air Quality Division	acfm	Actual cubic feet per minute
BACT	Best Available Control Technology	BTU	British Thermal Unit
CAA	Clean Air Act	°C	Degrees Celsius
CAM	Compliance Assurance Monitoring	CO	Carbon Monoxide
CEM	Continuous Emission Monitoring	CO_2e	Carbon Dioxide Equivalent
CEMS	Continuous Emission Monitoring System	dscf	Dry standard cubic foot
CFR	Code of Federal Regulations	dscm	Dry standard cubic meter
COM	Continuous Opacity Monitoring	°F	Degrees Fahrenheit
Department/ department	Michigan Department of Environment, Great Lakes, and Energy	gr	Grains
		HAP	Hazardous Air Pollutant
EGLE	Michigan Department of Environment, Great Lakes, and Energy	Hg	Mercury
		hr	Hour
EU	Emission Unit	HP	Horsepower
FG	Flexible Group	H_2S	Hydrogen Sulfide
GACS	Gallons of Applied Coating Solids	kW	Kilowatt
GC	General Condition	lb	Pound
GHGs	Greenhouse Gases	m	Meter
HVLP	High Volume Low Pressure*	mg	Milligram
ID	Identification	mm	Millimeter
IRSL	Initial Risk Screening Level	MM	Million
ITSL	Initial Threshold Screening Level	MW	Megawatts
LAER	Lowest Achievable Emission Rate	NMOC	Non-methane Organic Compounds
MACT	Maximum Achievable Control Technology	NO_x	Oxides of Nitrogen
MAERS	Michigan Air Emissions Reporting System	ng	Nanogram
MAP	Malfunction Abatement Plan	PM	Particulate Matter
MSDS	Material Safety Data Sheet	PM10	Particulate Matter equal to or less than 10 microns in diameter
NA	Not Applicable		
NAAQS	National Ambient Air Quality Standards	PM2.5	Particulate Matter equal to or less than 2.5 microns in diameter
NESHAP	National Emission Standard for Hazardous Air Pollutants	pph	Pounds per hour
		ppm	Parts per million
NSPS	New Source Performance Standards	ppmv	Parts per million by volume
NSR	New Source Review	ppmw	Parts per million by weight
PS	Performance Specification	%	Percent
PSD	Prevention of Significant Deterioration	psia	Pounds per square inch absolute
PTE	Permanent Total Enclosure	psig	Pounds per square inch gauge
PTI	Permit to Install	scf	Standard cubic feet
RACT	Reasonable Available Control Technology	sec	Seconds
ROP	Renewable Operating Permit	SO_2	Sulfur Dioxide
SC	Special Condition	TAC	Toxic Air Contaminant
SCR	Selective Catalytic Reduction	Temp	Temperature
SNCR	Selective Non-Catalytic Reduction	THC	Total Hydrocarbons
SRN	State Registration Number	tpy	Tons per year
TEQ	Toxicity Equivalence Quotient	µg	Microgram
USEPA/EPA	United States Environmental Protection Agency	µm	Micrometer or Micron
		VOC	Volatile Organic Compounds
VE	Visible Emissions	yr	Year

*For HVLP applicators, the pressure measured at the gun air cap shall not exceed 10 psig.

Appendix 2. Schedule of Compliance

The permittee certified in the ROP application that this stationary source is in compliance with all applicable requirements and the permittee shall continue to comply with all terms and conditions of this ROP. A Schedule of Compliance is not required. **(R 336.1213(4)(a), R 336.1119(a)(ii))**

Appendix 3. Monitoring Requirements

Specific monitoring requirement procedures, methods or specifications are detailed in Part A or the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, this appendix is not applicable.

Appendix 4. Recordkeeping

Specific recordkeeping requirement formats and procedures are detailed in Part A or the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, this appendix is not applicable.

Appendix 5. Testing Procedures

Specific testing requirement plans, procedures, and averaging times are detailed in the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, this appendix is not applicable.

Appendix 6. Permits to Install

The following table lists any PTIs issued or ROP revision applications received since the effective date of the previously issued ROP No. MI-ROP-N5586-2012. Those ROP revision applications that are being issued concurrently with this ROP renewal are identified by an asterisk (*). Those revision applications not listed with an asterisk were processed prior to this renewal.

Permit to Install Number	ROP Revision Application Number	Description of Equipment or Change	Corresponding Emission Unit(s) or Flexible Group(s)
NA			

Appendix 7. Emission Calculations

There are no specific emission calculations to be used for this ROP. Therefore, this appendix is not applicable.

Appendix 8. Reporting

A. Annual, Semiannual, and Deviation Certification Reporting

The permittee shall use the EGLE, AQD, Report Certification form (EQP 5736) and EGLE, AQD, Deviation Report form (EQP 5737) for the annual, semiannual and deviation certification reporting referenced in the Reporting Section of the Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Alternative formats must meet the provisions of Rule 213(4)(c) and Rule 213(3)(c)(i), respectively, and be approved by the AQD District Supervisor.

B. Other Reporting

Specific reporting requirement formats and procedures are detailed in Part A or the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, Part B of this appendix is not applicable.

TransCanada

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Summaries

Emission Calculations

NCOLN COMPRESSOR STATION
CLARE COUNTY, MICHIGAN

GENERATOR ENGINE (4SRB)
GENERATOR ENGINE GHG
BOILER
BOILER GHG
DEHY FURNACE
DEHY FURNACE GHG

Raw Data
AP42 Emission Factors

TITLE V RENEWAL
ANR PIPELINE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Significant Activities

Emission Point ID	Source	Manufacturer	Model/Type	Rated Capacity (hp)	Heat Input (MMBtu/hr)
EU-LI001	Compressor Engine 1	Clark	TLAD8	3,200	22.4
EU-LI002	Compressor Engine 2	Clark	TLAD8	3,200	22.4
EU-LI003	Compressor Engine 3	Cooper-Bessemer	16W330	8,000	55.2
EU-LI009	Dehydration Furnace	N/A	N/A	N/A	6.6
EU-LI010	Emergency Engine	Caterpillar	G379	755	5.4
EU-LI011	Natural Gas Fired Boiler	CleaverBrooks	CFC-E 5000	N/A	5.0
EU-LI012	Natural Gas Fired Boiler	CleaverBrooks	CFC-E 5000	N/A	5.0

Insignificant Activities

Emission Point ID	Source Description	Installation Date	Rating/ Capacity	RO Permit Exemption Rule	NSR Permit Exemption Rule	Basis for Permit Exemption
EULIFURNACE-1	Furnace in Office Building	1995	0.204 MMBtu/hr	R336.1212(4)(b)	R336.1282(b)(i)	< 50 MMBtu/hr Each unit fires sweet natural gas, is used for space heating, service water heating, electric power generation, oil and gas production or processing, and has input capacity of less than 50 MMBtu/hr.
EULIWTRHTR-1	One (1) water heater in Office Building	1971	0.083 MMBtu/hr			
EULIHTR-1	Seven (7) heaters in Warehouse Building	1974	0.125 MMBtu/hr			
EULIHTR-2	One (1) heater in Chromatograph Skid Building	2002	0.01 MMBtu/hr			
EULIHTR-3	Two (2) heaters in Dehy Control Building	1989	0.05 MMBtu/hr			
EULIWTRHTR-2	One (1) water heater in Dehy Control Building	1984	0.038 MMBtu/hr			
EULIHTR-4	One (1) heater in Dehy/Separator Skid Building	1970	0.01 MMBtu/hr			
EULIHTR-5	One (1) heater in Old Communication Building	1970	0.1 MMBtu/hr			
EULIHTR-6	One (1) heater in Valve PCV 105	1980	0.004 MMBtu/hr			
EULIHTR-7	One (1) heater in Valve Dehy Pressure Control	1991	0.006 MMBtu/hr			
EULIHTR-8	One (1) heater in Valve PCV 104	1980	0.004 MMBtu/hr			
EULIHTR-9	One (1) heater in Valve PCV 104	1980	0.006 MMBtu/hr			
EULIHTR-10	Two (2) heaters in Valve MCU/PCV 103	1980	0.004 MMBtu/hr			
EULIHTR-11	One (1) heater in Corrosion Inhibitor Injection Point	1991	0.004 MMBtu/hr			
EULIHTR-12	One (1) Heater in Separator Shed	1970	0.025 MMBtu/hr			
EULIHTR-13	Two (2) heaters in Great Lakes Meter Run Valve PCV 101 A	1980	0.004 MMBtu/hr			
EULIWTRHTR-3	One (1) water heater in Warehouse Bldg.	1974	0.065 MMBtu/hr			
EULIHTR-14	Four (4) catalytic heaters		0.099 MMBtu/hr			
EULILUBE	Lube Oil Storage Tank, T-9 (does not vent to atmosphere)	1970	10,000 gal	R336.1212(3)(e)	R336.128(c)	Container Contents - Each tank is used to store lubricating, hydraulic, thermal oils or indirect heat transfer fluids.
EULIMAINTOIL	Maintenance Oil Storage Tank, T-8	1970	1,500 gal			
EULIMAINTOIL2	Maintenance Oil Storage Tank, T-10	1974	2,115 gal			
EULIUSEDOIL	Used Oil Storage Tank, T-7	1974	3,760 gal			
EULI008	Condensate Storage Tank, T-11	1963	12,800 gal	R336.1212(4)(c)	R336.1284(e)	< 40,000 gallons Each tank is used to store sweet condensate and has a capacity of less than 40,000 gallons.
EULIAMBITROL	Ambitrol Storage Tank, T-2	1970	1,000 gal	R336.1212(4)(c)	R336.1284(i)	< 40,000 gallons and contents with a vapor pressure of ≤ 1.5 psia Each tank has a capacity of less than 40,000 gallons and is used to store non-carcinogenic liquids with a vapor pressure of not more than 1.5 psia at the actual storage conditions.
EULIAMBMIX1	Maintenance Ambitrol Storage Tank, T-1	1970	10,500 gal			
EULIAMBMIX2	Ambitrol Storage Tank, T-3	1974	7,050 gal			
EULIMETHANOL	Methanol Storage Tank,T-18	1997	3,750 gal			
EULIGASOLINE	Gasoline Storage Tank, T-12	1999	1,000 gal			
	Gasoline Storage Tank, T-13	1999	1,000 gal			
EULIDIESEL	Diesel Storage Tank, T-14	1999	1,000 gal			
EULIPROWTR1	Process Water Tank 1, T-15	1963	1,500 gal			
EULIPROWTR2	Process Water Tank 2	1974	1,212 gal			
EULIREMPRO	Remediation Project	1999		R336.1212(3)(f)	R336.1285(w)	The project utilizes air stripping technology, is controlled by an appropriately designed and operated catalytic oxidation system and is used exclusively for clean up of gasoline, natural gas condensate, and crude oil spills.

TITLE V RENEWAL
ANR PIPELINE COMPANY

LINCOLN COMPRESSOR STATION, MICHIGAN

Unit	Unit Description	HP	Type	Heat Input	Potential Emission Rates											
					NOx		CO		VOC		PM		SO2		GHG's	
				(MMBtu/hr)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
EU-LI001	Compressor Engine 1	3,200	2SLB	22.40	101.59	444.95	10.16	44.50	7.05	30.90	1.08	4.74	0.013	0.058	2,620.35	11,477.11
EU-LI002	Compressor Engine 2	3,200	2SLB	22.40	101.59	444.95	10.16	44.50	7.05	30.90	1.08	4.74	0.013	0.058	2,620.35	11,477.11
EU-LI003	Compressor Engine 3	8,000	2SLB	55.20	255.73	1120.11	102.29	448.04	17.64	77.25	2.67	11.68	0.032	0.14	6,457.28	28,282.89
EU-LI009	Dehydration Furnace	N/A	-	6.63	0.65	2.85	0.55	2.39	0.036	0.16	0.05	0.22	3.90E-03	0.017	775.93	3,398.56
EU-LI010	Emergency Engine	755	4SRB	5.45	3.33	0.83	6.66	1.66	1.66	0.42	0.11	0.026	3.20E-03	8.01E-04	637.31	159.33
EU-LI011	Natural Gas Fired Boiler	N/A	-	5.00	0.49	2.15	0.41	1.80	0.027	0.12	0.037	0.16	2.94E-03	0.013	584.90	2,561.86
EU-LI012	Natural Gas Fired Boiler	N/A	-	5.00	0.49	2.15	0.41	1.80	0.027	0.12	0.037	0.16	2.94E-03	0.013	584.90	2,561.86
Total Emissions					**463.87**	**2,017.99**	**130.64**	**544.70**	**33.50**	**139.86**	**5.06**	**21.73**	**0.072**	**0.30**	**14,281.01**	**59,918.72**

TITLE V RENEWAL
ANR PIPELINE COMPANY

LINCOLN COMPRESSOR STATION, MICHIGAN

Compound	Emission Rate														Tanks		Total	
	EU-LI001 Engine 1		EU-LI002 Engine 2		EU-LI003 Engine 3		EU-LI009 Dehydration Furnace		EU-LI010 Emergency Engine		EU-LI011 Boiler		EU-LI012 Boiler					
	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
1,1,2,2-Tetrachloroethane	1.49E-03	6.50E-03	1.49E-03	6.50E-03	3.66E-03	1.60E-02	0.00E+00	0.00E+00	1.38E-04	3.45E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	6.77E-03	2.91E-02
1,1,2-Trichloroethane	1.18E-03	5.17E-03	1.18E-03	5.17E-03	2.91E-03	1.27E-02	0.00E+00	0.00E+00	8.34E-05	2.08E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	5.35E-03	2.31E-02
1,3-Butadiene	1.84E-02	8.05E-02	1.84E-02	8.05E-02	4.53E-02	1.98E-01	0.00E+00	0.00E+00	3.61E-03	9.03E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	8.56E-02	3.60E-01
1,3-Dichloropropene	9.81E-04	4.30E-03	9.81E-04	4.30E-03	2.42E-03	1.06E-02	0.00E+00	0.00E+00	6.92E-05	1.73E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	4.45E-03	1.92E-02
2,2,4-Trimethylpentane	1.90E-02	8.30E-02	1.90E-02	8.30E-02	4.67E-02	2.05E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	8.46E-02	3.71E-01
2-Methylnaphthalene	4.79E-04	2.10E-03	4.79E-04	2.10E-03	1.18E-03	5.17E-03	1.56E-07	6.84E-07	0.00E+00	0.00E+00	1.18E-07	5.15E-07	1.18E-07	5.15E-07	0	0	2.14E-03	9.37E-03
3-Methylcholanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-08	5.13E-08	0.00E+00	0.00E+00	8.82E-09	3.86E-08	8.82E-09	3.86E-08	0	0	2.94E-08	1.29E-07
7,12-Dimethylbenz(a)anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-07	4.56E-07	0.00E+00	0.00E+00	7.84E-08	3.44E-07	7.84E-08	3.44E-07	0	0	2.61E-07	1.14E-06
Acenaphthene	2.98E-05	1.30E-04	2.98E-05	1.30E-04	7.34E-05	3.22E-04	1.17E-08	5.13E-08	0.00E+00	0.00E+00	8.82E-09	3.86E-08	8.82E-09	3.86E-08	0	0	1.33E-04	5.83E-04
Acenaphthylene	7.10E-05	3.11E-04	7.10E-05	3.11E-04	1.75E-04	7.66E-04	1.17E-08	5.13E-08	0.00E+00	0.00E+00	8.82E-09	3.86E-08	8.82E-09	3.86E-08	0	0	3.17E-04	1.39E-03
Acetaldehyde	1.74E-01	7.61E-01	1.74E-01	7.61E-01	4.28E-01	1.88E+00	0.00E+00	0.00E+00	1.52E-02	3.80E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	7.91E-01	3.40E+00
Acrolein	1.74E-01	7.63E-01	1.74E-01	7.63E-01	4.29E-01	1.88E+00	0.00E+00	0.00E+00	1.43E-02	3.58E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	7.92E-01	3.41E+00
Anthracene	1.61E-05	7.04E-05	1.61E-05	7.04E-05	3.96E-05	1.74E-04	1.56E-08	6.84E-08	0.00E+00	0.00E+00	1.18E-08	5.15E-08	1.18E-08	5.15E-08	0	0	7.18E-05	3.15E-04
Benz(a)anthracene	7.53E-06	3.30E-05	7.53E-06	3.30E-05	1.85E-05	8.12E-05	1.17E-08	5.13E-08	0.00E+00	0.00E+00	8.82E-09	3.86E-08	8.82E-09	3.86E-08	0	0	3.36E-05	1.47E-04
Benzene	4.35E-02	1.90E-01	4.35E-02	1.90E-01	1.07E-01	4.69E-01	1.37E-05	5.98E-05	8.61E-03	2.15E-03	1.03E-05	4.51E-05	1.03E-05	4.51E-05	0	0	2.03E-01	8.52E-01
Benzo(a)pyrene	1.27E-07	5.57E-07	1.27E-07	5.57E-07	3.14E-07	1.37E-06	7.80E-09	3.42E-08	0.00E+00	0.00E+00	5.88E-09	2.58E-08	5.88E-09	2.58E-08	0	0	5.88E-07	2.57E-06
Benzo(b)fluoranthene	1.91E-07	8.35E-07	1.91E-07	8.35E-07	4.70E-07	2.06E-06	1.17E-08	5.13E-08	0.00E+00	0.00E+00	8.82E-09	3.86E-08	8.82E-09	3.86E-08	0	0	8.80E-07	3.86E-06
Benzo(e)pyrene	5.24E-07	2.30E-06	5.24E-07	2.30E-06	1.29E-06	5.66E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	2.34E-06	1.02E-05
Benzo(g,h,i)perylene	5.56E-07	2.43E-06	5.56E-07	2.43E-06	1.37E-06	6.00E-06	7.80E-09	3.42E-08	0.00E+00	0.00E+00	5.88E-09	2.58E-08	5.88E-09	2.58E-08	0	0	2.50E-06	1.09E-05
Benzo(k)fluoranthene	9.54E-08	4.18E-07	9.54E-08	4.18E-07	2.35E-07	1.03E-06	1.17E-08	5.13E-08	0.00E+00	0.00E+00	8.82E-09	3.86E-08	8.82E-09	3.86E-08	0	0	4.55E-07	1.99E-06
Biphenyl	8.85E-05	3.88E-04	8.85E-05	3.88E-04	2.18E-04	9.55E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	3.95E-04	1.73E-03
Carbon Tetrachloride	1.36E-03	5.96E-03	1.36E-03	5.96E-03	3.35E-03	1.47E-02	0.00E+00	0.00E+00	9.64E-05	2.41E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	6.17E-03	2.66E-02
Chlorobenzene	9.95E-04	4.36E-03	9.95E-04	4.36E-03	2.45E-03	1.07E-02	0.00E+00	0.00E+00	7.03E-05	1.76E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	4.51E-03	1.95E-02
Chloroform	1.06E-03	4.62E-03	1.06E-03	4.62E-03	2.60E-03	1.14E-02	0.00E+00	0.00E+00	7.46E-05	1.87E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	4.78E-03	2.06E-02
Chrysene	1.51E-05	6.59E-05	1.51E-05	6.59E-05	3.71E-05	1.62E-04	1.17E-08	5.13E-08	0.00E+00	0.00E+00	8.82E-09	3.86E-08	8.82E-09	3.86E-08	0	0	6.72E-05	2.94E-04
Dichlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.80E-06	3.42E-05	0.00E+00	0.00E+00	5.88E-06	2.58E-05	5.88E-06	2.58E-05	0	0	1.96E-05	8.57E-05
Ethylbenzene	2.42E-03	1.06E-02	2.42E-03	1.06E-02	5.96E-03	2.61E-02	0.00E+00	0.00E+00	1.35E-04	3.38E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	1.09E-02	4.73E-02
Ethylene Dibromide	1.64E-03	7.20E-03	1.64E-03	7.20E-03	4.05E-03	1.77E-02	0.00E+00	0.00E+00	1.16E-04	2.90E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	7.46E-03	3.22E-02
Fluoranthene	8.09E-06	3.54E-05	8.09E-06	3.54E-05	1.99E-05	8.73E-05	1.95E-08	8.54E-08	0.00E+00	0.00E+00	1.47E-08	6.44E-08	1.47E-08	6.44E-08	0	0	3.61E-05	1.58E-04
Fluorene	3.79E-05	1.66E-04	3.79E-05	1.66E-04	9.33E-05	4.09E-04	1.82E-08	7.98E-08	0.00E+00	0.00E+00	1.37E-08	6.01E-08	1.37E-08	6.01E-08	0	0	1.69E-04	7.40E-04
Formaldehyde	1.24E+00	5.42E+00	1.24E+00	5.42E+00	3.05E+00	1.33E+01	4.88E-04	2.14E-03	1.12E-01	2.79E-02	3.68E-04	1.61E-03	3.68E-04	1.61E-03	0	0	5.63E+00	2.42E+01
Indeno(1,2,3-c,d)pyrene	2.22E-07	9.74E-07	2.22E-07	9.74E-07	5.48E-07	2.40E-06	1.17E-08	5.13E-08	0.00E+00	0.00E+00	8.82E-09	3.86E-08	8.82E-09	3.86E-08	0	0	1.02E-06	4.48E-06
Methanol	5.56E-02	2.43E-01	5.56E-02	2.43E-01	1.37E-01	6.00E-01	0.00E+00	0.00E+00	1.67E-02	4.17E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	2.65E-01	1.09E+00
Methylene Chloride	3.29E-03	1.44E-02	3.29E-03	1.44E-02	8.11E-03	3.55E-02	0.00E+00	0.00E+00	2.24E-04	5.61E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	1.49E-02	6.44E-02
n-Hexane	9.97E-03	4.37E-02	9.97E-03	4.37E-02	2.46E-02	1.08E-01	1.17E-02	5.13E-02	0.00E+00	0.00E+00	8.82E-03	3.86E-02	8.82E-03	3.86E-02	0	0	7.39E-02	3.23E-01
Naphthalene	2.16E-03	9.45E-03	2.16E-03	9.45E-03	5.32E-03	2.33E-02	3.97E-06	1.74E-05	5.29E-04	1.32E-04	2.99E-06	1.31E-05	2.99E-06	1.31E-05	0	0	1.02E-02	4.24E-02
PAH	3.00E-03	1.31E-02	3.00E-03	1.31E-02	7.40E-03	3.24E-02	1.39E-07	6.10E-07	7.68E-04	1.92E-04	1.05E-07	4.59E-07	1.05E-07	4.59E-07	0	0	1.42E-02	5.89E-02
Perylene	1.11E-07	4.88E-07	1.11E-07	4.88E-07	2.74E-07	1.20E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	4.97E-07	2.18E-06
Phenanthrene	7.91E-05	3.46E-04	7.91E-05	3.46E-04	1.95E-04	8.53E-04	1.11E-07	4.84E-07	0.00E+00	0.00E+00	8.33E-08	3.65E-07	8.33E-08	3.65E-07	0	0	3.53E-04	1.55E-03
Phenol	9.43E-04	4.13E-03	9.43E-04	4.13E-03	2.32E-03	1.02E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	4.21E-03	1.84E-02
Propylene Oxide	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00
Pyrene	1.31E-05	5.73E-05	1.31E-05	5.73E-05	3.22E-05	1.41E-04	3.25E-08	1.42E-07	0.00E+00	0.00E+00	2.45E-08	1.07E-07	2.45E-08	1.07E-07	0	0	5.85E-05	2.56E-04
Styrene	1.23E-03	5.38E-03	1.23E-03	5.38E-03	3.02E-03	1.32E-02	0.00E+00	0.00E+00	6.48E-05	1.62E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	5.54E-03	2.40E-02
Tetrachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00
Toluene	2.16E-02	9.45E-02	2.16E-02	9.45E-02	5.32E-02	2.33E-01	2.21E-05	9.68E-05	3.04E-03	7.60E-04	1.67E-05	7.30E-05	1.67E-05	7.30E-05	0	0	9.94E-02	4.23E-01
Vinyl Chloride	5.53E-04	2.42E-03	5.53E-04	2.42E-03	1.36E-03	5.97E-03	0.00E+00	0.00E+00	3.91E-05	9.78E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	2.51E-03	1.08E-02
Xylene	6.00E-03	2.63E-02	6.00E-03	2.63E-02	1.48E-02	6.48E-02	0.00E+00	0.00E+00	1.06E-03	2.64E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	2.79E-02	1.18E-01
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E-06	5.70E-06	0.00E+00	0.00E+00	9.80E-07	4.29E-06	9.80E-07	4.29E-06	0	0	3.26E-06	1.43E-05
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.80E-08	3.42E-07	0.00E+00	0.00E+00	5.88E-08	2.58E-07	5.88E-08	2.58E-07	0	0	1.96E-07	8.57E-07
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.15E-06	3.13E-05	0.00E+00	0.00E+00	5.39E-06	2.36E-05	5.39E-06	2.36E-05	0	0	1.79E-05	7.86E-05
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.10E-06	3.99E-05	0.00E+00	0.00E+00	6.86E-06	3.01E-05	6.86E-06	3.01E-05	0	0	2.28E-05	1.00E-04
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.46E-07	2.39E-06	0.00E+00	0.00E+00	4.12E-07	1.80E-06	4.12E-07	1.80E-06	0	0	1.37E-06	6.00E-06
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.47E-06	1.08E-05	0.00E+00	0.00E+00	1.86E-06	8.16E-06	1.86E-06	8.16E-06	0	0	6.20E-06	2.71E-05
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-06	7.41E-06	0.00E+00	0.00E+00	1.27E-06	5.58E-06	1.27E-06	5.58E-06	0	0	4.24E-06	1.86E-05
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-05	5.98E-05	0.00E+00	0.00E+00	1.03E-05	4.51E-05	1.03E-05	4.51E-05	0	0	3.42E-05	1.50E-04
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-07	6.84E-07	0.00E+00	0.00E+00	1.18E-07	5.15E-07	1.18E-07	5.15E-07	0	0	3.91E-07	1.71E-06
Total	**1.78**	**7.80**	**1.78**	**7.80**	**4.39**	**19.23**	**0.01**	**0.05**	**0.18**	**0.04**	**0.01**	**0.04**	**0.01**	**0.04**	**0.06**	**0.28**	**8.23**	**35.30**

TITLE V RENEWAL
ANR PIPELINE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Emission Unit ID	**EU-LI011 & EU-LI012**	
Unit ID No.	**--**	
Description of Unit	**Natural Gas Fired Boiler**	
Manufacturer	CFC-E 5000	
Date of Construction/Modification	2021	
Fuel Used	Natural Gas	
Minimum Higher Heating Value (HHV)	918	Btu/scf
Maximum Higher Heating Value (HHV)	1,020	Btu/scf
Rated Horsepower (hp)	N/A	hp
Heat Input (MMBtu/hr)	5.00	MMBtu/hr
Maximum Hourly Fuel Consumption	4,902	scf/hr
Control Device	N/A	
Stack Designation	N/A	
Annual Hours of Operation	8,760	hr/yr
Annual Fuel Consumption	42.94	MMscf/yr

Emission Factors:

Pollutant	Emission Factor (lb/MMscf)	Emission Factor Source
NOx	100	a
CO	84	a
NM/NE VOC	5.5	b
PM (Filterable + Condensable)	7.6	b
SO2	0.6	b

[a] AP-42 Table 1.4-1 "Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion" (7/98).
[b] AP-42 Table 1.4-2 "Emission Factors for Criteria Pollutants and Greenhouse Gasses from Natural Gas Combustion" (7/98).

Two (2) heaters in Valve MCU/PCV 103

POTENTIAL EMISSIONS:

Pollutant	Emission Rate lb/hr	Calculation Methodology	Potential Emissions [d] ton/yr	Potential Emissions [e] lb/yr
NOx	0.49	c	2.15	4,294.12
CO	0.41	c	1.80	3,607.06
NM/NEVOC	0.03	c	0.12	236.18
PM (Filterable + Condensable)	0.04	c	0.16	326.35
SO2	2.94E-03	c	0.013	25.76

Sample Calculation:

[c] Emission Rate (lb/hr) = (Emission Factor lb/MMscf) * (Max. Hourly Fuel Consumption scf/hr)/1000000

[d] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

[e] Emission Rate (lb/yr)=Emission Rate (lb/hr) *Annual Hours of Operation (hrs/yr)

HAP Calculated Emissions:

Pollutant	Emission Factor (lb/MMscf)[f]	Potential Emissions (lb/hr)[g]	Potential Emissions (tons/yr)[h]
HAPs:			
1,1,2,2-Tetrachloroethane	0.00E+00	0.00E+00	0.00E+00
1,1,2-Trichloroethane	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00
1,3-Dichloropropene	0.00E+00	0.00E+00	0.00E+00
2,2,4-Trimethylpentane	0.00E+00	0.00E+00	0.00E+00
2-Methylnaphthalene	2.40E-05	1.18E-07	5.15E-07
3-Methylcholanthrene	1.80E-06	8.82E-09	3.86E-08
7,12-Dimethylbenz(a)anthracene	1.60E-05	7.84E-08	3.44E-07
Acenaphthene	1.80E-06	8.82E-09	3.86E-08
Acenaphthylene	1.80E-06	8.82E-09	3.86E-08
Acetaldehyde	0.00E+00	0.00E+00	0.00E+00
Acrolein	0.00E+00	0.00E+00	0.00E+00
Anthracene	2.40E-06	1.18E-08	5.15E-08
Benz(a)anthracene	1.80E-06	8.82E-09	3.86E-08
Benzene	2.10E-03	1.03E-05	4.51E-05
Benzo(a)pyrene	1.20E-06	5.88E-09	2.58E-08
Benzo(b)fluoranthene	1.80E-06	8.82E-09	3.86E-08
Benzo(e)pyrene	0.00E+00	0.00E+00	0.00E+00
Benzo(g,h,i)perylene	1.20E-06	5.88E-09	2.58E-08
Benzo(k)fluoranthene	1.80E-06	8.82E-09	3.86E-08
Biphenyl	0.00E+00	0.00E+00	0.00E+00
Carbon Tetrachloride	0.00E+00	0.00E+00	0.00E+00
Chlorobenzene	0.00E+00	0.00E+00	0.00E+00
Chloroform	0.00E+00	0.00E+00	0.00E+00
Chrysene	1.80E-06	8.82E-09	3.86E-08
Dichlorobenzene	1.20E-03	5.88E-06	2.58E-05
Ethylbenzene	0.00E+00	0.00E+00	0.00E+00
Ethylene Dibromide	0.00E+00	0.00E+00	0.00E+00
Fluoranthene	3.00E-06	1.47E-08	6.44E-08
Fluorene	2.80E-06	1.37E-08	6.01E-08
Formaldehyde	7.50E-02	3.68E-04	1.61E-03
Indeno(1,2,3-c,d)pyrene	1.80E-06	8.82E-09	3.86E-08
Methanol	0.00E+00	0.00E+00	0.00E+00
Methylene Chloride	0.00E+00	0.00E+00	0.00E+00
n-Hexane	1.80E+00	8.82E-03	3.86E-02
Naphthalene	6.10E-04	2.99E-06	1.31E-05
PAH	2.14E-05	1.05E-07	4.59E-07
Perylene	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	1.70E-05	8.33E-08	3.65E-07
Phenol	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	0.00E+00	0.00E+00	0.00E+00
Pyrene	5.00E-06	2.45E-08	1.07E-07
Styrene	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethane	0.00E+00	0.00E+00	0.00E+00
Toluene	3.40E-03	1.67E-05	7.30E-05
Vinyl Chloride	0.00E+00	0.00E+00	0.00E+00
Xylene	0.00E+00	0.00E+00	0.00E+00
Arsenic	2.00E-04	9.80E-07	4.29E-06
Beryllium	1.20E-05	5.88E-08	2.58E-07
Cadmium	1.10E-03	5.39E-06	2.36E-05
Chromium	1.40E-03	6.86E-06	3.01E-05
Cobalt	8.40E-05	4.12E-07	1.80E-06
Manganese	3.80E-04	1.86E-06	8.16E-06
Mercury	2.60E-04	1.27E-06	5.58E-06
Nickel	2.10E-03	1.03E-05	4.51E-05
Selenium	2.40E-05	1.18E-07	5.15E-07
Total HAP (each boiler)		**9.25E-03**	**0.041**

[f] AP-42 Table 1.4-3 "Emission Factors for Speciated Organic Compounds from Natural Gas Combustion" (7/98) and Table 1.4-4 "Emission Factors for Metals from Natural Gas Combustion" (7/98).

[g] Emission Rate (lb/hr) = (Emission Factor lb/MMscf) * (Maximum Hourly Fuel Consumption scf/hr) *

[h] Emission Rate (ton/yr) = (Emission Rate lb/hr) * (Annual Operation hrs/yr) * (1 ton/2000 lb)

TITLE V RENEWAL

ANR PIPELNE COMPANY

LINCOLN COMPRESSOR STATION, MICHIGAN

Unit ID No.: **EU-LI011 & EU-LI012**
Description of Unit: **Natural Gas Fired Boiler**

Potential Greenhouse Gas (GHG) Emission Calculations[2]

Pollutant	Uncontrolled Emission Factor[2]	Factor Units[2]	Emissions (lb/hr)	Emissions (TPY)	Global Warming Potential (GWP)[2]	CO2e Emissions (lb/hr)	CO2e Emissions (TPY)
CO_2	53.06	kg CO_2/MMBtu	584.89	2,561.80	1.00	584.89	2,561.80
CH_4	0.001	kg CH_4/MMBtu	0.01	0.05	25.00	0.28	1.21
N_2O	0.0001	kg N_2O/MMBtu	0.00	0.00	298.00	0.33	1.44
TOTAL GHGs	--	--	**584.90**	**2,561.86**	--	--	--
TOTAL GHGs (CO_2e)	--	--	--	--	--	**585.49**	**2,564.45**

[1] Heat input based on fuel consumption and permitted HP.

[2] Based on 40 CFR 98 Subpart C, 98.33(a)(1)(i), Tier 1 Methodology, Equation C-1 and using source specific heat input.

GHG Emissions (lb/hr) = EF_{GHG} (kg/MMBtu) * 2.204623 lb/kg * Source Specific Heat Input (MMbtu/hr)

GHG Emissions (TPY) = GHG Emissions (lb/hr) * Annual Hoperating Hours (hr/yr) * 1 Ton/2000 lb

CO_2e Emissions (TPY) = Σ (GHG Emissions (tpy) * GWP)

Where:

EF_{GHG} = Fuel-specific default CO_2, CH_4, or N_2O emission factors from Table C-1 for CO_2 (Natural gas - Weighted U.S. Average) and Table C-2 for CH_4 and N_2O (Natural Gas) of 40 CFR Part 98, Subpart C (kg/MMBtu)

Heat Input = Btu/hp-hr x Site-rated hp x (1 MMBtu/1,000,000 Btu) = MMBtu/hr

GWP = Global Warming Potentials, 40 CFR 98, Subpart A, Table A-1

TITLE V RENEWAL
ANR PIPELINE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Emission Unit ID	**EU-LI001**	
Unit ID No.	**EU00015**	
Description of Unit	**Compressor Engine 1**	
Manufacturer	Clark TLAD8	
Date of Construction/Modification	1/1/1971	
Stroke Cycle	2-Stroke	
Type of Burn	Lean-burn	
Fuel Used	Natural Gas	
Minimum Higher Heating Value (HHV)	918	Btu/scf
Maximum Higher Heating Value (HHV)	1,020	Btu/scf
Rated Horsepower (hp)	3,200	hp
Heat Rate (Btu/bhp-hr)	7,000	Btu/bhp-hr
Heat Input (MMBtu/hr)	22.4	MMBtu/hr
Maximum Hourly Fuel Consumption	24,401	scf/hr
Control Device	N/A	
Stack Designation	SVLI001	
Annual Hours of Operation	8,760	hr/yr
Annual Fuel Consumption	213.75	MMscf/yr

Emission Factors:

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Source
NOx	14.40	g/hp-hr	a
CO	1.44	g/hp-hr	a
NM/NE VOC	1.00	g/hp-hr	a
PM (Filterable + Condensable)	4.83E-02	lb/MMBtu	b
PM10	3.84E-02	lb/MMBtu	b
SO2	5.88E-04	lb/MMBtu	b

[a] Initial Title V Operating Permit Application values.

[b] AP-42 Table 3.2-1 "Uncontrolled Emission Factors for 2-Stroke Lean Burn Engines" (7/00).

POTENTIAL EMISSIONS:

Pollutant	Emission Rate lb/hr	Calculation Methodology	Potential Emissions [e] ton/yr	Potential Emissions [f] lb/yr
NOx	101.59	c	444.95	889,904.76
CO	10.16	c	44.50	88,990.48
NM/NEVOC	7.05	c	30.90	61,798.94
PM (Filterable + Condensable)	1.082	d	4.74	9,479.58
PM10	0.860	d	3.77	7,535.00
SO2	0.013	d	0.06	115.38

[c] Emission Rate (lb/hr) = (Emission Factor g/hp-hr) / (453.6 g/lb) * (Max Horsepower hp)

[d] Emission Rate (lb/hr) = (Emission Factor lb/MMBtu) * (Heat Input MMBtu/hr)

[e] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

[f] Emission Rate (lb/yr)=Emission Rate (lb/hr) *Annual Hours of Operation (hrs/yr)

HAP Calculated Emissions:

Pollutant	Emission Factor (lb/MMBtu)[g]	Potential Emissions (lb/hr)[h]	Potential Emissions (tons/yr)[i]
HAPs:			
1,1,2,2-Tetrachloroethane	6.63E-05	1.49E-03	0.0065
1,1,2-Trichloroethane	5.27E-05	1.18E-03	0.0052
1,3-Butadiene	8.20E-04	1.84E-02	0.0805
1,3-Dichloropropene	4.38E-05	9.81E-04	0.0043
2,2,4-Trimethylpentane	8.46E-04	1.90E-02	0.0830
2-Methylnaphthalene	2.14E-05	4.79E-04	0.0021
3-Methylcholanthrene	0.00E+00	0.00E+00	0.0000
7,12-Dimethylbenz(a)anthracene	0.00E+00	0.00E+00	0.0000
Acenaphthene	1.33E-06	2.98E-05	0.0001
Acenaphthylene	3.17E-06	7.10E-05	0.0003
Acetaldehyde	7.76E-03	1.74E-01	0.7613
Acrolein	7.78E-03	1.74E-01	0.7633
Anthracene	7.18E-07	1.61E-05	0.0001
Benz(a)anthracene	3.36E-07	7.53E-06	0.0000
Benzene	1.94E-03	4.35E-02	0.1903
Benzo(a)pyrene	5.68E-09	1.27E-07	0.0000
Benzo(b)fluoranthene	8.51E-09	1.91E-07	0.0000
Benzo(e)pyrene	2.34E-08	5.24E-07	0.0000
Benzo(g,h,i)perylene	2.48E-08	5.56E-07	0.0000
Benzo(k)fluoranthene	4.26E-09	9.54E-08	0.0000
Biphenyl	3.95E-06	8.85E-05	0.0004
Carbon Tetrachloride	6.07E-05	1.36E-03	0.0060
Chlorobenzene	4.44E-05	9.95E-04	0.0044
Chloroform	4.71E-05	1.06E-03	0.0046
Chrysene	6.72E-07	1.51E-05	0.0001
Dichlorobenzene	0.00E+00	0.00E+00	0.0000
Ethylbenzene	1.08E-04	2.42E-03	0.0106
Ethylene Dibromide	7.34E-05	1.64E-03	0.0072
Fluoranthene	3.61E-07	8.09E-06	0.0000
Fluorene	1.69E-06	3.79E-05	0.0002
Formaldehyde	5.52E-02	1.24E+00	5.4158
Indeno(1,2,3-c,d)pyrene	9.93E-09	2.22E-07	0.0000
Methanol	2.48E-03	5.56E-02	0.2433
Methylene Chloride	1.47E-04	3.29E-03	0.0144
n-Hexane	4.45E-04	9.97E-03	0.0437
Naphthalene	9.63E-05	2.16E-03	0.0094
PAH	1.34E-04	3.00E-03	0.0131
Perylene	4.97E-09	1.11E-07	0.0000
Phenanthrene	3.53E-06	7.91E-05	0.0003
Phenol	4.21E-05	9.43E-04	0.0041
Propylene Oxide	0.00E+00	0.00E+00	0.0000
Pyrene	5.84E-07	1.31E-05	0.0001
Styrene	5.48E-05	1.23E-03	0.0054
Tetrachloroethane	0.00E+00	0.00E+00	0.0000
Toluene	9.63E-04	2.16E-02	0.0945
Vinyl Chloride	2.47E-05	5.53E-04	0.0024
Xylene	2.68E-04	6.00E-03	0.0263
Arsenic	0.00E+00	0.00E+00	0.0000
Beryllium	0.00E+00	0.00E+00	0.0000
Cadmium	0.00E+00	0.00E+00	0.0000
Chromium	0.00E+00	0.00E+00	0.0000
Cobalt	0.00E+00	0.00E+00	0.0000
Manganese	0.00E+00	0.00E+00	0.0000
Mercury	0.00E+00	0.00E+00	0.0000
Nickel	0.00E+00	0.00E+00	0.0000
Selenium	0.00E+00	0.00E+00	0.0000
Total HAP		**1.78**	**7.80**

[g] Based on AP-42 Table 3.2-1 "Uncontrolled Emission Factors for 2-Stroke Lean Burn Engines" (7/00).

[h] Emission Rate (lb/hr) = (Emission Factor lb/MMBtu) * (Heat Input MMBtu/hr)

[i] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

TITLE V RENEWAL
ANR PIPELNE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Unit ID No.: **EU-LI001**
Description of Unit: **Compressor Engine 1**

Potential Greenhouse Gas (GHG) Emission Calculations[2]

Pollutant	Uncontrolled Emission Factor[2]	Factor Units[2]	Emissions (lb/hr)	Emissions (TPY)	Global Warming Potential (GWP)[2]	CO2e Emissions (lb/hr)	CO2e Emissions (TPY)
CO_2	53.06	kg CO_2/MMBtu	2,620.29	11,476.88	1.00	2,620.29	11,476.88
CH_4	0.001	kg CH_4/MMBtu	0.05	0.22	25.00	1.23	5.41
N_2O	0.0001	kg N_2O/MMBtu	0.00	0.02	298.00	1.47	6.45
TOTAL GHGs	--	--	**2,620.35**	**11,477.11**	--	--	--
TOTAL GHGs (CO_2e)	--	--	--	--	--	**2,623.00**	**11,488.73**

[1] Heat input based on fuel consumption and permitted HP.
[2] Based on 40 CFR 98 Subpart C, 98.33(a)(1)(i), Tier 1 Methodology, Equation C-1 and using source specific heat input.

GHG Emissions (lb/hr) = EF_{GHG} (kg/MMBtu) * 2.204623 lb/kg * Source Specific Heat Input (MMbtu/hr)
GHG Emissions (TPY) = GHG Emissions (lb/hr) * Annual Hoperating Hours (hr/yr) * 1 Ton/2000 lb
CO_2e Emissions (TPY) = Σ (GHG Emissions (tpy) * GWP)

Where:

EF_{GHG} = Fuel-specific default CO_2, CH_4, or N_2O emission factors from Table C-1 for CO_2 (Natural gas - Weighted U.S. Average) and Table C-2 for CH_4 and N_2O (Natural Gas) of 40 CFR Part 98, Subpart C (kg/MMBtu)
Heat Input = Btu/hp-hr x Site-rated hp x (1 MMBtu/1,000,000 Btu) = MMBtu/hr
GWP = Global Warming Potentials, 40 CFR 98, Subpart A, Table A-1

TITLE V RENEWAL
ANR PIPELINE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Emission Unit ID	**EU-LI002**	
Unit ID No.	**EU00016**	
Description of Unit	**Compressor Engine 2**	
Manufacturer	Clark TLAD8	
Date of Construction/Modification	1/1/1971	
Stroke Cycle	2-Stroke	
Type of Burn	Lean-burn	
Fuel Used	Natural Gas	
Minimum Higher Heating Value (HHV)	918	Btu/scf
Maximum Higher Heating Value (HHV)	1,020	Btu/scf
Rated Horsepower (hp)	3,200	hp
Heat Rate (Btu/bhp-hr)	7,000	Btu/bhp-hr
Heat Input (MMBtu/hr)	22.4	MMBtu/hr
Maximum Hourly Fuel Consumption	24,401	scf/hr
Control Device	N/A	
Stack Designation	SVLI001	
Annual Hours of Operation	8,760	hr/yr
Annual Fuel Consumption	213.75	MMscf/yr

Emission Factors:

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Source
NOx	14.40	g/hp-hr	a
CO	1.44	g/hp-hr	a
NM/NE VOC	1.00	g/hp-hr	a
PM (Filterable + Condensable)	4.83E-02	lb/MMBtu	b
PM10	3.84E-02	lb/MMBtu	b
SO2	5.88E-04	lb/MMBtu	b

[a] Initial Title V Operating Permit Application values.

[b] AP-42 Table 3.2-1 "Uncontrolled Emission Factors for 2-Stroke Lean Burn Engines" (7/00).

POTENTIAL EMISSIONS:

Pollutant	Emission Rate lb/hr	Calculation Methodology	Potential Emissions [e] ton/yr	Potential Emissions [f] lb/yr
NOx	101.59	c	444.95	889,904.76
CO	10.16	c	44.50	88,990.48
NM/NEVOC	7.05	c	30.90	61,798.94
PM (Filterable + Condensable)	1.082	d	4.74	9,479.58
PM10	0.860	d	3.77	7,535.00
SO2	0.013	d	0.06	115.38

[c] Emission Rate (lb/hr) = (Emission Factor g/hp-hr) / (453.6 g/lb) * (Max Horsepower hp)

[d] Emission Rate (lb/hr) = (Emission Factor lb/MMBtu) * (Heat Input MMBtu/hr)

[e] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

[f] Emission Rate (lb/yr)=Emission Rate (lb/hr) *Annual Hours of Operation (hrs/yr)

HAP Calculated Emissions:

Pollutant	Emission Factor (lb/MMBtu)[g]	Potential Emissions (lb/hr)[h]	Potential Emissions (tons/yr)[i]
HAPs:			
1,1,2,2-Tetrachloroethane	6.63E-05	1.49E-03	0.0065
1,1,2-Trichloroethane	5.27E-05	1.18E-03	0.0052
1,3-Butadiene	8.20E-04	1.84E-02	0.0805
1,3-Dichloropropene	4.38E-05	9.81E-04	0.0043
2,2,4-Trimethylpentane	8.46E-04	1.90E-02	0.0830
2-Methylnaphthalene	2.14E-05	4.79E-04	0.0021
3-Methylcholanthrene	0.00E+00	0.00E+00	0.0000
7,12-Dimethylbenz(a)anthracene	0.00E+00	0.00E+00	0.0000
Acenaphthene	1.33E-06	2.98E-05	0.0001
Acenaphthylene	3.17E-06	7.10E-05	0.0003
Acetaldehyde	7.76E-03	1.74E-01	0.7613
Acrolein	7.78E-03	1.74E-01	0.7633
Anthracene	7.18E-07	1.61E-05	0.0001
Benz(a)anthracene	3.36E-07	7.53E-06	0.0000
Benzene	1.94E-03	4.35E-02	0.1903
Benzo(a)pyrene	5.68E-09	1.27E-07	0.0000
Benzo(b)fluoranthene	8.51E-09	1.91E-07	0.0000
Benzo(e)pyrene	2.34E-08	5.24E-07	0.0000
Benzo(g,h,i)perylene	2.48E-08	5.56E-07	0.0000
Benzo(k)fluoranthene	4.26E-09	9.54E-08	0.0000
Biphenyl	3.95E-06	8.85E-05	0.0004
Carbon Tetrachloride	6.07E-05	1.36E-03	0.0060
Chlorobenzene	4.44E-05	9.95E-04	0.0044
Chloroform	4.71E-05	1.06E-03	0.0046
Chrysene	6.72E-07	1.51E-05	0.0001
Dichlorobenzene	0.00E+00	0.00E+00	0.0000
Ethylbenzene	1.08E-04	2.42E-03	0.0106
Ethylene Dibromide	7.34E-05	1.64E-03	0.0072
Fluoranthene	3.61E-07	8.09E-06	0.0000
Fluorene	1.69E-06	3.79E-05	0.0002
Formaldehyde	5.52E-02	1.24E+00	5.4158
Indeno(1,2,3-c,d)pyrene	9.93E-09	2.22E-07	0.0000
Methanol	2.48E-03	5.56E-02	0.2433
Methylene Chloride	1.47E-04	3.29E-03	0.0144
n-Hexane	4.45E-04	9.97E-03	0.0437
Naphthalene	9.63E-05	2.16E-03	0.0094
PAH	1.34E-04	3.00E-03	0.0131
Perylene	4.97E-09	1.11E-07	0.0000
Phenanthrene	3.53E-06	7.91E-05	0.0003
Phenol	4.21E-05	9.43E-04	0.0041
Propylene Oxide	0.00E+00	0.00E+00	0.0000
Pyrene	5.84E-07	1.31E-05	0.0001
Styrene	5.48E-05	1.23E-03	0.0054
Tetrachloroethane	0.00E+00	0.00E+00	0.0000
Toluene	9.63E-04	2.16E-02	0.0945
Vinyl Chloride	2.47E-05	5.53E-04	0.0024
Xylene	2.68E-04	6.00E-03	0.0263
Arsenic	0.00E+00	0.00E+00	0.0000
Beryllium	0.00E+00	0.00E+00	0.0000
Cadmium	0.00E+00	0.00E+00	0.0000
Chromium	0.00E+00	0.00E+00	0.0000
Cobalt	0.00E+00	0.00E+00	0.0000
Manganese	0.00E+00	0.00E+00	0.0000
Mercury	0.00E+00	0.00E+00	0.0000
Nickel	0.00E+00	0.00E+00	0.0000
Selenium	0.00E+00	0.00E+00	0.0000
Total HAP		**1.78**	**7.80**

[g] Based on AP-42 Table 3.2-1 "Uncontrolled Emission Factors for 2-Stroke Lean Burn Engines" (7/00).

[h] Emission Rate (lb/hr) = (Emission Factor lb/MMBtu) * (Heat Input MMBtu/hr)

[i] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

TITLE V RENEWAL
ANR PIPELNE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Unit ID No.: **EU-LI002**
Description of Unit: **Compressor Engine 2**

Potential Greenhouse Gas (GHG) Emission Calculations[2]

Pollutant	Uncontrolled Emission Factor[2]	Factor Units[2]	Emissions (lb/hr)	Emissions (TPY)	Global Warming Potential (GWP)[2]	CO2e Emissions (lb/hr)	CO2e Emissions (TPY)
CO_2	53.06	kg CO_2/MMBtu	2,620.29	11,476.88	1.00	2,620.29	11,476.88
CH_4	0.001	kg CH_4/MMBtu	0.05	0.22	25.00	1.23	5.41
N_2O	0.0001	kg N_2O/MMBtu	0.00	0.02	298.00	1.47	6.45
TOTAL GHGs	--	--	**2,620.35**	**11,477.11**	--	--	--
TOTAL GHGs (CO_2e)	--	--	--	--	--	**2,623.00**	**11,488.73**

[1] Heat input based on fuel consumption and permitted HP.
[2] Based on 40 CFR 98 Subpart C, 98.33(a)(1)(i), Tier 1 Methodology, Equation C-1 and using source specific heat input.

GHG Emissions (lb/hr) = EF_{GHG} (kg/MMBtu) * 2.204623 lb/kg * Source Specific Heat Input (MMbtu/hr)
GHG Emissions (TPY) = GHG Emissions (lb/hr) * Annual Hoperating Hours (hr/yr) * 1 Ton/2000 lb
CO_2e Emissions (TPY) = Σ (GHG Emissions (tpy) * GWP)

Where:

EF_{GHG} = Fuel-specific default CO_2, CH_4, or N_2O emission factors from Table C-1 for CO_2 (Natural gas - Weighted U.S. Average) and Table C-2 for CH_4 and N_2O (Natural Gas) of 40 CFR Part 98, Subpart C (kg/MMBtu)
Heat Input = Btu/hp-hr x Site-rated hp x (1 MMBtu/1,000,000 Btu) = MMBtu/hr
GWP = Global Warming Potentials, 40 CFR 98, Subpart A, Table A-1

TITLE V RENEWAL
ANR PIPELINE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Emission Unit ID	**EU-LI003**	
Unit ID No.	**EU00017**	
Description of Unit	**Compressor Engine 3**	
Manufacturer	Cooper-Bessemer 16W330	
Date of Construction/Modification	1/1/1974	
Stroke Cycle	2-Stroke	
Type of Burn	Lean-burn	
Fuel Used	Natural Gas	
Minimum Higher Heating Value (HHV)	918	Btu/scf
Maximum Higher Heating Value (HHV)	1,020	Btu/scf
Rated Horsepower (hp)	8,000	hp
Heat Rate (Btu/bhp-hr)	6,900	Btu/bhp-hr
Heat Input (MMBtu/hr)	55.2	MMBtu/hr
Maximum Hourly Fuel Consumption	60,131	scf/hr
Control Device	N/A	
Stack Designation	SVLI003	
Annual Hours of Operation	8,760	hr/yr
Annual Fuel Consumption	526.75	MMscf/yr

Emission Factors:

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Source
NOx	14.50	gm/hp-hr	a
CO	5.80	gm/hp-hr	a
NM/NE VOC	1.00	gm/hp-hr	a
PM (Filterable + Condensable)	4.83E-02	lb/MMBtu	b
PM10	3.84E-02	lb/MMBtu	b
SO2	5.88E-04	lb/MMBtu	b

[a] Initial Title V Operating Permit Application values.

[b] AP-42 Table 3.2-1 "Uncontrolled Emission Factors for 2-Stroke Lean Burn Engines" (7/00).

POTENTIAL EMISSIONS:

Pollutant	Emission Rate lb/hr	Calculation Methodology	Potential Emissions [e] ton/yr	Potential Emissions [f] lb/yr
NOx	255.73	c	1120.11	2,240,211.64
CO	102.29	c	448.04	896,084.66
NM/NEVOC	17.64	c	77.25	154,497.35
PM (Filterable + Condensable)	2.67	d	11.68	23,360.40
PM10	2.12	d	9.28	18,568.40
SO2	0.03	d	0.14	284.33

[c] Emission Rate (lb/hr) = (Emission Factor g/hp-hr) / (453.6 g/lb) * (Max Horsepower hp)

[d] Emission Rate (lb/hr) = (Emission Factorlb/MMBtu) * (Heat Input MMBtu/hr)

[e] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

[f] Emission Rate (lb/yr)=Emission Rate (lb/hr) *Annual Hours of Operation (hrs/yr)

HAP Calculated Emissions:

Pollutant	Emission Factor (lb/MMBtu)[g]	Potential Emissions (lb/hr)[h]	Potential Emissions (tons/yr)[i]
HAPs:			
1,1,2,2-Tetrachloroethane	6.63E-05	3.66E-03	0.0160
1,1,2-Trichloroethane	5.27E-05	2.91E-03	0.0127
1,3-Butadiene	8.20E-04	4.53E-02	0.1983
1,3-Dichloropropene	4.38E-05	2.42E-03	0.0106
2,2,4-Trimethylpentane	8.46E-04	4.67E-02	0.2045
2-Methylnaphthalene	2.14E-05	1.18E-03	0.0052
3-Methylcholanthrene	0.00E+00	0.00E+00	0.0000
7,12-Dimethylbenz(a)anthracene	0.00E+00	0.00E+00	0.0000
Acenaphthene	1.33E-06	7.34E-05	0.0003
Acenaphthylene	3.17E-06	1.75E-04	0.0008
Acetaldehyde	7.76E-03	4.28E-01	1.8762
Acrolein	7.78E-03	4.29E-01	1.8810
Anthracene	7.18E-07	3.96E-05	0.0002
Benz(a)anthracene	3.36E-07	1.85E-05	0.0001
Benzene	1.94E-03	1.07E-01	0.4690
Benzo(a)pyrene	5.68E-09	3.14E-07	0.0000
Benzo(b)fluoranthene	8.51E-09	4.70E-07	0.0000
Benzo(e)pyrene	2.34E-08	1.29E-06	0.0000
Benzo(g,h,i)perylene	2.48E-08	1.37E-06	0.0000
Benzo(k)fluoranthene	4.26E-09	2.35E-07	0.0000
Biphenyl	3.95E-06	2.18E-04	0.0010
Carbon Tetrachloride	6.07E-05	3.35E-03	0.0147
Chlorobenzene	4.44E-05	2.45E-03	0.0107
Chloroform	4.71E-05	2.60E-03	0.0114
Chrysene	6.72E-07	3.71E-05	0.0002
Dichlorobenzene	0.00E+00	0.00E+00	0.0000
Ethylbenzene	1.08E-04	5.96E-03	0.0261
Ethylene Dibromide	7.34E-05	4.05E-03	0.0177
Fluoranthene	3.61E-07	1.99E-05	0.0001
Fluorene	1.69E-06	9.33E-05	0.0004
Formaldehyde	5.52E-02	3.05E+00	13.3460
Indeno(1,2,3-c,d)pyrene	9.93E-09	5.48E-07	0.0000
Methanol	2.48E-03	1.37E-01	0.5996
Methylene Chloride	1.47E-04	8.11E-03	0.0355
n-Hexane	4.45E-04	2.46E-02	0.1076
Naphthalene	9.63E-05	5.32E-03	0.0233
PAH	1.34E-04	7.40E-03	0.0324
Perylene	4.97E-09	2.74E-07	0.0000
Phenanthrene	3.53E-06	1.95E-04	0.0009
Phenol	4.21E-05	2.32E-03	0.0102
Propylene Oxide	0.00E+00	0.00E+00	0.0000
Pyrene	5.84E-07	3.22E-05	0.0001
Styrene	5.48E-05	3.02E-03	0.0132
Tetrachloroethane	0.00E+00	0.00E+00	0.0000
Toluene	9.63E-04	5.32E-02	0.2328
Vinyl Chloride	2.47E-05	1.36E-03	0.0060
Xylene	2.68E-04	1.48E-02	0.0648
Arsenic	0.00E+00	0.00E+00	0.0000
Beryllium	0.00E+00	0.00E+00	0.0000
Cadmium	0.00E+00	0.00E+00	0.0000
Chromium	0.00E+00	0.00E+00	0.0000
Cobalt	0.00E+00	0.00E+00	0.0000
Manganese	0.00E+00	0.00E+00	0.0000
Mercury	0.00E+00	0.00E+00	0.0000
Nickel	0.00E+00	0.00E+00	0.0000
Selenium	0.00E+00	0.00E+00	0.0000
Total HAP		**4.39**	**19.23**

[g] Based on AP-42 Table 3.2-1 "Uncontrolled Emission Factors for 2-Stroke Lean Burn Engines" (7/00).

[h] Emission Rate (lb/hr) = (Emission Factor lb/MMBtu) * (Heat Input MMBtu/hr)

[i] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

TITLE V RENEWAL
ANR PIPELNE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Unit ID No.: **EU-LI003**
Description of Unit: **Compressor Engine 3**

Potential Greenhouse Gas (GHG) Emission Calculations[2]

Pollutant	Uncontrolled Emission Factor[2]	Factor Units[2]	Emissions (lb/hr)	Emissions (TPY)	Global Warming Potential (GWP)[2]	CO2e Emissions (lb/hr)	CO2e Emissions (TPY)
CO_2	53.06	kg CO_2/MMBtu	6,457.15	28,282.30	1.00	6,457.15	28,282.30
CH_4	0.001	kg CH_4/MMBtu	0.12	0.53	25.00	3.04	13.33
N_2O	0.0001	kg N_2O/MMBtu	0.01	0.05	298.00	3.63	15.88
TOTAL GHGs	--	--	**6,457.28**	**28,282.89**	--	--	--
TOTAL GHGs (CO_2e)	--	--	--	--	--	**6,463.82**	**28,311.51**

[1] Heat input based on fuel consumption and permitted HP.
[2] Based on 40 CFR 98 Subpart C, 98.33(a)(1)(i), Tier 1 Methodology, Equation C-1 and using source specific heat input.

GHG Emissions (lb/hr) = EF_{GHG} (kg/MMBtu) * 2.204623 lb/kg * Source Specific Heat Input (MMbtu/hr)
GHG Emissions (TPY) = GHG Emissions (lb/hr) * Annual Hoperating Hours (hr/yr) * 1 Ton/2000 lb
CO_2e Emissions (TPY) = Σ (GHG Emissions (tpy) * GWP)

Where:

EF_{GHG} = Fuel-specific default CO_2, CH_4, or N_2O emission factors from Table C-1 for CO_2 (Natural gas - Weighted U.S. Average) and Table C-2 for CH_4 and N_2O (Natural Gas) of 40 CFR Part 98, Subpart C (kg/MMBtu)
Heat Input = Btu/hp-hr x Site-rated hp x (1 MMBtu/1,000,000 Btu) = MMBtu/hr
GWP = Global Warming Potentials, 40 CFR 98, Subpart A, Table A-1

TITLE V RENEWAL
ANR PIPELINE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Emission Unit ID	**EU-LI006**	
Unit ID No.	**--**	
Description of Unit	**Natural Gas Fired Boiler**	
Manufacturer	Kewanee	
Date of Construction/Modification	1970	
Fuel Used	Natural Gas	
Minimum Higher Heating Value (HHV)	918	Btu/scf
Maximum Higher Heating Value (HHV)	1,020	Btu/scf
Rated Horsepower (hp)	N/A	hp
Heat Input (MMBtu/hr)	4.19	MMBtu/hr
Maximum Hourly Fuel Consumption	4,103	scf/hr
Control Device	N/A	
Stack Designation	N/A	
Annual Hours of Operation	8,760	hr/yr
Annual Fuel Consumption	35.94	MMscf/yr

Emission Factors:

Pollutant	Emission Factor (lb/MMscf)	Emission Factor Source
NOx	100	a
CO	84	a
NM/NE VOC	5.5	b
PM (Filterable + Condensable)	7.6	b
SO2	0.6	b

[a] AP-42 Table 1.4-1 "Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion" (7/98).
[b] AP-42 Table 1.4-2 "Emission Factors for Criteria Pollutants and Greenhouse Gasses from Natural Gas Combustion" (7/98).

POTENTIAL EMISSIONS:

Pollutant	Emission Rate lb/hr	Calculation Methodology	Potential Emissions [d] ton/yr	Potential Emissions [e] lb/yr
NOx	0.41	c	1.80	3,594.18
CO	0.34	c	1.51	3,019.11
NM/NEVOC	0.02	c	0.10	197.68
PM (Filterable + Condensable)	0.03	c	0.14	273.16
SO2	0.00	c	0.01	21.57

Sample Calculation:
[c] Emission Rate (lb/hr) = (Emission Factor lb/MMscf) * (Max. Hourly Fuel Consumption scf/hr)/1000000
[d] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)
[e] Emission Rate (lb/yr)=Emission Rate (lb/hr) *Annual Hours of Operation (hrs/yr)

HAP Calculated Emissions:

Pollutant	Emission Factor (lb/MMscf)[f]	Potential Emissions (lb/hr)[g]	Potential Emissions (tons/yr)[h]
HAPs:			
1,1,2,2-Tetrachloroethane	0.00E+00	0.00E+00	0.00E+00
1,1,2-Trichloroethane	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00
1,3-Dichloropropene	0.00E+00	0.00E+00	0.00E+00
2,2,4-Trimethylpentane	0.00E+00	0.00E+00	0.00E+00
2-Methylnaphthalene	2.40E-05	9.85E-08	4.31E-07
3-Methylcholanthrene	1.80E-06	7.39E-09	3.23E-08
7,12-Dimethylbenz(a)anthracene	1.60E-05	6.56E-08	2.88E-07
Acenaphthene	1.80E-06	7.39E-09	3.23E-08
Acenaphthylene	1.80E-06	7.39E-09	3.23E-08
Acetaldehyde	0.00E+00	0.00E+00	0.00E+00
Acrolein	0.00E+00	0.00E+00	0.00E+00
Anthracene	2.40E-06	9.85E-09	4.31E-08
Benz(a)anthracene	1.80E-06	7.39E-09	3.23E-08
Benzene	2.10E-03	8.62E-06	3.77E-05
Benzo(a)pyrene	1.20E-06	4.92E-09	2.16E-08
Benzo(b)fluoranthene	1.80E-06	7.39E-09	3.23E-08
Benzo(e)pyrene	0.00E+00	0.00E+00	0.00E+00
Benzo(g,h,i)perylene	1.20E-06	4.92E-09	2.16E-08
Benzo(k)fluoranthene	1.80E-06	7.39E-09	3.23E-08
Biphenyl	0.00E+00	0.00E+00	0.00E+00
Carbon Tetrachloride	0.00E+00	0.00E+00	0.00E+00
Chlorobenzene	0.00E+00	0.00E+00	0.00E+00
Chloroform	0.00E+00	0.00E+00	0.00E+00
Chrysene	1.80E-06	7.39E-09	3.23E-08
Dichlorobenzene	1.20E-03	4.92E-06	2.16E-05
Ethylbenzene	0.00E+00	0.00E+00	0.00E+00
Ethylene Dibromide	0.00E+00	0.00E+00	0.00E+00
Fluoranthene	3.00E-06	1.23E-08	5.39E-08
Fluorene	2.80E-06	1.15E-08	5.03E-08
Formaldehyde	7.50E-02	3.08E-04	1.35E-03
Indeno(1,2,3-c,d)pyrene	1.80E-06	7.39E-09	3.23E-08
Methanol	0.00E+00	0.00E+00	0.00E+00
Methylene Chloride	0.00E+00	0.00E+00	0.00E+00
n-Hexane	1.80E+00	7.39E-03	3.23E-02
Naphthalene	6.10E-04	2.50E-06	1.10E-05
PAH	2.14E-05	8.78E-08	3.85E-07
Perylene	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	1.70E-05	6.98E-08	3.06E-07
Phenol	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	0.00E+00	0.00E+00	0.00E+00
Pyrene	5.00E-06	2.05E-08	8.99E-08
Styrene	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethane	0.00E+00	0.00E+00	0.00E+00
Toluene	3.40E-03	1.40E-05	6.11E-05
Vinyl Chloride	0.00E+00	0.00E+00	0.00E+00
Xylene	0.00E+00	0.00E+00	0.00E+00
Arsenic	2.00E-04	8.21E-07	3.59E-06
Beryllium	1.20E-05	4.92E-08	2.16E-07
Cadmium	1.10E-03	4.51E-06	1.98E-05
Chromium	1.40E-03	5.74E-06	2.52E-05
Cobalt	8.40E-05	3.45E-07	1.51E-06
Manganese	3.80E-04	1.56E-06	6.83E-06
Mercury	2.60E-04	1.07E-06	4.67E-06
Nickel	2.10E-03	8.62E-06	3.77E-05
Selenium	2.40E-05	9.85E-08	4.31E-07
Total HAP		**0.01**	**0.03**

[f] AP-42 Table 1.4-3 "Emission Factors for Speciated Organic Compounds from Natural Gas Combustion" (7/98) and Table 1.4-4 "Emission Factors for Metals from Natural Gas Combustion" (7/98).

[g] Emission Rate (lb/hr) = (Emission Factor lb/MMscf) * (Maximum Hourly Fuel Consumption scf/hr) * (MM/1,000,000)

[h] Emission Rate (ton/yr) = (Emission Rate lb/hr) * (Annual Operation hrs/yr) * (1 ton/2000 lb)

TITLE V RENEWAL
ANR PIPELNE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Unit ID No.: **EU-LI006**
Description of Unit: **Natural Gas Fired Boiler A**

Potential Greenhouse Gas (GHG) Emission Calculations[2]

Pollutant	Uncontrolled Emission Factor[2]	Factor Units[2]	Emissions (lb/hr)	Emissions (TPY)	Global Warming Potential (GWP)[2]	CO2e Emissions (lb/hr)	CO2e Emissions (TPY)
CO_2	53.06	kg CO_2/MMBtu	489.55	2,144.23	1.00	489.55	2,144.23
CH_4	0.001	kg CH_4/MMBtu	0.01	0.04	25.00	0.23	1.01
N_2O	0.0001	kg N_2O/MMBtu	0.00	0.00	298.00	0.27	1.20
TOTAL GHGs	--	--	**489.56**	**2,144.27**	--	--	--
TOTAL GHGs (CO_2e)	--	--	--	--	--	**490.06**	**2,146.44**

[1] Heat input based on fuel consumption and permitted HP.
[2] Based on 40 CFR 98 Subpart C, 98.33(a)(1)(i), Tier 1 Methodology, Equation C-1 and using source specific heat input.

GHG Emissions (lb/hr) = EF_{GHG} (kg/MMBtu) * 2.204623 lb/kg * Source Specific Heat Input (MMbtu/hr)
GHG Emissions (TPY) = GHG Emissions (lb/hr) * Annual Hoperating Hours (hr/yr) * 1 Ton/2000 lb
CO_2e Emissions (TPY) = Σ (GHG Emissions (tpy) * GWP)

Where:

EF_{GHG} = Fuel-specific default CO_2, CH_4, or N_2O emission factors from Table C-1 for CO_2 (Natural gas - Weighted U.S. Average) and Table C-2 for CH_4 and N_2O (Natural Gas) of 40 CFR Part 98, Subpart C (kg/MMBtu)
Heat Input = Btu/hp-hr x Site-rated hp x (1 MMBtu/1,000,000 Btu) = MMBtu/hr
GWP = Global Warming Potentials, 40 CFR 98, Subpart A, Table A-1

TITLE V RENEWAL
ANR PIPELINE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Emission Unit ID	**EU-LI009**	
Unit ID No.	**--**	
Description of Unit	**Dehydration Furnace**	
Manufacturer		
Date of Construction/Modification	2018	
Fuel Used	Natural Gas	
Minimum Higher Heating Value (HHV)	918	Btu/scf
Maximum Higher Heating Value (HHV)	1,020	Btu/scf
Rated Horsepower (hp)	N/A	hp
Heat Input (MMBtu/hr)	6.63	MMBtu/hr
Maximum Hourly Fuel Consumption	6,503	scf/hr
Annual Hours of Operation	8,760	hr/yr
Annual Fuel Consumption	56.97	MMscf/yr

Emission Factors:

Pollutant	Emission Factor (lb/MMscf)	Emission Factor Source
NOx	100	a
CO	84	a
NM/NE VOC	5.5	b
PM (Filterable + Condensable)	7.6	b
SO2	0.6	b

[a] AP-42 Table 1.4-1 "Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion" (7/98).
[b] AP-42 Table 1.4-2 "Emission Factors for Criteria Pollutants and Greenhouse Gasses from Natural Gas Combustion" (7/98).

POTENTIAL EMISSIONS:

Pollutant	Emission Rate lb/hr	Calculation Methodology	Potential Emissions [d] ton/yr	Potential Emissions [e] lb/yr
NOx	0.65	c	2.85	5,696.58
CO	0.55	c	2.39	4,785.12
NM/NEVOC	0.04	c	0.16	313.31
PM (Filterable + Condensable)	0.05	c	0.22	432.94
SO2	0.00	c	0.02	34.18

Sample Calculation:

[c] Emission Rate (lb/hr) = (Emission Factor lb/MMscf) * (Max. Hourly Fuel Consumption scf/hr)/1000000

[d] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

[e] Emission Rate (lb/yr)=Emission Rate (lb/hr) *Annual Hours of Operation (hrs/yr)

HAP Calculated Emissions:

Pollutant	Emission Factor (lb/MMscf)[f]	Potential Emissions (lb/hr)[g]	Potential Emissions (tons/yr)[h]
HAPs:			
1,1,2,2-Tetrachloroethane	0.00E+00	0.00E+00	0.00E+00
1,1,2-Trichloroethane	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00
1,3-Dichloropropene	0.00E+00	0.00E+00	0.00E+00
2,2,4-Trimethylpentane	0.00E+00	0.00E+00	0.00E+00
2-Methylnaphthalene	2.40E-05	1.56E-07	6.84E-07
3-Methylcholanthrene	1.80E-06	1.17E-08	5.13E-08
7,12-Dimethylbenz(a)anthracene	1.60E-05	1.04E-07	4.56E-07
Acenaphthene	1.80E-06	1.17E-08	5.13E-08
Acenaphthylene	1.80E-06	1.17E-08	5.13E-08
Acetaldehyde	0.00E+00	0.00E+00	0.00E+00
Acrolein	0.00E+00	0.00E+00	0.00E+00
Anthracene	2.40E-06	1.56E-08	6.84E-08
Benz(a)anthracene	1.80E-06	1.17E-08	5.13E-08
Benzene	2.10E-03	1.37E-05	5.98E-05
Benzo(a)pyrene	1.20E-06	7.80E-09	3.42E-08
Benzo(b)fluoranthene	1.80E-06	1.17E-08	5.13E-08
Benzo(e)pyrene	0.00E+00	0.00E+00	0.00E+00
Benzo(g,h,i)perylene	1.20E-06	7.80E-09	3.42E-08
Benzo(k)fluoranthene	1.80E-06	1.17E-08	5.13E-08
Biphenyl	0.00E+00	0.00E+00	0.00E+00
Carbon Tetrachloride	0.00E+00	0.00E+00	0.00E+00
Chlorobenzene	0.00E+00	0.00E+00	0.00E+00
Chloroform	0.00E+00	0.00E+00	0.00E+00
Chrysene	1.80E-06	1.17E-08	5.13E-08
Dichlorobenzene	1.20E-03	7.80E-06	3.42E-05
Ethylbenzene	0.00E+00	0.00E+00	0.00E+00
Ethylene Dibromide	0.00E+00	0.00E+00	0.00E+00
Fluoranthene	3.00E-06	1.95E-08	8.54E-08
Fluorene	2.80E-06	1.82E-08	7.98E-08
Formaldehyde	7.50E-02	4.88E-04	2.14E-03
Indeno(1,2,3-c,d)pyrene	1.80E-06	1.17E-08	5.13E-08
Methanol	0.00E+00	0.00E+00	0.00E+00
Methylene Chloride	0.00E+00	0.00E+00	0.00E+00
n-Hexane	1.80E+00	1.17E-02	5.13E-02
Naphthalene	6.10E-04	3.97E-06	1.74E-05
PAH	2.14E-05	1.39E-07	6.10E-07
Perylene	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	1.70E-05	1.11E-07	4.84E-07
Phenol	0.00E+00	0.00E+00	0.00E+00
Propylene Oxide	0.00E+00	0.00E+00	0.00E+00
Pyrene	5.00E-06	3.25E-08	1.42E-07
Styrene	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethane	0.00E+00	0.00E+00	0.00E+00
Toluene	3.40E-03	2.21E-05	9.68E-05
Vinyl Chloride	0.00E+00	0.00E+00	0.00E+00
Xylene	0.00E+00	0.00E+00	0.00E+00
Arsenic	2.00E-04	1.30E-06	5.70E-06
Beryllium	1.20E-05	7.80E-08	3.42E-07
Cadmium	1.10E-03	7.15E-06	3.13E-05
Chromium	1.40E-03	9.10E-06	3.99E-05
Cobalt	8.40E-05	5.46E-07	2.39E-06
Manganese	3.80E-04	2.47E-06	1.08E-05
Mercury	2.60E-04	1.69E-06	7.41E-06
Nickel	2.10E-03	1.37E-05	5.98E-05
Selenium	2.40E-05	1.56E-07	6.84E-07
Total HAP		**1.23E-02**	**0.054**

[f] AP-42 Table 1.4-3 "Emission Factors for Speciated Organic Compounds from Natural Gas Combustion" (7/98) and Table 1.4-4 "Emission Factors for Metals from Natural Gas Combustion" (7/98).

[g] Emission Rate (lb/hr) = (Emission Factor lb/MMscf) * (Maximum Hourly Fuel Consumption scf/hr) * (MM/1,000,000)

[h] Emission Rate (ton/yr) = (Emission Rate lb/hr) * (Annual Operation hrs/yr) * (1 ton/2000 lb)

TITLE V RENEWAL
ANR PIPELNE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Unit ID No.: **EU-LI009**
Description of Unit: **Dehydration Furnace**

Potential Greenhouse Gas (GHG) Emission Calculations[2]

Pollutant	Uncontrolled Emission Factor[2]	Factor Units[2]	Emissions (lb/hr)	Emissions (TPY)	Global Warming Potential (GWP)[2]	CO2e Emissions (lb/hr)	CO2e Emissions (TPY)
CO_2	53.06	kg CO_2/MMBtu	775.91	3,398.49	1.00	775.91	3,398.49
CH_4	0.001	kg CH_4/MMBtu	0.01	0.06	25.00	0.37	1.60
N_2O	0.0001	kg N_2O/MMBtu	0.00	0.01	298.00	0.44	1.91
TOTAL GHGs	--	--	**775.93**	**3,398.56**	--	--	--
TOTAL GHGs (CO_2e)	--	--	--	--	--	**776.71**	**3,402.00**

[1] Heat input based on fuel consumption and permitted HP.
[2] Based on 40 CFR 98 Subpart C, 98.33(a)(1)(i), Tier 1 Methodology, Equation C-1 and using source specific heat input.

GHG Emissions (lb/hr) = EF_{GHG} (kg/MMBtu) * 2.204623 lb/kg * Source Specific Heat Input (MMbtu/hr)
GHG Emissions (TPY) = GHG Emissions (lb/hr) * Annual Hoperating Hours (hr/yr) * 1 Ton/2000 lb
CO_2e Emissions (TPY) = Σ (GHG Emissions (tpy) * GWP)

Where:

EF_{GHG} = Fuel-specific default CO_2, CH_4, or N_2O emission factors from Table C-1 for CO_2 (Natural gas - Weighted U.S. Average) and Table C-2 for CH_4 and N_2O (Natural Gas) of 40 CFR Part 98, Subpart C (kg/MMBtu)
Heat Input = Btu/hp-hr x Site-rated hp x (1 MMBtu/1,000,000 Btu) = MMBtu/hr
GWP = Global Warming Potentials, 40 CFR 98, Subpart A, Table A-1

TITLE V RENEWAL
ANR PIPELINE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Emission Unit ID	**EU-LI010**	
Unit ID No.		
Description of Unit	**Emergency Generator**	
Manufacturer	Caterpillar G3412C	
Date of Construction/Modification	2019	
Stroke Cycle	4-Stroke	
Type of Burn	Lean-Burn	
Fuel Used	Natural Gas	
Low Heating Value (LHV)	905	Btu/scf
Higher Heating Value (HHV)	1,020	Btu/scf
Brake Specific Fuel Consumption	7216	Btu/Bhp-hr
Rated Horsepower (hp)	755	hp
Heat Input (MMBtu/hr)	5.45	MMBtu/hr
Maximum Hourly Fuel Consumption	6,020	scf/hr
Control Device	Catalyst	
Stack Designation	N/A	
Annual Hours of Operation	500	hr/yr
Annual Fuel Consumption	3.01	MMscf/yr

Emission Factors:

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Source
NOx	2.00	g/bhp-hr	a
CO	4.00	g/bhp-hr	a
NM/NE VOC	1.00	g/bhp-hr	a
PM (Filterable + Condensable)	0.019	lb/MMBtu	b
PM10	0.010	lb/MMBtu	b
SO2	0.001	lb/MMBtu	b

[a] NSPS Supbart JJJJ Limitation

[b] AP-42 Table 3.2-3 "Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines" (7/00).

POTENTIAL EMISSIONS:

Pollutant	Emission Rate lb/hr	Calculation Methodology	Potential Emissions [c] ton/yr	Potential Emissions [d] lb/yr
NOx	3.33	b	0.83	1,664.49
CO	6.66	b	1.66	3,328.98
NM/NEVOC	1.66	b	0.42	832.25
PM (Filterable + Condensable)	0.11	b	0.03	52.87
PM10	0.05	b	0.01	25.88
SO2	0.00	b	0.00	1.60

Sample Calculation:

[b] Emission Rate (lb/hr) = (Emission Factor lb/MMBtu) * (Heat Input MMBtu/hr)

[c] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

[d] Emission Rate (lb/yr)=Emission Rate (lb/hr) *Annual Hours of Operation (hrs/yr)

HAP Calculated Emissions:

Pollutant	Emission Factor (lb/MMBtu)[e]	Potential Emissions (lb/hr)[f]	Potential Emissions (tons/yr)[g]
HAPs:			
1,1,2,2-Tetrachloroethane	2.53E-05	1.38E-04	0.0000
1,1,2-Trichloroethane	1.53E-05	8.34E-05	0.0000
1,3-Butadiene	6.63E-04	3.61E-03	0.0009
1,3-Dichloropropene	1.27E-05	6.92E-05	0.0000
2,2,4-Trimethylpentane	0.00E+00	0.00E+00	0.0000
2-Methylnaphthalene	0.00E+00	0.00E+00	0.0000
3-Methylcholanthrene	0.00E+00	0.00E+00	0.0000
7,12-Dimethylbenz(a)anthracene	0.00E+00	0.00E+00	0.0000
Acenaphthene	0.00E+00	0.00E+00	0.0000
Acenaphthylene	0.00E+00	0.00E+00	0.0000
Acetaldehyde	2.79E-03	1.52E-02	0.0038
Acrolein	2.63E-03	1.43E-02	0.0036
Anthracene	0.00E+00	0.00E+00	0.0000
Benz(a)anthracene	0.00E+00	0.00E+00	0.0000
Benzene	1.58E-03	8.61E-03	0.0022
Benzo(a)pyrene	0.00E+00	0.00E+00	0.0000
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.0000
Benzo(e)pyrene	0.00E+00	0.00E+00	0.0000
Benzo(g,h,i)perylene	0.00E+00	0.00E+00	0.0000
Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.0000
Biphenyl	0.00E+00	0.00E+00	0.0000
Carbon Tetrachloride	1.77E-05	9.64E-05	0.0000
Chlorobenzene	1.29E-05	7.03E-05	0.0000
Chloroform	1.37E-05	7.46E-05	0.0000
Chrysene	0.00E+00	0.00E+00	0.0000
Dichlorobenzene	0.00E+00	0.00E+00	0.0000
Ethylbenzene	2.48E-05	1.35E-04	0.0000
Ethylene Dibromide	2.13E-05	1.16E-04	0.0000
Fluoranthene	0.00E+00	0.00E+00	0.0000
Fluorene	0.00E+00	0.00E+00	0.0000
Formaldehyde	2.05E-02	1.12E-01	0.0279
Indeno(1,2,3-c,d)pyrene	0.00E+00	0.00E+00	0.0000
Methanol	3.06E-03	1.67E-02	0.0042
Methylene Chloride	4.12E-05	2.24E-04	0.0001
n-Hexane	0.00E+00	0.00E+00	0.0000
Naphthalene	9.71E-05	5.29E-04	0.0001
PAH	1.41E-04	7.68E-04	0.0002
Perylene	0.00E+00	0.00E+00	0.0000
Phenanthrene	0.00E+00	0.00E+00	0.0000
Phenol	0.00E+00	0.00E+00	0.0000
Propylene Oxide	0.00E+00	0.00E+00	0.0000
Pyrene	0.00E+00	0.00E+00	0.0000
Styrene	1.19E-05	6.48E-05	0.0000
Tetrachloroethane	0.00E+00	0.00E+00	0.0000
Toluene	5.58E-04	3.04E-03	0.0008
Vinyl Chloride	7.18E-06	3.91E-05	0.0000
Xylene	1.94E-04	1.06E-03	0.0003
Arsenic	0.00E+00	0.00E+00	0.0000
Beryllium	0.00E+00	0.00E+00	0.0000
Cadmium	0.00E+00	0.00E+00	0.0000
Chromium	0.00E+00	0.00E+00	0.0000
Cobalt	0.00E+00	0.00E+00	0.0000
Manganese	0.00E+00	0.00E+00	0.0000
Mercury	0.00E+00	0.00E+00	0.0000
Nickel	0.00E+00	0.00E+00	0.0000
Selenium	0.00E+00	0.00E+00	0.0000
Total HAP		**0.18**	**0.04**

[e] Based on AP-42 Table 3.2-3 "Uncontrolled Emission Factors for 4-Stroke Rich Burn Engines" (7/00).

[f] Emission Rate (lb/hr) = (Emission Factor lb/MMBtu) * (Heat Input MMBtu/hr)

[g] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

TITLE V RENEWAL
ANR PIPELNE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Unit ID No.: **EU-LI010**
Description of Unit: **Emergency Generator**

Potential Greenhouse Gas (GHG) Emission Calculations[2]

Pollutant	Uncontrolled Emission Factor[2]	Factor Units[2]	Emissions (lb/hr)	Emissions (TPY)	Global Warming Potential (GWP)[2]	CO2e Emissions (lb/hr)	CO2e Emissions (TPY)
CO_2	53.06	kg CO_2/MMBtu	637.30	159.33	1.00	637.30	159.33
CH_4	0.001	kg CH_4/MMBtu	0.01	0.00	25.00	0.30	0.08
N_2O	0.0001	kg N_2O/MMBtu	0.00	0.00	298.00	0.36	0.09
TOTAL GHGs	--	--	**637.31**	**159.33**	--	--	--
TOTAL GHGs (CO_2e)	--	--	--	--	--	**637.96**	**159.49**

[1] Heat input based on fuel consumption and permitted HP.
[2] Based on 40 CFR 98 Subpart C, 98.33(a)(1)(i), Tier 1 Methodology, Equation C-1 and using source specific heat input.

GHG Emissions (lb/hr) = EF_{GHG} (kg/MMBtu) * 2.204623 lb/kg * Source Specific Heat Input (MMbtu/hr)
GHG Emissions (TPY) = GHG Emissions (lb/hr) * Annual Hoperating Hours (hr/yr) * 1 Ton/2000 lb
CO_2e Emissions (TPY) = Σ (GHG Emissions (tpy) * GWP)

Where:

EF_{GHG} = Fuel-specific default CO_2, CH_4, or N_2O emission factors from Table C-1 for CO_2 (Natural gas - Weighted U.S. Average) and Table C-2 for CH_4 and N_2O (Natural Gas) of 40 CFR Part 98, Subpart C (kg/MMBtu)
Heat Input = Btu/hp-hr x Site-rated hp x (1 MMBtu/1,000,000 Btu) = MMBtu/hr
GWP = Global Warming Potentials, 40 CFR 98, Subpart A, Table A-1

Lincoln
B-11 Tank Emissions

Summary of Tank Parameters

Tank ID	Capacity (gallons)	Turnovers	Annual Throughput (gallons)	Contents (surrogate)	Tank Type	Diameter (ft)	Shell Height (ft)	Shell Length (ft)
T-11 Condensate Tank	12,800	2	25,600	Condensate	Horizontal	9.50	0.00	24.00

Summary of Tank Emissions

Tank ID	Standing Loss (lbs/yr)	Standing Loss (tpy)	Working Loss (lbs/yr)	Working Loss (tpy)	Flash VOC Emissions (tpy)	Total VOC Emissions (tpy)	Flash HAP Emissions (tpy)
T-11 Condensate Tank	863.97	0.43	89.93	0.04	3.02	**3.49**	**0.28**

Molecular Weight	65.70	lb/lbmole (Condensate)	
Temperature (AP-42)	54.51	F	
Pressure (AP-42)	14.10	psia	
Universal Gas Constant	391.32	cf/lbmole	@ 54.51F and 14.1psia
Weight % VOC	96	Condensate SDS	
Weight % HAP	9	Condensate SDS	
Weight % CH4	1	Condensate SDS	

Flash Emissions B11

Gas/Oil Ratio (GOR)	61.38	scf/bbl (worst case correlation)	
Annual Flash Gas	37,413	scf/yr	
Total Flash Emissions	3.14	tpy	**scf/yr * MW * 1/391 scf/lb-mole * 1 ton/2000 lbs**
VOC Flash Emissions	**3.02**	**tpy**	
HAP Flash Emissions	0.28	tpy	
CO2e Flash Emissions	0.79	tpy	

TITLE V RENEWAL
ANR PIPELNE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

TANKS

EULILUBE	Lube Oil Storage Tank, T-9 (does not vent to atmosphere)	1970	10,000 gal	<0.01	0
EULIMAINTOIL	Maintenance Oil Storage Tank, T-8	1970	1,500 gal	<0.01	0
EULIMAINTOIL2	Maintenance Oil Storage Tank, T-10	1974	2,115 gal	<0.01	0
EULIUSEDOIL	Used Oil Storage Tank, T-7	1974	3,760 gal	<0.01	0
EULI008	Condensate Storage Tank, T-11	1963	12,800 gal	3.49	0.28
EULIAMBITROL	Ambitrol Storage Tank, T-2	1970	1,000 gal	<0.01	0
EULIAMBMIX1	Maintenance Ambitrol Storage Tank, T-1	1970	10,500 gal	<0.01	0
EULIAMBMIX2	Ambitrol Storage Tank, T-3	1974	7,050 gal	<0.01	0
EULIMETHANOL	Methanol Storage Tank,T-18	1997	3,750 gal	<0.01	0
EULIGASOLINE	Gasoline Storage Tank, T-12	1999	1,000 gal	<0.01	0
	Gasoline Storage Tank, T-13	1999	1,000 gal	<0.01	0
EULIDIESEL	Diesel Storage Tank, T-14	1999	1,000 gal	<0.01	0
EULIPROWTR1	Process Water Tank 1, T-15	1963	1,500 gal	<0.01	0
EULIPROWTR2	Process Water Tank 2	1974	1,212 gal	<0.01	0
Total				**3.49**	**0.28**

	2-Stroke Lean-Burn Engines		4-Stroke Lean-Burn Engines		4-Stroke Rich-Burn Engines			Natural Gas Turbines		Natural Gas External Combustion
HAP	Emission Factor	Emission Factor	Emission Factor	Emission Factor	Emission Factor	Emission Factor	Controlled EF	Emission Factor	Emission Factor	Emission Factor
	(lbs/MMBtu)	(g/hp-hr)	(lbs/MMBtu)	(g/hp-hr)	(lbs/MMBtu)	(g/hp-hr)	(g/hp-hr)	(lbs/MMBtu)	(g/hp-hr)	(lbs/MMscf)
1,1,2,2-Tetrachloroethane	6.63E-05	3.6E-04	4.00E-05	2.2E-04	2.53E-05	1.4E-04	2.8E-05			
1,1,2-Trichloroethane	5.27E-05	2.9E-04	3.18E-05	1.7E-04	1.53E-05	8.3E-05	1.7E-05			
1,3-Butadiene	8.20E-04	4.5E-03	2.67E-04	1.5E-03	6.63E-04	3.6E-03	7.2E-04	4.3E-07	2.3E-06	
1,3-Dichloropropene	4.38E-05	2.4E-04	2.64E-05	1.4E-04	1.27E-05	6.9E-05	1.4E-05			
2,2,4-Trimethylpentane	8.46E-04	4.6E-03	2.50E-04	1.4E-03						
2-Methylnaphthalene	2.14E-05	1.2E-04	3.32E-05	1.8E-04						2.4E-05
3-Methylcholanthrene										1.8E-06
7,12-Dimethylbenz(a)anthracene										1.6E-05
Acenaphthene	1.33E-06	7.2E-06	1.25E-06	6.8E-06						1.8E-06
Acenaphthylene	3.17E-06	1.7E-05	5.53E-06	3.0E-05						1.8E-06
Acetaldehyde	7.76E-03	4.2E-02	8.36E-03	4.6E-02	2.79E-03	1.5E-02	3.0E-03	4.0E-05	2.2E-04	
Acrolein	7.78E-03	4.2E-02	5.14E-03	2.8E-02	2.63E-03	1.4E-02	2.9E-03	6.4E-06	3.5E-05	
Anthracene	7.18E-07	3.9E-06								2.4E-06
Benz(a)anthracene	3.36E-07	1.8E-06								1.8E-06
Benzene	1.94E-03	1.1E-02	4.40E-04	2.4E-03	1.58E-03	8.6E-03	1.7E-03	1.2E-05	6.5E-05	2.1E-03
Benzo(a)pyrene	5.68E-09	3.1E-08								1.2E-06
Benzo(b)fluoranthene	8.51E-09	4.6E-08	1.66E-07	9.0E-07						1.8E-06
Benzo(e)pyrene	2.34E-08	1.3E-07	4.15E-07	2.3E-06						
Benzo(g,h,i)perylene	2.48E-08	1.3E-07	4.14E-07	2.3E-06						1.2E-06
Benzo(k)fluoranthene	4.26E-09	2.3E-08								1.8E-06
Biphenyl	3.95E-06	2.2E-05	2.12E-04	1.2E-03						
Carbon Tetrachloride	6.07E-05	3.3E-04	3.67E-05	2.0E-04	1.77E-05	9.6E-05	1.9E-05			
Chlorobenzene	4.44E-05	2.4E-04	3.04E-05	1.7E-04	1.29E-05	7.0E-05	1.4E-05			
Chloroform	4.71E-05	2.6E-04	2.85E-05	1.6E-04	1.37E-05	7.5E-05	1.5E-05			
Chrysene	6.72E-07	3.7E-06	6.93E-07	3.8E-06						1.8E-06
Dichlorobenzene										1.2E-03
Ethylbenzene	1.08E-04	5.9E-04	3.97E-05	2.2E-04	2.48E-05	1.3E-04	2.7E-05	3.2E-05	1.7E-04	
Ethylene Dibromide	7.34E-05	4.0E-04	4.43E-05	2.4E-04	2.13E-05	1.2E-04	2.3E-05			
Fluoranthene	3.61E-07	2.0E-06	1.11E-06	6.0E-06						3.0E-06
Fluorene	1.69E-06	9.2E-06	5.67E-06	3.1E-05						2.8E-06
Formaldehyde	5.52E-02	3.0E-01	5.28E-02	2.9E-01	2.05E-02	1.1E-01	2.2E-02	7.1E-04	3.9E-03	7.5E-02
Indeno(1,2,3-c,d)pyrene	9.93E-09	5.4E-08								1.8E-06
Methanol	2.48E-03	1.3E-02	2.50E-03	1.4E-02	3.06E-03	1.7E-02	3.3E-03			
Methylene Chloride	1.47E-04	8.0E-04	2.00E-05	1.1E-04	4.12E-05	2.2E-04	4.5E-05			
n-Hexane	4.45E-04	2.4E-03	1.11E-03	6.0E-03						1.8E+00
Naphthalene	9.63E-05	5.2E-04	7.44E-05	4.0E-04	9.71E-05	5.3E-04	1.1E-04	1.3E-06	7.1E-06	6.1E-04
PAH	1.34E-04	7.3E-04	2.69E-05	1.5E-04	1.41E-04	7.7E-04	1.5E-04	2.2E-06	1.2E-05	2.1E-05
Perylene	4.97E-09	2.7E-08								
Phenanthrene	3.53E-06	1.9E-05	1.04E-05	5.7E-05						1.7E-05
Phenol	4.21E-05	2.3E-04	2.40E-05	1.3E-04						
Propylene Oxide								2.9E-05	1.6E-04	
Pyrene	5.84E-07	3.2E-06	1.36E-06	7.4E-06						5.0E-06
Styrene	5.48E-05	3.0E-04	2.36E-05	1.3E-04	1.19E-05	6.5E-05	1.3E-05			
Tetrachloroethane			2.48E-06	1.3E-05						
Toluene	9.63E-04	5.2E-03	4.08E-04	2.2E-03	5.58E-04	3.0E-03	6.1E-04	1.3E-04	7.1E-04	3.4E-03
Vinyl Chloride	2.47E-05	1.3E-04	1.49E-05	8.1E-05	7.18E-06	3.9E-05	7.8E-06			
Xylene	2.68E-04	1.5E-03	1.84E-04	1.0E-03	1.94E-04	1.1E-03	2.1E-04	6.4E-05	3.5E-04	
Arsenic										2.0E-04
Beryllium										1.2E-05
Cadmium										1.1E-03
Chromium										1.4E-03
Cobalt										8.4E-05
Manganese										3.8E-04
Mercury										2.6E-04
Nickel										2.1E-03
Selenium										2.4E-05
Total HAPs	0.080	0.433	0.072	0.393	0.032	0.176	0.035	0.001	0.006	1.888

AP-42 emission factors converted to g/hp-hr as follows:lb/MMBtu * 12000 Btu/hp-hr * 453.6 g/lb * 1/10^6
Natural Gas-Fired Engines based on AP-42 Section 3.2 (7/00)
Natural Gas-Fired Turbines based on AP-42 Section 3.1 (4/00)
External Natural Gas Combustion based on AP-42 1.4 (7/98)

TITLE V RENEWAL
ANR PIPELINE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Emission Unit ID	**EU-LI004**	
Unit ID No.		
Description of Unit	**Emergency Generator**	
Manufacturer	Caterpillar G379	
Date of Construction/Modification	1974	
Stroke Cycle	4-Stroke	
Type of Burn	Rich-burn	
Fuel Used	Natural Gas	
Minimum Higher Heating Value (HHV)	918	Btu/scf
Maximum Higher Heating Value (HHV)	1,020	Btu/scf
Rated Horsepower (hp)	330	hp
Heat Input (MMBtu/hr)	3.20	MMBtu/hr
Maximum Hourly Fuel Consumption	3,137	scf/hr
Control Device	N/A	
Stack Designation	N/A	
Annual Hours of Operation	500	hr/yr
Annual Fuel Consumption	1.57	MMscf/yr

Emission Factors:

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Source
NOx	2.21	lb/MMBtu	a
CO	3.72	lb/MMBtu	a
NM/NE VOC	0.03	lb/MMBtu	a
PM (Filterable + Condensable)	0.019	lb/MMBtu	a
PM10	0.010	lb/MMBtu	a
SO2	0.001	lb/MMBtu	a

[a] AP-42 Table 3.2-3 "Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines" (7/00).

POTENTIAL EMISSIONS:

Pollutant	Emission Rate lb/hr	Calculation Methodology	Potential Emissions [c] ton/yr	Potential Emissions [d] lb/yr
NOx	7.07	b	1.77	3,536.00
CO	11.90	b	2.98	5,952.00
NM/NEVOC	0.09	b	0.02	47.36
PM (Filterable + Condensable)	0.06	b	0.02	31.06
PM10	0.03	b	0.01	15.20
SO2	0.00	b	0.00	0.94

Sample Calculation:

[b] Emission Rate (lb/hr) = (Emission Factor lb/MMBtu) * (Heat Input MMBtu/hr)

[c] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

[d] Emission Rate (lb/yr)=Emission Rate (lb/hr) *Annual Hours of Operation (hrs/yr)

HAP Calculated Emissions:

Pollutant	Emission Factor (lb/MMBtu)[e]	Potential Emissions (lb/hr)[f]	Potential Emissions (tons/yr)[g]
HAPs:			
1,1,2,2-Tetrachloroethane	2.53E-05	8.10E-05	0.0000
1,1,2-Trichloroethane	1.53E-05	4.90E-05	0.0000
1,3-Butadiene	6.63E-04	2.12E-03	0.0005
1,3-Dichloropropene	1.27E-05	4.06E-05	0.0000
2,2,4-Trimethylpentane	0.00E+00	0.00E+00	0.0000
2-Methylnaphthalene	0.00E+00	0.00E+00	0.0000
Acenaphthene	0.00E+00	0.00E+00	0.0000
Acenaphthylene	0.00E+00	0.00E+00	0.0000
Acetaldehyde	2.79E-03	8.93E-03	0.0022
Acrolein	2.63E-03	8.42E-03	0.0021
Benzene	1.58E-03	5.06E-03	0.0013
Benzo(a)pyrene	0.00E+00	0.00E+00	0.0000
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.0000
Benzo(e)pyrene	0.00E+00	0.00E+00	0.0000
Benzo(g,h,i)perylene	0.00E+00	0.00E+00	0.0000
Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.0000
Biphenyl	0.00E+00	0.00E+00	0.0000
Carbon Tetrachloride	1.77E-05	5.66E-05	0.0000
Chlorobenzene	1.29E-05	4.13E-05	0.0000
Chloroform	1.37E-05	4.38E-05	0.0000
Chrysene	0.00E+00	0.00E+00	0.0000
Ethylbenzene	2.48E-05	7.94E-05	0.0000
Ethylene Dibromide	2.13E-05	6.82E-05	0.0000
Fluoranthene	0.00E+00	0.00E+00	0.0000
Fluorene	0.00E+00	0.00E+00	0.0000
Formaldehyde	2.05E-02	6.56E-02	0.0164
Indeno(1,2,3-c,d)pyrene	0.00E+00	0.00E+00	0.0000
Methanol	3.06E-03	9.79E-03	0.0024
Methylene Chloride	4.12E-05	1.32E-04	0.0000
n-Hexane	0.00E+00	0.00E+00	0.0000
Naphthalene	9.71E-05	3.11E-04	0.0001
PAH	1.41E-04	4.51E-04	0.0001
Perylene	0.00E+00	0.00E+00	0.0000
Phenanthrene	0.00E+00	0.00E+00	0.0000
Phenol	0.00E+00	0.00E+00	0.0000
Pyrene	0.00E+00	0.00E+00	0.0000
Styrene	1.19E-05	3.81E-05	0.0000
Toluene	5.58E-04	1.79E-03	0.0004
Vinyl Chloride	7.18E-06	2.30E-05	0.0000
Xylene	1.94E-04	6.21E-04	0.0002
Total HAP	**0.03**	**0.10**	**0.03**

[e] Based on AP-42 Table 3.2-3 "Uncontrolled Emission Factors for 4-Stroke Rich Burn Engines" (7/00).

[f] Emission Rate (lb/hr) = (Emission Factor lb/MMBtu) * (Heat Input MMBtu/hr)

[g] Emission Rate (ton/yr) = (Hourly Emission Rate lb/hr) * (Annual Hours of Operation hrs/yr) * (1 ton/2000 lb)

TITLE V RENEWAL
ANR PIPELNE COMPANY
LINCOLN COMPRESSOR STATION, MICHIGAN

Unit ID No.: **EU-LI004**
Description of Unit: **Emergency Generator**

Potential Greenhouse Gas (GHG) Emission Calculations[2]

Pollutant	Uncontrolled Emission Factor[2]	Factor Units[2]	Emissions (lb/hr)	Emissions (TPY)	Global Warming Potential (GWP)[2]	CO2e Emissions (lb/hr)	CO2e Emissions (TPY)
CO_2	53.06	kg CO_2/MMBtu	374.33	93.58	1.00	374.33	93.58
CH_4	0.001	kg CH_4/MMBtu	0.01	0.00	25.00	0.18	0.04
N_2O	0.0001	kg N_2O/MMBtu	0.00	0.00	298.00	0.21	0.05
TOTAL GHGs	--	--	**374.34**	**93.58**	--	--	--
TOTAL GHGs (CO_2e)	--	--	--	--	--	**374.71**	**93.68**

[1] Heat input based on fuel consumption and permitted HP.
[2] Based on 40 CFR 98 Subpart C, 98.33(a)(1)(i), Tier 1 Methodology, Equation C-1 and using source specific heat input.

GHG Emissions (lb/hr) = EF_{GHG} (kg/MMBtu) * 2.204623 lb/kg * Source Specific Heat Input (MMbtu/hr)
GHG Emissions (TPY) = GHG Emissions (lb/hr) * Annual Hoperating Hours (hr/yr) * 1 Ton/2000 lb
CO_2e Emissions (TPY) = Σ (GHG Emissions (tpy) * GWP)

Where:

EF_{GHG} = Fuel-specific default CO_2, CH_4, or N_2O emission factors from Table C-1 for CO_2 (Natural gas - Weighted U.S. Average) and Table C-2 for CH_4 and N_2O (Natural Gas) of 40 CFR Part 98, Subpart C (kg/MMBtu)
Heat Input = Btu/hp-hr x Site-rated hp x (1 MMBtu/1,000,000 Btu) = MMBtu/hr
GWP = Global Warming Potentials, 40 CFR 98, Subpart A, Table A-1

Tanks Working and Breathing Losses

AP-42 5th Edition, Chapter 7.1, June 2020

Tank Identification:	**T-11 Condensate Tank**
Facility:	**Lincoln Compressor Station**
Location:	**Lake George, Clare County, MI**
Description:	**ANR Pipeline Company**

Conversions:
7.48 gal/ft3
5.614 ft3/bbl

Type of Tank: Horizontal Fixed Roof Tank

Tank Dimensions:

Length of Horizontal Tank (Horizontal tanks only)	L	24.0	ft	*For tanks with rounded ends, use the overall length*	
Diameter of a vertical cross-section (Horizontal tanks only)	D	9.50	ft		
Effective Diameter (Horizontal tanks only)	D_E	17.04	ft	where D_E = Sq Rt (L*D/(pi/4))	Equation 1-14
Shell Height	H_s		ft		
Diameter (Vertical tanks only)	D	0.0	ft		
Tank Shell Radius	R_s	8.52	ft		
Max. Liquid Height	H_{LX}	9.0	ft		
Min. Liquid Height	H_{LN}	0.7	ft	*If unknown, use 1 for vertical tanks and 0 for horizontal tanks*	
Avg. Liquid Height	H_L	3.0	ft		
Volume	---	12,800	gal	*304.81 bbl*	
Net Throughput	Q	25,600	gal/year	*609.63 bbl/yr*	
Turnovers	N	2.0	per year		

$N = \sum H_{QI} / (H_{LX} - H_{LN})$ Equation 1-36

Where: $\sum H_{QI}$ = annual sum of increases in liquid level, ft/yr

If ΣH_{QI} is unknown, it can be estimated from pump utilization records. Over the course of a year, the sum of increases in liquid level, ΣHQI, and the sum of decreases in liquid level, ΣH_{QD}, will be approximately the same. Alternatively, ΣH_{QI} may be approximated as follows:

$\sum H_{QI} = (5.614Q) / ((pi/4)D^2)$ = 15.01 ft/yr Equation 1-37

For Horizontal Tanks, use D_E in place of D in Equation 1-37

Tank Insulation:		Uninsulated			
Is tank heated?		No			
Do Not Input Tank Liquid Temperature Below for Unheated Tank			°F	°R	°C
Heated - Avg Liquid Bulk Temperature	T_B			459.67	-17.78

Paint Characteristics:

Shell Color:	Gray	α_S = tank shell surface solar absorptance, dimensionless	
Shell Shade:	Light	0.54	*Table 7.1-6 Lookup*
Shell Condition:	New		
Roof Color:	Gray	α_R = tank roof surface solar absorptance, dimensionless	
Roof Shade:	Light	α_R = 0.54	*Table 7.1-6 Lookup*
Roof Condition:	New		

α = average tank surface solar absorptance, dimensionless
α = 0.54 *average of α_S and α_R*

If specific information is not available, a white shell and roof, with the paint in good condition, can be assumed to represent the most common or typical tank surface in use. If the tank roof and shell are painted a different color, α is determined from $\alpha = (\alpha_R + \alpha_S) / 2$; where α_R is the tank roof paint solar absorptance and α_S is the tank shell paint solar absorptance.

If aluminum is the base metal, rather than aluminum-colored paint, select "Mill finish, unpainted" as the Paint Shade.

Tanks Working and Breathing Losses

AP-42 5th Edition, Chapter 7.1, June 2020

Tank Identification:	**T-11 Condensate Tank**
Facility:	**Lincoln Compressor Station**
Location:	**Lake George, Clare County, MI**
Description:	**ANR Pipeline Company**

Conversions:
7.48 gal/ft3
5.614 ft3/bbl

Roof Characteristics:

Vertical Tanks Only:

Type of Roof: Cone

For Flat Roof:

Roof Outage (H_{RO}) = ft — For Flat Roof, $H_{RO} = 0$

For Cone Roof:

Tank Cone Roof Slope (S_R): 0.0625 ft/ft — *If unknown, a standard value of 0.0625 is used.*

Tank Roof Height (H_R): 0.53 ft — where $H_R = S_R R_S$ — Equation 1-18

Cone Roof Outage (H_{RO}) = 0.177 ft — where $H_{RO} = (1/3)\ H_R$ — Equation 1-17

For Dome Roof:

Tank Dome Roof Radius (R_R): 12 ft — Equation 1-20 Note

*The value of the tank dome roof radius usually ranges from 0.8D - 1.2D, where D = 2*tank shell radius. If tank dome roof radius is unknown, the tank diameter is used in its place.*

Dome Tank Roof Height (H_R) = 3.55 ft — where $H_R = R_R - (R_R^2 - R_S^2)^{0.5}$ — Equation 1-20

Dome Roof Outage (H_{RO}) = 1.88 ft — where $H_{RO} = H_R[1/2 + 1/6(H_R/R_S)^2]$ — Equation 1-19

Horizontal Tanks Only:

Effective Height (H_E) = 13.38 ft — where $H_E = D^*(pi/4)$ — Equation 1-15

Vapor Space Outage (H_{VO}) = 6.69 ft — where $H_{VO} = H_S - H_L + H_{RO}$ (vertical) or $H_{VO} = H_E/2$ (horizontal) — Equation 1-16

Meterorological Data:

Nearest City with Data: Houghton Lake, MI

Parameter	Symbol	Unit	Annual Average	Conversion to Rankine (°R)	
Daily Total Insolation Factor	I	Btu/ft^2-day	1121	NA	*Table 7.1-7 Lookup*
Daily Max Ambient Temp	T_{AX}	°F	53.6	513.3	*Table 7.1-7 Lookup*
Daily Min Ambient Temp	T_{AN}	°F	34.5	494.2	*Table 7.1-7 Lookup*
Daily Average Ambient Temp	T_{AA}	°F	44.05	503.7	Equation 1-30 where $T_{AA} = (T_{AX}+T_{AN})/2$
Average Atmospheric Pressure of Location	P_A	psia	14.1	NA	*Table 7.1-7 Lookup*

			UNINSULATED			
Parameter	Daily Ambient Temperature Range (°R)	Liquid Bulk Temperature (°R)	Daily Vapor Temperature Range (°R)	Daily Average Liquid Surface Temperature (°R)	Daily Maximum Liquid Surface Temperature (°R)	Daily Minimum Liquid Surface Temperature (°R)
Symbol	ΔT_A	T_B	ΔT_V	T_{LA}	T_{LX}	T_{LN}
Equation	$\Delta T_A = T_{AX} - T_{AN}$	$T_B = T_{AA} + 0.003^*\alpha_s^*I$	$\Delta TV = 0.7^*\Delta TA + 0.02^*\alpha^*I$	$TLA = 0.4^*TAA + 0.6^*TB + 0.005^*\alpha^*I$	$TLX = TLA + 0.25^*\Delta TV$	$TLN = TLA - 0.25^*\Delta TV$
Reference	Equation 1-11	Equation 1-31	Equation 1-7	Equation 1-28	Figure 7.1-17	Figure 7.1-17
Value	19.1	505.5	25.5	507.8	514.2	501.5
Conversion to Farenheit (°F)	19.1	45.9	25.5	48.1	54.5	41.8
Conversion to Farenheit (°C)		7.7		9.0	12.5	5.4

Material Data:

Type: Other — *If type is "Other" - manually enter chemical name and parameters below:*

Mixture/Component: Benzene; Ethylbenzene; Hexane (n)

Other Chemical Name: Mixture (Hexane, Ber **Provide data**

How Many Chemicals in Mixture? 5

Tanks Working and Breathing Losses

AP-42 5th Edition, Chapter 7.1, June 2020

Tank Identification:	**T-11 Condensate Tank**
Facility:	**Lincoln Compressor Station**
Location:	**Lake George, Clare County, MI**
Description:	**ANR Pipeline Company**

Conversions:
7.48 gal/ft3
5.614 ft3/bbl

Toluene

Xylene (o) {1,2-dimethyl benzene}

Name	CAS Registry No.	Vapor Molecular Weight (M_v)	Other M_v
Mixture	NA	Enter Other Molecular Weight	87.5

Table 7.1-2 (Petroleum) and 7.1-3 (Organic) Lookup; manual entry for

	Vapor Pressure Equation Constants		
	A	B	C
Name	(Dimensionless)	(°C)	(°C)
Benzene	6.906	1211	220.79
Ethylbenzene	6.95	1419.3	212.61
Hexane (n)	6.878	1171.5	224.37
Toluene	7.017	1377.6	222.64
Xylene (o) {1,2-dimethyl benzene}	6.999	1474.7	213.69

Table 7.1-2 (Petroleum) and 7.1-3 (Organic) Lookup; manual entry for "Other"

Tanks Working and Breathing Losses

AP-42 5th Edition, Chapter 7.1, June 2020

Tank Identification:	**T-11 Condensate Tank**
Facility:	**Lincoln Compressor Station**
Location:	**Lake George, Clare County, MI**
Description:	**ANR Pipeline Company**

Conversions:
7.48 gal/ft3
5.614 ft3/bbl

Determination of Site-Specific Vapor Pressure:

Parameter	Symbol	Equation	Value (psia)	Conversion to psia	
Vapor Pressure at Avg. Liquid Surface Temperature	P_{VA}	PVA = 10^[A - (B/(TLA + C))]	1.643	1.643	Equation 1-26 (organic) or Equation 1-25 (petroleum)
Vapor Pressure at Max. Liquid Surface Temperature	P_{VX}	PVX = 10^[A - (B/(TLX + C))]	1.965	1.965	Equation 1-26 (organic) or Equation 1-25 (petroleum)
Vapor Pressure at Min. Liquid Surface Temperature	P_{VN}	PVN = 10^[A - (B/(TLN + C))]	1.366	1.366	Equation 1-26 (organic) or Equation 1-25 (petroleum)
Pressure of Vapor Space at Normal Operating Conditions	P_I	Actual Guage Pressure	0.000		Equation 1-41 Notes

Determination of Site-Specific Daily Vapor Pressure Range:

Parameter	Symbol	Equation	Value	
Daily Vapor Pressure Range (psia)	ΔP_V	$\Delta P_V = P_{VX} - P_{VN}$	0.599	Equation 1-9

Breather Vent Settings:

Parameter	Symbol	Unit	Value	
Breather Vent Pressure Setting	P_{BP}	psig	0.03	
Breather Vent Vacuum Setting	P_{BV}	psig	-0.03	
Breather Vent Pressure Setting	$\Delta P_B = P_{BP} - P_{BV}$	psig	0.06	Equation 1-10

If specific information on the breather vent pressure setting and vacuum setting is not available, assume 0.03 psig for P_{BP} and -0.03 psig for P_{BV} as typical values. If the fixed roof tank is of bolted or riveted construction in which the roof or shell plates are not vapor tight, assume $\Delta P_B = 0$, even if a breather vent is used.

Parameter	Symbol	Unit	Equation	Value	
Average Vapor Temperature	T_v	°R	TV = 0.7*TAA + 0.3*TB + 0.009*α*I	509.7	Equation 1-33 (uninsulated), Equation 1-34 (partially insultated), or $T_V=T_B$ (fully insulated)

Vapor Space Expansion Factor:

Is true vapor pressure less than 0.1 psia? NO

Are the breather vent settings NOT higher than the typical range of ±0.03 psig? YES

Equation to use: EQUATION 1-5

Parameter	Symbol	Equation	Value	
Vapor Space Expansion Factor (dimensionless)	K_E	$K_E = 0.0018*\Delta T_V$	0.046	Equation 1-12
Vapor Space Expansion Factor (dimensionless)	K_E	$K_E = (\Delta T_V/T_{LA}) + (\Delta P_V - \Delta P_B)/(P_A-P_{VA})$	0.093	Equation 1-5
Vapor Space Expansion Factor used	K_E	KE = (ΔTV/TLA) + (ΔPV - ΔPB)/(PA-PVA)	0.093	Equation 1-5

Note: If K_E is less than zero, standing storage losses will not occur.

Is $K_E < 0$? NO

Tanks Working and Breathing Losses

AP-42 5th Edition, Chapter 7.1, June 2020

Tank Identification:	**T-11 Condensate Tank**
Facility:	**Lincoln Compressor Station**
Location:	**Lake George, Clare County, MI**
Description:	**ANR Pipeline Company**

Conversions:
7.48 gal/ft3
5.614 ft3/bbl

Emissions

$L_T = L_S + L_W$ Equation 1-1

where:

L_T = total losses, lb/yr

L_S = standing storage losses, lb/yr, see Equation 1-2

L_W = working losses, lb/hr, see Equation 1-35

Standing Storage Losses (lb/yr)	Working Losses (lb/yr)	Total Losses (lb/yr)	Total Losses (tpy)
863.97	**89.93**	**953.90**	**0.48**

Standing Storage Losses:

Standing storage loss, L_S, refers to the loss of stock vapors as a result of tank vapor space breathing.

$L_S = 365 * V_V * W_V * K_E * K_S$ Equation 1-2

Parameter	Tank Vapor Space Volume	Stock Vapor Density	Vapor Space Expansion Factor	Vented Vapor Saturation Factor	Standing Storage Loss
Symbol	V_V	W_V	K_E	K_S	L_S
Unit	ft^3	lb/ft^3	dimensionless	dimensionless	lb/yr
Equation	VV = (π/4)*(DE2)*HVO	$W_{V=}$ (M_V*P_{VA}) / (R*T_V)	KE = (ΔTV/TLA) + (ΔPV - ΔPB)/(PA-PVA)	K_S = 1 / (1 + 0.053* P_{VA}*H_{VO})	L_S = 365 * V_V * W_V * K_E * K_S
Reference	Equation 1-3	Equation 1-22	Equation 1-5	Equation 1-21	Equation 1-2
Value	1525.52	0.026	0.093	0.632	863.974
Notes		R = the ideal gas constant, 10.731 psia ft3/lb-mole °R	If K_E < zero, standing storage losses will not occur.	0.053 = constant $(psi\text{-}ft)^{-1}$	365 = 365 days/yr

Working Loss:

Working loss, L_W, refers to the loss of stock vapors as a result of tank filling or emptying operations.

$L_W = V_Q * K_N * K_P * W_v * K_B$ Equation 1-35

Parameter	Net Working Loss Throughput	Working Loss Turnover (Saturation) Factor	Working Loss Product Factor	Vent Setting Correction Factor	Working Loss
Symbol	V_Q	K_N	K_P	K_B	L_W
Unit	ft3/yr	dimensionless	dimensionless	dimensionless	lb/yr
Equation	VQ = (∑HQI) (pi/4)DE2	KN = 1 when N<36	KP=0.75 for petroleum	Equation 1-35 Notes	L_W = V_Q * K_N * K_P * W_v * K_B
Reference	Equation 1-38	Equation 1-35 Notes	Equation 1-35 Notes	Equation 1-35 Notes	Equation 1-35
Value	3422	1.00	1.00	1	89.927

Table 7.1-3. PHYSICAL PROPERTIES OF SELECTED PETROCHEMICALS

Chemical Name	CAS Registry No.	Molecular Weight	Liquid Density (lb/gal)	True Vapor Pressure at 60 °F (psia)	Cor
					A dimensionless
Acetaldehyde	00075-07-0	44.05	6.5464	12.19	8.063
Acetic acid	00064-19-7	60.05	8.7277	0.176	7.557
Acetic anhydride {acetic acid anhydride}	00108-24-7	102.09	9.03	0.053	7.122
Acetone	00067-64-1	58.08	6.5577	2.921	7.300
Acetonitrile	00075-05-8	41.05	6.56	1.090	7.154
Acrylamide	00079-06-1	71.08	9.36	8.57E-05	11.293
Acrylic acid {2-propenoic acid}	00079-10-7	72.06	8.77	1.344	5.652
Acrylonitrile {2-propenenitrile}	00107-13-1	53.06	6.73	1.383	6.942
Allyl alcohol	00107-18-6	58.08	7.13	0.326	11.658
Allyl chloride {3-chloro-1-propene}	00107-05-1	76.52	7.83	4.702	5.297
Aniline	00062-53-3	93.13	8.53	0.0058	7.221
Benzene	00071-43-2	78.11	7.32	1.171	6.906
Benz[a]anthracene	00056-55-3	228.29		7.92E-10	11.528
Benzo[a]pyrene	00050-32-8	252.31		2.29E-11	12.482
Benzo[ghi]perylene	00191-24-2	276.33		2.07E-13	11.820
Biphenyl	00092-52-4	154.21	8.68	2.37E-04	7.245
Butadiene (1,3) {divinyl}	00106-99-0	54.09	5.1377	30.22	6.873
Butane (n)	00106-97-8	58.12	4.7877	25.67	6.725
Butene (1)	00106-98-9	56.11	4.9177	30.83	7.122
Butene (cis-2)	00590-18-1	56.11	5.1477	22.62	6.863
Butene (2-methyl-1)	00563-46-2	70.13	5.43	8.257	6.862
Butene (trans-2)	00624-64-6	56.11	5.0077	24.97	6.919
Butyl alcohol (*n*) {butanol (1)}	00071-36-3	74.12	6.76	0.062	7.421
Butyl alcohol (tert) {1,1-dimethyl ethanol}	00075-65-0	74.12	6.58	0.424	7.373
Butyl chloride (-n) {1-chloro-butane}	00109-69-3	92.57	7.40	1.255	6.871
Butyl ether (di-tert)	06163-66-2	130.23	6.39	0.381	6.590
Carbon disulfide	00075-15-0	76.14	10.54	4.817	6.942
Carbon tetrachloride	00056-23-5	153.82	13.31	1.431	6.898
Chlorobenzene	00108-90-7	112.56	9.23	0.134	6.986
Chlorobutane (2)	00078-86-4	92.57	7.27	1.255	6.871
Chloroform	00067-66-3	119.38	12.38	2.468	7.083
Chloroprene {2-chloro- 1,3-butadiene}	00126-99-8	88.54	7.98	2.736	6.291

Chlorotoluene (o) {1- chloro-2methylbenzene}	00095-49-8	126.58	9.04	0.039	7.363
Chrysene {benzo[a]phenanthrene}	00218-01-9	228.29	10.63	1.86E-11	12.320
Cresol (m) {3-methyl-phenol}	00108-39-4	108.14	8.63	0.0013	7.477
Cresol (o) {2-methyl-phenol}	00095-48-7	108.14	9.4777	0.0016	6.843
Cresol (p) {4-methyl-phenol}	00106-44-5	108.14	8.50104	0.00062	7.016
Cyclohexane	00110-82-7	84.16	6.4677	1.212	6.845
Cyclohexanol	00108-93-0	100.16	8.03	0.00090	5.956
Cyclohexanone	00108-94-1	98.14	7.91	0.0042	5.978
Cyclohexene	00110-83-8	82.14	6.77	0.110	5.872
Cyclopentane	00287-92-3	70.13	6.22	4.171	6.878
Cyclopentanone	00120-92-3	84.12	7.92	0.130	3.958
Cyclopentene	00142-29-0	68.12	6.44	3.264	6.921
Decane (-*n*)	00124-18-5	142.28	6.09	0.011	3.085
Dibromopropane (1,2)	00078-75-1	201.89	16.13	0.088	7.314
Dibromopropane (1,3)	00109-64-8	201.89	16.55	0.029	7.309
Dichloroethane (1,1)	00075-34-3	98.96	9.81	2.863	7.097
Dichloroethane (1,2)	00107-06-2	98.96	10.4077	0.961	7.460
Dichloroethylene (1,2) {1,2 dichloroethene}	00540-59-0	96.94	10.76	2.579	7.022
Dichloroethylene (trans- 1,2)	00156-60-5	96.94	10.49	4.333	6.965
Dichlorotoluene (3,4)	00095-75-0	161.03	10.49	0.0029	7.344
Diethoxyethane (1,1)	00105-57-7	118.17	6.89	0.307	7.625
Diethoxymethane	00462-95-3	104.15	6.94	0.810	6.986
Diethyl (n,n) aniline {N,N-diethylbenzenamine}	00091-66-7	149.23	7.77	0.0031	8.258
Diethyl ketone {3-pentanone}	00096-22-0	86.13	6.7677	0.423	5.741
Diethyl sulfide	00352-93-2	90.19	6.98	0.749	7.541
Diethylamine {N-ethyl ethanamine}	00109-89-7	73.14	5.89	2.712	5.737
Diethylbenzene (1,2)	00135-01-3	134.22	7.34	0.0094	6.990
Diethylbenzene (1,3)	00141-93-5	134.22	7.18	0.010	7.006
Diethylbenzene (1,4)	00105-05-5	134.22	7.20	0.010	7.001
Di-isopropyl ether	00108-20-3	102.17	6.04	1.877	6.842
Dimethoxyethane (1,2)	00110-71-4	90.12	7.25	0.966	6.713
Dimethyl formamide (n,n)	00068-12-2	73.09	7.8877	0.040	6.806
Dimethyl hydrazine (1,1)	00057-14-7	60.10	6.6072	1.896	7.588
Dimethyl phthalate	00131-11-3	194.18	9.94	2.25E-08	4.522
Dimethylbutane (2,3)	00079-29-8	86.18	5.52	3.064	6.810

Dimethylcyclopentane (1,1)	01638-26-2	98.19	6.2677	0.932	6.830
Dimethylpentane (2,2)	00590-35-2	100.20	5.63	1.315	6.815
Dimethylpentane (2,3)	00565-59-3	100.20	5.80	0.842	6.862
Dimethylpentane (2,4)	00108-08-7	100.20	5.62	1.221	6.836
Dimethylpentane (3,3)	00562-49-2	100.20	5.79	1.029	6.831
Dioxane (1,4)	00123-91-1	88.11	8.63	0.439	7.456
Dipropyl ether {di-*n* - propyl ether}	00111-43-3	102.17	6.23	0.754	6.945
Dodecane (*n*)	00112-40-3	170.33	6.25	0.00093	6.981
Epichlorohydrin {chloromethyl oxirane}	00106-89-8	92.52	9.85	0.194	8.229
Ethane	00074-84-0	30.07		472	6.813
Ethanolamine (mono)	00141-43-5	61.08	8.50	0.002	7.168
Ethyl acetate	00141-78-6	88.11	7.51	1.135	7.103
Ethyl acrylate {ethyl ester 2-propenoic acid}	00140-88-5	100.12	7.71	0.445	7.150
Ethyl alcohol {ethanol}	00064-17-5	46.07	6.59	0.648	8.247
Ethyl chloride	00075-00-3	64.51	7.4377	16.63	7.037
Ethyl ether {diethyl ether}	00060-29-7	74.12	5.96	6.675	6.897
Ethylamine	00075-04-7	45.08	5.6577	14.08	7.405
Ethylbenzene	00100-41-4	106.17	7.24	0.104	6.950
Ethylcyclopentane	01640-89-7	98.19	6.40	0.475	6.898
Ethylene {ethene}	00074-85-1	28.05	4.74-155	749	6.748
Ethylene Glycol	107-21-1	62.07	9.28	0.00102	8.212
Ethyleneoxide	00075-21-8	44.05	7.3650	17.84	8.722
Ethylpentane (3)	00617-78-7	100.20	5.83	0.701	6.880
Fluoranthene	00206-44-0	202.25	10.45	3.96E-08	12.836
Fluorobenzene	00462-06-6	96.10	8.53	0.936	7.237
Formic acid	00064-18-6	46.03	10.18	0.516	4.876
Freon 11 {trichlorofluoromethane}	00075-69-4	137.37	12.48	10.93	6.884
Furan	00110-00-9	68.07	7.94	7.963	6.975
Furfural {2-furancarboxaldehyde}	00098-01-1	96.09	9.68	0.018	6.969
Heneicosane (*n*)	00629-94-7	296.57	6.61	6.23E-07	8.796
Heptane (*n*)	00142-82-5	100.20	5.71	0.541	6.903
Heptene (1)	00592-76-7	98.19	5.82	0.752	7.093
Hexadiene (1,5)	00592-42-7	82.14	5.7477	2.890	6.563
Hexane (*n*)	00110-54-3	86.18	5.4777	1.913	6.878
Hexanol (1)	00111-27-3	102.17	6.79	0.005	7.288
Hexene (1)	00592-41-6	84.16	5.62	2.378	6.866
Hydrogen cyanide {hydrocyanic acid}	00074-90-8	27.03	5.74	9.931	7.549
Isobutane {methylpropane (2)}	00075-28-5	58.12	4.6077	38.22	6.819

Isobutene {methylpropene (2)}	00115-11-7	56.11	4.9277	32.18	6.522
Isobutyl alcohol {2-methyl 1-propanol}	00078-83-1	74.12	6.69	0.096	7.306
Isooctane {2,2,4-trimethylpentane}	00540-84-1	114.23	5.7477	0.596	6.812
Isopentane {2-methyl butane}	00078-78-4	72.15	5.18	9.426	6.790
Isopentene {2-methyl 2-butene}	00513-35-9	70.13	5.53	6.210	6.922
Isoprene {2-methyl 1,3-butadiene}	00078-79-5	68.12	5.67	7.446	6.091
Isopropyl alcohol {isopropanol}	00067-63-0	60.10	6.5277	0.443	7.736
Isopropyl benzene {cumene}	00098-82-8	120.19	7.19	0.048	6.929
Isopropylbenzene (1-methyl-2)	00527-84-4	134.22	7.32	0.017	7.417
Methacrylonitrile {2-methyl 2-propenenitrile}	00126-98-7	67.09	6.68	0.886	6.999
Methane	00074-82-8	16.04	$_{3.53}$-260	4567	7.096
Methyl acetate {methyl ester acetic acid}	00079-20-9	74.08	7.80	2.703	7.079
Methyl acrylate {methyl ester 2- propenoic acid}	00096-33-3	86.09	7.96	1.058	7.198
Methyl alcohol {methanol}	00067-56-1	32.04	6.61	1.476	8.079
Methyl ethyl ketone {2-butanone}	00078-93-3	72.11	6.6877	1.081	6.864
Methyl isobutyl ketone	00108-10-1	100.16	6.6577	0.219	6.828
Methyl methacrylate	00080-62-6	100.12	7.88	0.416	8.253
Methyl propyl ether	00557-17-5	74.12	6.1455	6.017	6.563
Methyl styrene (alpha)	00098-83-9	118.18	7.60	0.024	6.924
Methylcyclohexane	00108-87-2	98.19	6.42	0.558	6.823
Methylcyclopentane	00096-37-7	84.16	6.25	1.738	6.863
Methyldichlorosilane	20156-50-7	115.03	8.91	5.718	7.028
Methylene chloride	00075-09-2	84.93	11.07	5.640	7.412
Methylhexane (2)	00591-76-4	100.20	5.66	0.799	6.882
Methylhexane (3)	00589-34-4	100.20	5.72	0.744	6.874
Methylpentane (2)	00107-83-5	86.18	5.4377	2.730	6.839
Methyl-tert-butyl ether {MTBE}	01634-04-4	88.15	6.18	3.226	6.867
Morpholine	00110-91-8	87.12	8.35	0.109	7.718
Naphthalene	00091-20-3	128.17	8.56	0.0024	7.146
Nitrobenzene	00098-95-3	123.11	10.05	0.0022	7.091
Nitromethane	00075-52-5	61.04	9.49	0.415	7.281
Nonadecane (*n*)	00629-92-5	268.52	6.56	3.64E-07	33.303

Nonane (*n*)	00111-84-2	128.26	5.99	0.037	6.700
Octadecane (*n*)	00593-45-3	254.49	6.4882	6.16E-07	7.207
Octane (*n*)	00111-65-9	114.23	5.8377	0.142	8.076
Octanol (1)	00111-87-5	130.23	6.9077	0.00061	9.352
Octene (1)	00111-66-0	112.21	5.97	0.196	6.933
Pentachloroethane	00076-01-7	202.29	14.02	0.040	6.643
Pentadiene (1,2)	00591-95-7	68.12	5.78	4.718	6.936
Pentadiene (1,4)	00591-93-5	68.12	5.52	10.06	7.035
Pentadiene (2,3)	00591-96-8	68.12	5.80	4.223	7.263
Pentane (n)	00109-66-0	72.15	5.23	6.884	6.864
Pentene (1)	00109-67-1	70.13	5.35	8.671	6.786
Pentyne (1)	00627-19-0	68.12	5.76	5.657	6.967
Phenanthrene	00085-01-8	178.23	8.18	3.37E-06	7.394
Phenol	00108-95-2	94.11	8.80113	0.003	7.122
Phosgene	00075-44-5	98.92	11.4577	19.43	7.146
Picoline (3) {3-methyl pyridine}	00108-99-6	93.13	7.98	0.064	7.054
Propane	00074-98-6	44.10	4.1277	111	6.858
Propanethiol (1)	00107-03-9	76.16	7.02	1.943	6.929
Propanethiol (2)	00075-33-2	76.16	6.80	3.590	6.877
Propyl alcohol (n) {propanol (1)}	00071-23-8	60.10	6.6777	0.218	8.189
Propyl nitrate (n) {propyl ester nitric acid}	00627-13-4	105.09	8.80	0.261	6.955
Propylamine (n) {1-propanamine}	00107-10-8	59.11	5.99	3.990	6.926
Propylene {propene}	00115-07-1	42.08	4.22	132	6.850
Propylene glycol (1,2) {1,2 propanediol}	00057-55-6	76.09	8.65	0.00094	8.208
Propylene oxide	00075-56-9	58.08	7.1732	7.101	6.970
Pyridine	00110-86-1	79.10	8.20	0.233	7.038
Resorcinol	00108-46-3	110.11	10.6177	6.65E-06	8.398
Styrene	00100-42-5	104.15	7.56	0.066	7.095
Tetrachloroethane (1,1,1,2)	00630-20-6	167.85	12.86	0.133	6.906
Tetrachloroethane (1,1,2,2)	00079-34-5	167.85	13.32	0.037	6.091
Tetrachloroethylene	00127-18-4	165.83	13.54	0.213	7.056
Tetrahydrofuran	00109-99-9	72.11	7.42	2.039	6.996
Toluene	00108-88-3	92.14	7.24	0.331	7.017
Trichloroethane (1,1,1)	00071-55-6	133.40	11.18	1.650	8.761
Trichloroethane (1,1,2)	00079-00-5	133.40	12.02	0.245	6.945
Trichloroethylene	00079-01-6	131.39	12.22	0.817	6.429
Trichloropropane (1,2,3)	00096-18-4	147.43	11.59	0.031	7.532
Tridecane (*n*)	00629-50-5	184.36	6.31	2.46E-04	7.003
Trifluoroethane (1,1,2-trichloro-1,2,2)	00076-13-1	187.37	13.0577	4.376	6.880
Trimethylbenzene (1,2,4)	00095-63-6	120.19	7.31	0.020	7.044

Trimethylchlorosilane {chlorotrimethylsilane}	00075-77-4	108.64	7.1577	3.068	6.951
Trimethylpentane (2,2,3)	00564-02-3	114.23	5.7477	0.378	6.825
Trimethylpentane (2,3,3)	00560-21-4	114.23	6.06	0.317	6.844
Trimethylpentane (2,3,4)	00565-75-3	114.23	6.00	0.314	7.031
Undecane (*n*)	01120-21-4	156.31	6.18	0.0035	6.977
Vinyl acetate {acetic acid ethenyl ester}	00108-05-4	86.09	7.78	1.396	7.215
Vinylidene chloride {1,1-dichloro ethene}	00075-35-4	96.94	10.13	8.096	6.983
Xylene (m) {1,3-dimethyl benzene}	00108-38-3	106.17	7.21	0.090	7.009
Xylene (o) {1,2-dimethyl benzene}	00095-47-6	106.17	7.3550	0.071	6.999
Xylene (p) {1,4-dimethyl benzene}	00106-42-3	106.17	7.19	0.097	7.021
Water (H_2O)	7732-18-5	18.02	8.34	0.247	8.071
0	-	-	-	-	-

NOTE: Synonyms are shown in braces { }. Prefixes are shown in parentheses ( ).

* Wenck added Water, Ethylene Glycol, and 0 Information

Antoine's Equation				Normal Boiling Point (°F)
nstants		Temperature Range		
B (°C)	*C* (°C)	Minimum (°F)	Maximum (°F)	
1,637.1	295.47	32	94	69
1,642.5	233.39	63	244	244
1,427.8	198.04	145	283	282
1,312.3	240.71	7	454	133
1,355.4	235.30	59	192	179
3,939.9	273.16			379
648.6	154.68	68	158	282
1,255.9	231.30	-60	172	172
4,510.2	416.80	70	207	206
418.4	128.68	55	111	113
1,661.9	199.10	88	363	363
1,211.0	220.79	46	217	176
5,461	273.15	219	260	820
6,181	273.15	185	316	923
6,580	273.15	391	513	
1,998.7	202.73	156	520	489
941.7	240.40	-104	29	24
909.7	237.00	-108	31	32
1,099.2	264.89	-108	25	21
957.1	236.65	-94	73	39
1,047.8	232.06	34	145	88
982.2	242.38	-97	34	34
1,351.6	179.81	73	244	243
1,174.9	179.23	103	180	180
1,182.9	218.27	2	173	170
1,157.7	203.05	39	228	224
1,168.6	241.53	38	176	115
1,221.8	227.41	68	172	170
1,435.7	218.03	144	269	269
1,182.9	218.27	2	173	170
1,233.1	232.20	-73	142	142
841.9	187.79	68	140	140

1,768.1	234.76	42	319	318
6,160	273.15	185	374	838
1,833.1	196.74	301	394	396
1,391.3	160.18	248	376	376
1,498.6	160.55	262	395	395
1,203.5	222.86	68	179	177
777.4	91.11	201	321	320
1,495.5	209.55	193	330	311
1,221.9	223.17	98	196	181
1,119.2	230.74	60	122	121
376.4	104.65	32	78	266
1,121.8	223.45			111
440.6	116.25	-21	99	345
1,667.0	234.85	19	287	286
1,776.7	233.46	49	333	314
1,229.2	233.95	-77	135	135
1,521.8	248.48	-23	211	182
1,205.4	230.60	32	183	141
1,141.9	231.90	-36	185	118
1,882.5	215.00	32	221	408
1,574.0	229.47	-10	216	212
1,270.2	221.26	32	167	191
2,652.8	277.32	122	425	422
716.2	147.17	97	215	215
1,560.5	246.59	-39	190	197
559.1	140.18	89	141	132
1,577.9	200.55	206	364	361
1,576.3	201.00	203	360	358
1,589.3	202.02	206	365	363
1,135.0	218.23	74	153	155
1,260.5	235.83	-55	199	185
1,337.7	190.50	86	194	307
1,388.5	232.54	-32	68	146
700.3	51.42	180	304	540
1,127.2	228.95	58	138	136

1,226.6	222.76	60	192	190
1,190.3	223.34	60	176	174
1,242.6	222.34	64	195	194
1,197.6	222.27	57	178	177
1,231.0	225.58	56	189	187
1,570.1	241.85	68	221	214
1,254.8	218.82	80	192	194
1,625.9	180.31	259	423	421
2,086.8	273.16			241
659.7	256.431	-215	-100	-127
1,408.9	157.06	150	340	339
1,245.7	217.96	60	168	171
1,366.1	220.47	-21	211	211
1,670.4	232.96	32	173	173
1,052.8	241.07	-69	55	61
1,062.6	228.22	-10	132	94
1,203.8	249.43	62	349	64
1,419.3	212.61	134	279	277
1,305.0	221.40	84	220	218
584.1	254.84	-191	-120	-155
2161.9	208.43			387.1 *
2,022.8	335.81	32	89	53
1,254.1	220.15	70	202	200
5,348.1	273.15	77	230	723
1,409.8	238.36	0	183	185
515.0	133.74	33	93	213
1,043.0	236.88			75
1,060.8	227.73	37	143	89
1,430.1	188.70	133	321	323
3,571.2	253.20	307	663	679
1,268.6	216.95	79	211	209
1,400.7	238.96	32	192	201
1,008.1	214.16	32	138	140
1,171.5	224.37	55	157	156
1,422.0	165.44	126	315	314
1,153.0	225.85	61	148	147
1,340.8	261.56	2	115	79
912.1	243.34	-121	11	12

799.1	226.54	-70	32	20
1,237.0	171.62	176	240	226
1,257.8	220.74	76	212	211
1,020.0	233.10	61	83	82
1,098.6	233.26	37	159	100
706.9	186.10	62	93	93
1,357.4	197.34	134	193	180
1,455.8	207.20	158	308	305
1,880.5	236.27	178	355	350
1,353.6	238.03	-48	194	194
516.7	284.37	-262	-117	-260
1,164.4	220.46	35	133	134
1,338.7	229.63	-47	176	177
1,581.3	239.65	59	183	148
1,150.2	209.25	106	207	176
1,254.1	201.61	71	241	241
1,945.6	265.58	102	192	213
903.6	206.46	31	103	102
1,486.9	202.40			329
1,270.8	221.42	27	261	214
1,186.1	226.04	59	163	161
1,167.8	240.70	34	106	
1,327.0	252.68	-40	104	104
1,240.9	220.10	65	196	194
1,243.8	219.63	68	199	197
1,135.4	226.57	55	142	142
1,116.1	224.74	125	431	131
1,745.8	235.00	32	111	263
1,831.6	211.82	177	354	422
1,727.6	199.71	273	411	412
1,446.2	227.52	132	277	214
28,197	725.94	91	131	624

1,492.9	217.26	-64	94	303
2,069.0	161.22	346	602	592
1,936.3	253.01	-70	75	258
2,603.4	224.35	68	176	383
1,353.5	212.76	113	252	251
1,342.3	196.51	77	324	324
1,125.5	231.88	-76	-19	113
1,108.2	241.05	-110	65	79
1,256.2	239.57	-76	-15	119
1,070.6	232.70	24	155	97
1,014.3	229.78	55	87	88
1,092.5	227.18	-47	142	104
2,428.5	202.19	212	302	635
1,509.7	174.20	225	359	359
1,072.7	243.30	47	345	46
1,484.3	211.54	165	364	291
819.3	248.73	-45	117	-44
1,183.4	224.63	76	216	154
1,113.9	226.16	51	186	131
1,690.9	221.35	67	207	207
1,294.4	206.70	32	158	231
1,044.0	210.84	73	172	120
795.8	248.27	-161	-53	-54
2,085.9	203.54			368
1,065.3	226.28	-100	94	95
1,371.4	214.65	153	307	240
2,687.2	210.99	305	530	532
1,525.1	216.77	86	293	295
1,370.4	210.25	139	266	271
959.6	149.78	77	266	295
1,440.8	223.98	82	226	250
1,202.9	226.33	74	211	151
1,377.6	222.64	32	122	231
2,210.2	308.05	22	62	165
1,310.3	208.74	122	237	237
974.5	187.34	64	188	189
1,818.9	232.52	48	316	313
1,689.1	174.28	283	457	453
1,099.9	227.50	-13	181	118
1,573.3	208.56	126	388	337

1,191.0	235.15	37	132	136	
1,294.9	218.42			230	
1,328.1	220.38			238	
1,420.7	228.53	-59	308	237	
1,572.5	188.02	220	387	383	
1,299.1	226.97	71	162	163	
1,104.7	237.75	-19	90	88	
1,462.3	215.11	82	331	283	
1,474.7	213.69	90	342	291	
1,474.4	217.77	56	355	281	
1,730.6	233.43			212	*
-	-	-	-	-	*

Table 7.1-2. PROPERTIES (M_V, M_L, P_{VA}, W_L) OF SELECTED PETROLEUM LIQUIDS

Petroleum Liquid Mixture	Vapor Molecular Weight	Liquid Molecular Weight	Liquid Density	ASTM D86 Distillation Slope
	M_v	M_L	W_L	S
	lb/lb-mole	lb/lb-mole	lb/gal	°F/vol %
Midcontinent Crude Oil	50	207	7.1	–
Refined Petroleum Stocks	–	–	–	–
Motor Gasoline RVP 13	62	92	5.6	3.0
Motor Gasoline RVP 10	66	92	5.6	3.0
Motor Gasoline RVP 7	68	92	5.6	3.0
Light Naphtha RVP 9-14	–	–	–	3.5
Naphtha RVP 2-8	–	–	–	2.5
Aviation Gasoline	–	–	–	2.0
Jet Naphtha (JP-4)	80	120	6.4	–
Jet Kerosene (Jet A)	130	162	7.0	–
No. 2 Fuel Oil (Diesel)	130	188	7.1	–
No. 6 Fuel Oil	130	387	7.9	–
Vacuum Residual Oil	190	387	7.9	–

[a] References 10 and 11

[b] Liquid molecular weights from "Memorandum from Patrick B. Murphy, Radian/RTP to Refinery Liquid HAP and Properties Data, August 10, 1993," as adopted in versions 3.1 and 4

[c] Reference 4.

[d] For motor gasolines, see Figure 7.1-15; for crude oil, see Figure 7.1-16;
for Jet Naphtha, Jet Kerosene, and No. 2 Fuel Oil, see Barnett and Hibbard[10]; for No. 6 Fuel

[e] Alternatively, in the absence of measured data, a value of 66 lb/lb-mole may be assumed of RVP is speculative.

[f] This is for a blend of Vacuum Residual Oil with a light distillate cutter stock, or similar mixt

Vapor Pressure Equation Constant	Vapor Pressure Equation Constant	True Vapor Pressure (at 60 °F)
A	***B***	P_{VA}
dimensionless	**°R**	**psia**
11.26335165	5303.923498	–
Figure 7.1-15	Figure 7.1-15	–
11.644	5043.6	7.0
11.724	5237.3	5.2
11.833	5500.6	3.5
–	–	–
–	–	–
–	–	–
11.368	5784.3	1.3
12.390	8933	0.008
12.101	8907	0.006
10.781	8933	0.002
10.104	10475.5	0.00004

RVP 5

James F. Durham, EPA/CPB Concerning Petroleum
4.0 of EPA's TANKS software.

Oil.[22]
for all gasolines, in that the variability shown as a function

ure. Vapor pressure constants given will result in higher

.1-92

Table 7.1-7. METEOROLOGICAL DATA (T_{AN}, T_{AX}, V, I, P_A) FOR SELECTED U.S. LOCATIONS

Location	Symbol	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Birmingham, AL	T_{AN}	°F	35.0	37.5	44.1	51.7	60.6	68.1	71.7	71.1	64.7	53.3	43.3	36.7
	T_{AX}	°F	53.7	57.8	65.9	73.9	80.9	86.8	90.0	89.8	84.5	74.7	64.2	55.3
	V	mi/hr	7.2	7.4	7.8	7.4	6.3	5.4	5.1	4.7	5.4	5.4	6.0	6.7
	I	Btu/ft^2/day	769	1013	1382	1720	1884	1928	1889	1760	1504	1212	890	699
	P_A	lb/in^2												
Huntsville, AL	T_{AN}	°F	32.7	35.2	42.1	50.6	59.6	67.2	70.3	69.2	62.6	51.1	41.2	34.5
	T_{AX}	°F	50.3	54.4	63.1	72.3	79.9	86.3	88.9	89.2	83.7	73.4	61.6	52.1
	V	mi/hr	8.3	8.3	8.9	8.5	7.4	5.8	4.9	4.9	5.8	6.3	7.2	7.8
	I	Btu/ft^2/day	714	949	1314	1690	1868	1973	1948	1823	1508	1191	835	656
	P_A	lb/in^2												
Mobile, AL	T_{AN}	°F	41.4	43.8	49.7	56.3	64.7	71.0	73.3	73.1	68.9	58.4	48.3	42.4
	T_{AX}	°F	60.8	64.2	70.4	76.7	84.0	88.3	90.1	89.9	86.4	78.5	69.5	62.1
	V	mi/hr	8.5	8.5	8.7	8.3	7.4	6.0	5.4	5.4	6.7	6.9	7.2	7.8
	I	Btu/ft^2/day	865	1114	1446	1774	1955	1925	1876	1767	1557	1304	1024	818
	P_A	lb/in^2												
Montgomery, AL	T_{AN}	°F	37.1	39.9	46.1	52.6	61.8	68.9	72.2	71.7	66.2	54.4	44.0	38.0
	T_{AX}	°F	57.7	62.0	69.4	76.6	83.9	89.4	91.8	91.5	86.9	77.7	67.9	59.1
	V	mi/hr	7.2	7.4	7.6	6.5	5.8	4.9	4.7	4.7	5.6	5.4	5.8	6.7
	I	Btu/ft^2/day	823	1076	1421	1766	1952	1951	1943	1781	1530	1223	950	749
	P_A	lb/in^2												
Phoenix, AZ	T_{AN}	°F	46.5	49.5	54.0	60.1	69.8	78.1	84.3	83.4	78.1	65.4	53.3	45.6
	T_{AX}	°F	66.7	69.8	76.1	83.6	93.8	102.6	105.4	103.6	99.6	87.8	75.1	65.6
	V	mi/hr	4.9	5.6	6.3	6.9	6.9	6.7	6.9	6.7	6.0	5.6	4.9	4.7
	I	Btu/ft^2/day	1058	1335	1774	2248	2495	2606	2379	2144	1910	1542	1172	967
	P_A	lb/in^2												
Prescott, AZ	T_{AN}	°F	26.8	29.5	33.5	38.9	48.0	55.9	63.3	61.9	54.9	42.7	32.3	26.2
	T_{AX}	°F	51.4	54.4	60.0	66.4	76.5	85.6	89.2	86.5	82.2	71.4	60.1	51.1
	V	mi/hr	6.5	7.2	8.1	8.9	8.7	8.7	7.4	6.7	6.9	6.9	6.5	6.3
	I	Btu/ft^2/day	982	1245	1694	2156	2415	2571	2171	1903	1805	1493	1130	901
	P_A	lb/in^2												
Tucson, AZ	T_{AN}	°F	40.7	43.1	47.0	52.4	61.6	70.4	75.7	74.4	70.1	58.4	47.0	40.0
	T_{AX}	°F	65.8	68.4	74.2	81.7	91.7	99.9	99.6	97.3	94.7	85.1	74.1	65.0

	V	mi/hr	6.9	7.4	7.8	8.3	8.1	8.1	7.8	7.4	7.6	7.6	7.2	6.9
	I	Btu/ft^2/day	1110	1370	1840	2279	2510	2582	2198	2007	1886	1595	1249	1033
	P_A	lb/in^2												
Fort Smith, AR	T_{AN}	°F	30.7	34.3	41.8	50.5	60.4	68.4	72.4	71.4	63.0	51.6	41.0	32.8
	T_{AX}	°F	49.4	55.3	63.7	73.0	79.8	87.1	92.3	92.8	84.4	74.3	61.8	51.6
	V	mi/hr	7.6	8.1	8.7	8.3	6.9	6.0	5.4	5.6	6.0	6.3	7.2	7.6
	I	Btu/ft^2/day	738	977	1299	1674	1808	1991	2117	1918	1522	1177	811	674
	P_A	lb/in^2												
Little Rock, AR	T_{AN}	°F	33.3	36.3	43.8	52.4	61.6	69.7	73.2	72.2	64.4	53.1	42.9	35.0
	T_{AX}	°F	50.6	55.5	63.7	73.1	80.8	88.1	91.8	92.2	84.9	74.4	62.1	52.3
	V	mi/hr	7.8	7.8	8.7	8.5	7.2	6.3	6.0	5.6	6.3	6.0	7.2	7.6
	I	Btu/ft^2/day	717	970	1302	1686	1820	2008	2009	1879	1534	1171	814	656
	P_A	lb/in^2												
Arcata, CA	T_{AN}	°F	40.7	41.4	41.1	42.4	46.0	48.4	51.4	51.4	48.3	45.1	42.5	40.2
	T_{AX}	°F	55.1	55.6	55.5	56.2	58.9	61.1	62.2	63.2	63.2	61.9	57.5	54.9
	V	mi/hr	6.7	6.7	7.2	7.2	7.2	7.2	6.0	5.6	5.1	5.4	5.8	6.9
	I	Btu/ft^2/day	527	730	1139	1516	1822	1946	1809	1573	1327	971	613	460
	P_A	lb/in^2												
Bakersfield, CA	T_{AN}	°F	40.3	43.7	46.9	49.8	57.8	64.2	70.7	69.3	64.5	55.3	45.3	39.7
	T_{AX}	°F	56.9	62.9	69.0	74.1	83.3	90.6	96.9	95.7	90.4	79.0	65.7	57.3
	V	mi/hr	4.9	5.6	6.0	6.9	7.4	7.6	6.9	6.7	6.0	5.4	4.7	4.9
	I	Btu/ft^2/day	717	1031	1543	2010	2358	2570	2500	2293	1911	1411	952	696
	P_A	lb/in^2												
Bishop, CA	T_{AN}	°F	24.0	27.4	32.1	36.8	45.1	51.9	57.7	54.8	47.6	38.5	28.3	22.9
	T_{AX}	°F	53.0	56.2	64.5	70.5	80.8	90.4	97.5	95.5	87.6	75.2	61.9	52.5
	V	mi/hr	7.2	8.1	9.4	10.1	9.2	8.3	7.8	8.1	7.6	7.8	7.4	6.9
	I	Btu/ft^2/day	882	1186	1683	2080	2378	2564	2487	2278	1925	1457	1046	824
	P_A	lb/in^2												
Daggett, CA	T_{AN}	°F	37.5	41.2	46.2	51.3	60.6	68.0	74.7	73.6	66.5	55.3	43.2	36.1
	T_{AX}	°F	60.8	64.4	71.7	78.3	88.9	98.0	104.6	103.1	95.7	82.5	69.1	59.6
	V	mi/hr	8.1	9.4	11.4	13.9	14.1	13.6	11.6	11.0	10.1	9.6	8.5	7.6
	I	Btu/ft^2/day	992	1270	1756	2197	2492	2656	2470	2259	1972	1544	1142	921
	P_A	lb/in^2												
Fresno, CA	T_{AN}	°F	39.9	43.1	46.5	49.6	56.9	62.4	68.3	66.7	62.2	53.7	44.6	39.4
	T_{AX}	°F	55.0	61.1	67.4	73.1	83.2	90.9	97.7	96.3	90.7	78.5	64.7	55.1

	V	mi/hr	4.3	5.1	5.8	7.4	8.3	8.5	7.6	6.9	6.0	4.7	4.0	4.3
	I	Btu/ft^2/day	638	973	1519	2002	2368	2573	2534	2290	1895	1383	889	602
	P_A	lb/in^2												
Long Beach, CA	T_{AN}	°F	47.6	49.0	51.5	53.6	58.2	61.4	64.7	65.3	63.5	58.8	51.8	46.8
	T_{AX}	°F	66.5	65.9	67.7	70.4	72.6	75.7	80.3	82.5	81.0	76.0	71.4	66.0
	V	mi/hr	4.5	5.1	5.6	6.3	6.0	6.0	6.0	5.8	5.4	4.7	4.3	4.3
	I	Btu/ft^2/day	894	1109	1548	1958	2066	2207	2264	2156	1767	1327	1039	843
	P_A	lb/in^2												
Los Angeles AP, CA	T_{AN}	°F	50.0	50.9	52.4	54.1	57.8	61.0	64.0	64.6	63.4	59.6	54.0	49.7
	T_{AX}	°F	64.9	64.4	64.7	66.5	68.5	71.0	73.9	75.3	74.5	72.3	69.3	64.8
	V	mi/hr	6.5	7.6	8.1	8.7	8.1	8.1	8.1	7.6	7.4	6.7	6.3	6.5
	I	Btu/ft^2/day	895	1115	1537	1988	2045	2140	2117	2037	1662	1298	1036	834
	P_A	lb/in^2												
Redding, CA	T_{AN}	°F	38.2	40.6	43.7	46.6	55.0	62.0	67.0	63.8	58.7	50.4	41.8	37.6
	T_{AX}	°F	55.0	58.3	64.9	69.6	80.4	89.3	98.1	96.2	90.4	77.1	62.5	54.0
	V	mi/hr	5.8	6.5	6.7	6.7	6.7	6.9	6.0	5.6	5.4	5.6	4.9	6.0
	I	Btu/ft^2/day	577	856	1354	1772	2198	2464	2526	2246	1786	1209	721	497
	P_A	lb/in^2												
Sacramento, CA	T_{AN}	°F	40.0	42.7	44.7	46.8	52.1	56.5	59.1	58.9	56.4	50.7	43.3	39.5
	T_{AX}	°F	54.3	59.6	65.4	70.3	79.3	86.1	91.4	90.9	87.4	77.1	63.8	54.4
	V	mi/hr	5.6	6.0	6.7	7.4	7.6	8.1	7.6	6.9	5.8	5.4	4.9	5.8
	I	Btu/ft^2/day	563	877	1409	1891	2249	2510	2514	2239	1823	1269	790	518
	P_A	lb/in^2												
San Diego, CA	T_{AN}	°F	50.1	51.6	53.9	56.2	59.8	62.3	65.4	66.9	65.4	61.0	54.4	49.5
	T_{AX}	°F	64.5	64.3	65.0	66.6	67.9	70.1	73.4	75.6	75.0	72.0	68.6	64.2
	V	mi/hr	5.4	6.3	6.7	7.4	7.2	7.4	7.2	6.9	6.7	5.8	4.9	4.9
	I	Btu/ft^2/day	990	1206	1604	1990	1993	2135	2127	2087	1774	1367	1107	922
	P_A	lb/in^2												
San Francisco AP, CA	T_{AN}	°F	45.2	47.2	48.3	49.4	52.2	54.0	55.8	56.6	56.2	53.9	49.4	45.6
	T_{AX}	°F	55.9	58.6	61.4	63.3	66.3	69.2	70.6	71.6	72.5	69.4	62.3	56.2
	V	mi/hr	6.9	8.3	10.3	12.5	13.4	14.1	12.8	12.3	10.7	9.2	7.4	7.4
	I	Btu/ft^2/day	666	896	1353	1813	1981	2123	2023	1747	1488	1124	798	619
	P_A	lb/in^2												
Santa Barbara, CA	T_{AN}	°F	41.9	44.6	46.8	48.2	52.1	54.8	57.9	58.0	56.3	51.7	45.4	41.1
	T_{AX}	°F	63.7	63.8	64.8	67.2	69.0	70.7	73.2	74.2	73.9	71.9	68.7	63.7

	V	mi/hr	4.5	5.6	5.8	6.7	6.5	6.0	6.0	5.6	5.1	4.7	4.3	4.3
	I	Btu/ft^2/day	907	1116	1543	1968	2115	2184	2153	2107	1749	1346	1051	839
	P_A	lb/in^2												
Santa Maria, CA	T_{AN}	°F	41.1	43.0	44.2	44.6	48.2	50.9	54.0	54.3	53.0	49.3	44.0	40.2
	T_{AX}	°F	63.2	63.6	64.9	66.5	68.3	69.9	71.7	72.4	73.3	72.2	68.5	63.1
	V	mi/hr	6.0	6.7	7.6	8.3	8.3	7.8	6.5	6.3	5.8	6.0	6.0	6.0
	I	Btu/ft^2/day	892	1109	1563	2010	2253	2358	2261	2111	1784	1386	1036	828
	P_A	lb/in^2												
Stockton, CA	T_{AN}	°F	39.5	42.2	44.3	47.0	52.8	57.6	60.9	60.4	57.5	50.9	43.1	38.9
	T_{AX}	°F	54.5	60.4	66.5	71.7	80.6	87.8	93.4	92.3	88.5	78.0	64.6	54.7
	V	mi/hr	6.7	7.2	7.6	8.9	9.6	10.1	8.9	8.3	7.4	6.5	5.8	6.9
	I	Btu/ft^2/day	573	907	1445	1879	2251	2525	2510	2256	1844	1308	824	552
	P_A	lb/in^2												
Alamosa, CO	T_{AN}	°F	0.5	7.4	18.0	25.4	34.8	41.4	47.7	46.7	37.4	25.4	12.7	2.0
	T_{AX}	°F	34.2	39.7	50.1	58.5	69.1	78.0	81.7	78.9	72.6	61.3	46.5	34.9
	V	mi/hr	5.1	6.5	8.1	10.1	9.6	8.7	6.7	6.3	6.5	6.5	5.8	4.9
	I	Btu/ft^2/day	898	1191	1619	1987	2266	2427	2269	1992	1786	1397	1023	798
	P_A	lb/in^2												
Colorado Springs, CO	T_{AN}	°F	18.8	20.9	27.1	34.1	43.8	52.2	57.8	56.4	47.9	36.8	26.0	19.4
	T_{AX}	°F	42.6	45.0	51.9	58.6	68.8	78.1	84.1	80.9	74.2	62.6	50.1	42.5
	V	mi/hr	8.7	9.4	10.3	11.6	10.7	10.1	8.9	8.5	8.9	9.4	8.7	8.9
	I	Btu/ft^2/day	843	1093	1467	1794	2012	2182	2108	1884	1667	1275	899	742
	P_A	lb/in^2												
Denver, CO	T_{AN}	°F	19.2	21.7	28.2	34.8	44.7	53.2	60.4	58.7	49.6	37.7	26.7	19.6
	T_{AX}	°F	42.9	45.7	53.7	60.1	70.6	80.9	88.0	85.2	77.3	64.0	51.1	43.0
	V	mi/hr	9.2	9.2	10.3	11.0	10.1	9.6	9.2	8.9	8.9	9.2	8.9	9.2
	I	Btu/ft^2/day	764	1052	1463	1779	2049	2275	2213	1941	1658	1216	817	664
	P_A	lb/in^2												
Grand Junction, CO	T_{AN}	°F	19.3	25.9	32.7	39.5	48.8	57.9	65.2	62.8	53.4	41.3	28.8	19.9
	T_{AX}	°F	37.4	45.3	56.5	64.4	76.2	86.9	93.4	89.3	79.9	66.0	49.9	38.0
	V	mi/hr	5.4	6.5	7.8	8.9	9.2	9.6	9.4	8.9	8.5	7.6	6.0	5.4
	I	Btu/ft^2/day	739	1039	1522	1876	2211	2434	2339	2020	1721	1281	874	662
	P_A	lb/in^2												
Limon, CO	T_{AN}	°F	12.4	15.2	22.0	29.2	39.4	49.3	54.8	53.9	43.7	31.6	19.9	12.7
	T_{AX}	°F	41.7	44.2	52.7	59.5	69.7	79.6	86.2	82.7	75.8	63.4	49.6	41.8

	V	mi/hr	8.7	9.4	10.7	11.9	11.0	10.1	9.2	8.7	8.9	9.4	8.9	8.9
	I	Btu/ft^2/day	797	1066	1466	1773	2074	2301	2267	2003	1712	1264	860	693
	P_A	lb/in^2												
Pueblo, CO	T_{AN}	°F	15.3	18.5	26.5	34.8	45.2	53.6	59.6	58.3	48.3	35.1	23.4	15.9
	T_{AX}	°F	47.2	50.8	58.9	66.1	76.7	86.3	92.3	88.8	81.4	68.9	55.1	46.8
	V	mi/hr	6.7	7.4	8.5	9.8	8.9	8.7	8.1	7.4	7.4	7.4	6.5	6.5
	I	Btu/ft^2/day	862	1144	1557	1897	2197	2399	2356	2093	1783	1344	950	779
	P_A	lb/in^2												
Bridgeport, CT	T_{AN}	°F	24.4	25.9	32.1	41.8	51.1	61.4	67.0	66.6	59.2	47.4	38.9	29.5
	T_{AX}	°F	37.2	39.1	46.3	57.1	66.8	76.4	81.4	80.4	73.7	62.7	52.4	42.1
	V	mi/hr	9.8	10.1	10.3	9.6	8.9	7.8	7.6	7.8	8.7	9.2	9.4	9.8
	I	Btu/ft^2/day	560	847	1156	1490	1750	1862	1904	1685	1320	948	621	501
	P_A	lb/in^2												
Hartford, CT	T_{AN}	°F	19.4	21.4	28.8	39.2	48.3	58.4	63.3	61.9	53.9	42.2	34.1	24.6
	T_{AX}	°F	34.4	37.5	46.7	60.2	70.4	79.1	83.6	82.2	74.4	62.3	50.8	39.5
	V	mi/hr	8.5	8.9	9.4	8.9	8.1	6.9	6.5	6.3	6.7	7.4	7.6	8.3
	I	Btu/ft^2/day	560	814	1133	1453	1700	1797	1833	1622	1289	905	582	482
	P_A	lb/in^2												
Wilmington, DE	T_{AN}	°F	26.3	27.2	34.3	43.8	53.0	63.2	67.9	66.9	58.9	46.8	38.4	30.1
	T_{AX}	°F	40.5	42.7	51.6	63.1	72.1	80.9	85.1	83.9	76.8	65.5	55.0	44.7
	V	mi/hr	9.4	9.8	10.1	9.6	8.3	7.6	7.4	6.9	7.8	7.6	8.5	8.9
	I	Btu/ft^2/day	629	911	1185	1528	1786	1909	1916	1680	1366	1016	678	556
	P_A	lb/in^2												
Daytona Beach, FL	T_{AN}	°F	49.0	50.6	55.0	59.8	66.4	72.1	73.7	74.0	73.2	66.9	57.7	52.3
	T_{AX}	°F	68.4	69.9	74.2	78.8	84.5	87.7	89.5	88.8	86.3	81.5	75.1	70.2
	V	mi/hr	7.2	7.6	8.3	7.8	7.4	6.3	5.6	5.6	6.7	7.4	6.9	6.7
	I	Btu/ft^2/day	1018	1215	1579	1931	2049	1893	1911	1767	1518	1296	1063	916
	P_A	lb/in^2												
Fort Myers, FL	T_{AN}	°F	54.4	56.1	59.8	64.0	69.3	73.8	75.0	75.4	74.7	69.4	61.8	56.7
	T_{AX}	°F	74.2	76.2	79.6	83.5	88.5	90.3	90.7	90.8	89.3	85.8	80.2	75.5
	V	mi/hr	7.4	7.8	8.3	8.1	7.2	6.3	5.4	5.6	6.3	7.2	7.4	7.2
	I	Btu/ft^2/day	1150	1426	1718	1993	2075	1880	1805	1740	1533	1415	1205	1054
	P_A	lb/in^2												
Gainesville, FL	T_{AN}	°F	43.4	45.5	50.2	55.6	63.2	69.8	72.1	72.1	69.4	61.1	51.4	45.5
	T_{AX}	°F	66.3	69.0	74.4	80.0	86.4	89.0	90.2	89.4	86.6	80.7	73.6	67.6

	V	mi/hr	6.5	6.9	7.4	7.2	6.7	5.6	5.1	4.9	5.8	5.8	6.0	5.8
	I	Btu/ft^2/day	970	1213	1549	1890	2019	1865	1863	1704	1484	1276	1063	887
	P_A	lb/in^2												
Jacksonville, FL	T_{AN}	°F	42.9	45.1	50.1	55.5	63.7	70.5	72.9	73.1	70.1	61.0	50.8	44.4
	T_{AX}	°F	64.5	67.2	72.7	78.3	84.8	88.7	91.0	89.6	85.8	79.6	72.2	65.4
	V	mi/hr	7.2	7.4	8.1	7.6	7.2	6.5	5.8	5.8	6.5	6.3	6.3	6.5
	I	Btu/ft^2/day	937	1186	1522	1890	2035	1911	1948	1756	1466	1237	1021	846
	P_A	lb/in^2												
Key West, FL	T_{AN}	°F	64.9	66.2	68.7	72.2	76.2	79.4	80.6	80.5	79.2	76.5	71.8	67.1
	T_{AX}	°F	74.4	75.7	78.2	81.0	84.6	87.7	89.0	89.4	87.7	84.5	79.6	75.7
	V	mi/hr	11.0	10.5	11.0	11.2	9.8	8.7	8.5	8.3	8.7	10.1	11.2	10.5
	I	Btu/ft^2/day	1206	1462	1805	2069	2131	2035	2041	1943	1667	1465	1240	1098
	P_A	lb/in^2												
Miami, FL	T_{AN}	°F	61.2	62.6	65.8	69.4	73.9	76.6	78.1	78.2	77.3	74.3	68.4	63.6
	T_{AX}	°F	75.5	77.0	79.6	82.4	86.2	88.4	89.9	90.0	88.2	85.1	80.5	76.9
	V	mi/hr	8.5	8.5	9.6	9.8	8.7	7.4	7.2	6.9	7.4	8.3	8.5	8.1
	I	Btu/ft^2/day	1118	1346	1625	1875	1938	1737	1813	1701	1456	1309	1113	1015
	P_A	lb/in^2												
Orlando, FL	T_{AN}	°F	50.5	52.5	56.5	61.0	67.3	72.4	74.0	74.4	73.2	66.8	58.7	52.9
	T_{AX}	°F	70.7	72.8	77.2	81.7	87.2	89.5	90.8	90.5	88.3	83.4	77.0	71.8
	V	mi/hr	8.3	8.7	9.2	8.7	8.1	6.9	6.3	6.5	7.2	7.8	8.1	7.8
	I	Btu/ft^2/day	1043	1257	1588	1904	2021	1849	1854	1726	1506	1328	1096	944
	P_A	lb/in^2												
Pensacola, FL	T_{AN}	°F	43.5	46.0	52.0	58.6	67.0	73.3	75.2	74.8	71.1	61.1	51.0	44.6
	T_{AX}	°F	61.0	63.9	69.8	75.6	83.4	88.4	89.9	89.4	86.6	79.0	70.1	62.6
	V	mi/hr	8.7	8.7	9.2	9.2	8.3	7.2	6.5	6.3	7.2	7.4	7.8	8.1
	I	Btu/ft^2/day	890	1144	1504	1813	2038	2019	1911	1783	1594	1327	1040	830
	P_A	lb/in^2												
Tallahassee, FL	T_{AN}	°F	40.5	42.4	47.9	53.7	62.8	70.3	72.8	72.8	69.1	58.2	47.6	41.5
	T_{AX}	°F	63.6	66.8	73.3	79.4	86.7	90.1	91.6	90.9	87.9	80.9	72.0	64.7
	V	mi/hr	5.8	6.3	6.5	6.3	6.0	5.1	4.5	4.7	5.6	5.4	5.4	5.4
	I	Btu/ft^2/day	933	1195	1553	1904	2031	1925	1866	1764	1565	1327	1070	872
	P_A	lb/in^2												
Tampa, FL	T_{AN}	°F	52.3	54.1	58.5	63.5	70.2	74.8	76.2	76.2	74.6	68.2	59.9	54.3
	T_{AX}	°F	69.8	71.6	75.9	80.8	86.7	89.1	89.5	89.6	88.4	83.8	77.1	71.4

	V	mi/hr	7.2	7.4	8.1	7.8	7.2	6.5	5.6	5.6	6.3	6.7	6.9	6.7
	I	Btu/ft^2/day	1073	1294	1656	1991	2124	1962	1851	1732	1561	1394	1158	990
	P_A	lb/in^2												
Vero Beach, FL	T_{AN}	°F	52.7	54.2	58.2	62.3	68.5	72.6	73.9	73.9	73.9	69.6	62.0	56.4
	T_{AX}	°F	72.3	73.9	77.1	80.2	84.6	87.9	89.4	89.3	87.5	83.7	78.3	74.1
	V	mi/hr	8.5	8.7	9.6	9.6	8.9	7.6	6.7	6.7	7.4	8.5	8.5	8.1
	I	Btu/ft^2/day	1052	1300	1593	1906	2000	1848	1898	1752	1516	1318	1083	949
	P_A	lb/in^2												
West Palm Beach, FL	T_{AN}	°F	58.1	59.4	63.1	67.1	72.0	75.1	76.4	76.6	76.0	72.6	65.8	60.6
	T_{AX}	°F	74.0	75.6	78.4	81.2	85.3	87.8	89.2	89.3	87.6	84.4	79.4	75.5
	V	mi/hr	9.8	9.8	11.0	10.7	9.8	7.8	7.4	7.4	8.3	9.4	9.8	9.4
	I	Btu/ft^2/day	1105	1342	1635	1912	1999	1852	1936	1789	1555	1352	1113	998
	P_A	lb/in^2												
Athens, GA	T_{AN}	°F	34.4	36.8	43.1	50.1	58.9	66.7	70.2	69.6	63.3	52.0	42.4	35.5
	T_{AX}	°F	53.2	56.8	64.8	72.9	80.2	86.7	89.8	88.6	82.7	73.1	63.5	54.5
	V	mi/hr	7.4	7.4	7.6	6.9	6.0	5.4	5.1	4.9	5.6	5.6	6.0	6.7
	I	Btu/ft^2/day	819	1062	1390	1764	1951	1978	1946	1760	1487	1211	915	743
	P_A	lb/in^2												
Atlanta, GA	T_{AN}	°F	35.5	38.2	44.8	52.3	61.2	68.5	71.7	71.3	65.4	54.4	44.2	37.1
	T_{AX}	°F	52.8	56.5	64.1	72.2	79.5	85.5	88.4	87.6	81.9	72.4	62.7	53.9
	V	mi/hr	9.4	9.4	9.6	8.7	7.8	7.4	6.9	6.7	7.6	7.8	8.1	8.9
	I	Btu/ft^2/day	801	1046	1379	1747	1925	1949	1925	1739	1477	1201	896	718
	P_A	lb/in^2												
Augusta, GA	T_{AN}	°F	34.7	36.7	43.0	49.6	58.6	67.2	70.5	70.0	63.7	51.9	41.8	35.3
	T_{AX}	°F	57.7	61.1	68.7	76.4	83.8	89.2	91.8	90.6	85.5	76.6	67.6	58.9
	V	mi/hr	6.0	6.3	6.7	6.3	5.6	4.9	4.7	4.0	4.7	4.5	4.9	5.4
	I	Btu/ft^2/day	836	1084	1432	1806	1995	1979	1965	1782	1509	1214	935	775
	P_A	lb/in^2												
Columbus, GA	T_{AN}	°F	38.0	40.4	46.6	53.5	62.9	70.1	73.2	72.7	67.3	56.2	45.9	39.1
	T_{AX}	°F	57.4	61.2	68.7	76.0	83.4	88.5	91.3	90.4	85.5	76.4	67.2	58.4
	V	mi/hr	6.5	6.7	7.2	6.7	6.3	5.6	5.6	5.1	6.0	5.6	5.6	6.0
	I	Btu/ft^2/day	823	1079	1409	1773	1936	1936	1936	1718	1491	1211	949	753
	P_A	lb/in^2												
Macon, GA	T_{AN}	°F	36.3	38.6	44.8	51.0	60.1	68.3	71.6	70.8	64.7	53.0	43.0	36.8
	T_{AX}	°F	57.8	61.3	68.8	76.1	83.9	89.0	91.7	90.5	85.5	76.6	67.6	58.9

	V	mi/hr	6.7	6.7	6.9	6.5	6.0	5.4	4.9	4.7	5.4	5.1	5.4	6.0
	I	Btu/ft^2/day	852	1107	1460	1839	2026	1978	1981	1788	1523	1233	960	783
	P_A	lb/in^2												
Savannah, GA	T_{AN}	°F	40.0	42.0	48.3	54.5	62.9	70.4	73.3	73.0	68.6	58.1	47.9	41.3
	T_{AX}	°F	60.5	63.5	70.2	76.9	83.6	88.3	91.3	89.7	85.2	77.6	69.5	61.8
	V	mi/hr	7.2	7.4	7.8	7.4	6.7	6.3	5.6	5.6	6.5	6.3	6.0	6.5
	I	Btu/ft^2/day	876	1134	1484	1847	2015	1947	1981	1765	1477	1224	993	817
	P_A	lb/in^2												
Hilo, HI	T_{AN}	°F	64.1	64.0	65.1	65.9	67.2	68.5	69.5	70.0	69.4	68.8	67.5	65.6
	T_{AX}	°F	78.6	78.1	78.5	78.7	80.7	81.9	82.7	83.0	83.0	82.3	80.4	79.0
	V	mi/hr	6.7	7.2	7.2	6.9	6.7	6.5	6.5	6.3	6.3	6.3	6.3	6.5
	I	Btu/ft^2/day	1187	1316	1431	1617	1743	1820	1822	1748	1672	1413	1137	1076
	P_A	lb/in^2												
Honolulu, HI	T_{AN}	°F	67.1	67.3	68.5	70.3	71.8	74.3	75.3	76.0	75.1	74.2	72.1	69.5
	T_{AX}	°F	79.5	79.6	80.4	82.3	84.1	86.3	87.2	88.0	87.6	86.0	83.2	80.8
	V	mi/hr	8.7	9.2	10.3	11.2	10.3	12.1	12.1	12.1	10.5	10.1	9.6	9.4
	I	Btu/ft^2/day	1279	1511	1737	1995	2071	2155	2127	2075	1901	1595	1318	1177
	P_A	lb/in^2												
Kahului, HI	T_{AN}	°F	64.0	63.7	65.0	66.5	67.7	70.3	71.8	72.3	71.2	70.2	68.4	65.9
	T_{AX}	°F	79.7	79.7	80.3	81.6	83.9	85.5	86.3	87.0	87.0	86.0	83.1	80.9
	V	mi/hr	10.5	11.2	11.9	13.0	12.1	14.8	15.0	14.5	12.8	11.9	11.2	10.7
	I	Btu/ft^2/day	1335	1552	1727	1984	2126	2228	2164	2115	1932	1682	1377	1257
	P_A	lb/in^2												
Lihue, HI	T_{AN}	°F	66.0	66.3	67.4	69.3	71.0	73.7	74.6	75.2	74.7	73.7	71.3	68.7
	T_{AX}	°F	77.1	76.6	77.3	78.2	80.5	82.4	83.4	83.9	84.0	82.7	80.0	78.2
	V	mi/hr	11.9	12.5	13.2	14.3	12.8	14.3	14.8	14.3	13.0	13.0	13.2	12.8
	I	Btu/ft^2/day	1193	1375	1566	1755	1941	2022	1956	1918	1779	1427	1161	1036
	P_A	lb/in^2												
Boise, ID	T_{AN}	°F	26.2	29.0	34.5	39.3	47.2	53.9	61.5	60.5	52.2	41.3	31.9	26.2
	T_{AX}	°F	38.5	45.3	54.4	61.0	71.3	80.0	91.3	89.3	79.1	64.0	47.8	38.5
	V	mi/hr	6.9	7.6	8.7	8.7	8.3	8.1	7.6	7.4	7.2	7.2	6.9	7.4
	I	Btu/ft^2/day	492	831	1255	1705	2135	2360	2476	2163	1695	1102	580	427
	P_A	lb/in^2												
Lewiston, ID	T_{AN}	°F	30.7	32.4	36.4	41.2	48.1	54.1	61.3	60.3	52.4	42.0	34.7	29.9
	T_{AX}	°F	41.1	46.7	54.1	60.9	70.1	77.1	88.9	88.1	78.2	61.6	47.4	39.7

	V	mi/hr	6.0	5.6	6.0	6.0	5.6	5.6	5.6	5.4	4.7	4.7	5.4	6.0
	I	Btu/ft^2/day	407	698	1068	1497	1870	2063	2307	2003	1473	882	448	326
	P_A	lb/in^2												
Pocatello, ID	T_{AN}	°F	18.0	20.7	27.9	33.5	40.8	47.0	53.2	51.5	42.9	33.8	24.4	18.7
	T_{AX}	°F	33.4	38.1	49.0	57.4	67.9	76.7	87.9	86.8	76.0	60.7	44.5	33.8
	V	mi/hr	9.4	8.9	10.5	11.2	10.3	9.6	8.5	8.5	8.3	9.4	9.4	9.4
	I	Btu/ft^2/day	485	817	1292	1680	2084	2327	2398	2081	1634	1103	605	413
	P_A	lb/in^2												
Chicago, IL	T_{AN}	°F	17.7	21.4	29.8	39.8	49.3	59.3	64.9	64.0	55.3	44.2	33.3	22.3
	T_{AX}	°F	30.7	35.2	46.0	58.4	69.1	78.9	83.0	81.0	74.2	61.8	47.7	34.9
	V	mi/hr	11.0	10.7	11.0	11.2	9.8	8.5	8.3	7.8	8.3	9.6	10.5	10.3
	I	Btu/ft^2/day	487	755	1103	1453	1718	1939	1898	1621	1332	913	549	423
	P_A	lb/in^2												
Moline, IL	T_{AN}	°F	15.3	20.2	29.9	40.9	51.2	61.0	65.1	63.5	54.2	43.2	31.9	20.3
	T_{AX}	°F	30.5	35.8	48.7	62.1	72.3	81.6	84.5	82.8	76.2	63.8	48.7	34.9
	V	mi/hr	9.2	8.9	9.8	10.1	8.5	6.9	6.3	5.8	6.5	7.8	8.7	8.5
	I	Btu/ft^2/day	532	798	1181	1469	1756	1959	1949	1712	1400	946	593	456
	P_A	lb/in^2												
Peoria, IL	T_{AN}	°F	17.8	22.2	31.4	42.4	52.4	62.0	65.8	64.6	55.7	44.3	33.3	22.5
	T_{AX}	°F	32.1	37.8	50.0	62.6	72.3	81.4	84.5	83.0	76.5	64.1	49.7	36.4
	V	mi/hr	9.2	9.2	9.8	10.1	8.5	7.2	6.5	6.0	6.5	7.8	8.9	8.7
	I	Btu/ft^2/day	553	845	1179	1503	1746	1990	1982	1724	1444	983	608	475
	P_A	lb/in^2												
Rockford, IL	T_{AN}	°F	14.1	18.5	27.7	38.6	48.9	59.1	62.8	61.6	52.6	41.4	30.6	18.9
	T_{AX}	°F	28.3	33.4	45.7	59.4	70.1	79.5	82.5	81.0	74.2	61.7	46.5	32.8
	V	mi/hr	9.8	9.8	10.5	11.2	9.6	7.8	7.2	6.7	7.4	8.9	9.8	9.4
	I	Btu/ft^2/day	483	766	1123	1442	1700	1933	1881	1647	1337	902	545	401
	P_A	lb/in^2												
Springfield, IL	T_{AN}	°F	19.9	24.2	32.9	43.4	53.8	62.7	65.6	64.5	55.0	44.6	34.6	24.4
	T_{AX}	°F	34.3	40.2	51.7	64.3	73.9	82.1	85.0	84.1	78.2	66.1	51.7	38.7
	V	mi/hr	10.7	10.7	11.2	11.4	9.4	7.6	6.5	6.3	6.7	8.7	10.5	10.3
	I	Btu/ft^2/day	561	862	1179	1513	1747	1983	2017	1766	1459	1035	641	501
	P_A	lb/in^2												
Evansville, IN	T_{AN}	°F	25.9	28.6	36.3	46.3	56.2	65.2	68.6	66.8	58.1	47.1	37.4	28.8
	T_{AX}	°F	40.7	45.6	55.6	67.2	76.0	84.4	87.2	87.3	80.6	69.2	55.5	43.8

	V	mi/hr	8.3	8.3	8.3	8.5	6.9	6.0	5.6	5.1	5.4	6.0	7.4	7.6
	I	Btu/ft^2/day	598	880	1173	1574	1796	2005	1994	1850	1484	1097	693	525
	P_A	lb/in^2												
Fort Wayne, IN	T_{AN}	°F	18.6	21.5	29.6	40.0	50.0	60.4	63.2	61.6	53.1	42.9	33.5	23.5
	T_{AX}	°F	32.0	36.2	47.4	60.7	70.9	80.1	83.2	81.3	75.5	63.1	49.0	36.1
	V	mi/hr	11.0	10.5	10.5	10.7	9.4	7.6	6.9	6.3	6.9	8.5	9.8	10.3
	I	Btu/ft^2/day	490	750	1131	1458	1709	1923	1944	1677	1371	935	560	420
	P_A	lb/in^2												
Indianapolis, IN	T_{AN}	°F	21.5	24.7	33.3	43.8	53.5	63.1	66.2	65.5	57.2	45.7	35.7	25.9
	T_{AX}	°F	35.6	40.2	51.2	63.3	72.3	81.1	84.1	83.6	77.3	65.1	51.6	39.3
	V	mi/hr	11.0	11.0	11.0	11.4	9.6	8.3	7.8	7.4	7.8	8.9	10.3	10.5
	I	Btu/ft^2/day	550	815	1165	1486	1757	1958	1934	1739	1441	1012	615	472
	P_A	lb/in^2												
South Bend, IN	T_{AN}	°F	18.6	21.4	28.9	39.2	49.2	59.4	63.3	62.2	54.0	43.4	33.5	23.6
	T_{AX}	°F	31.3	35.4	46.5	59.5	69.6	79.1	82.3	80.5	73.9	61.7	47.8	35.5
	V	mi/hr	10.7	10.3	10.3	10.5	9.2	7.6	7.4	6.7	7.2	8.5	9.6	10.1
	I	Btu/ft^2/day	433	698	1130	1471	1729	1935	1898	1646	1335	889	518	389
	P_A	lb/in^2												
Des Moines, IA	T_{AN}	°F	14.1	19.3	29.6	41.3	52.4	62.4	66.6	64.9	55.1	43.6	30.9	19.3
	T_{AX}	°F	29.6	35.5	48.0	61.3	71.2	80.5	84.3	82.7	75.5	62.9	47.4	34.5
	V	mi/hr	10.3	10.1	11.0	11.2	10.1	8.7	8.1	7.6	8.5	9.6	10.3	9.8
	I	Btu/ft^2/day	545	817	1181	1507	1782	1979	1995	1762	1435	986	613	482
	P_A	lb/in^2												
Dubuque, IA	T_{AN}	°F	11.8	16.7	27.0	38.4	49.0	58.9	62.3	60.9	52.1	40.7	29.2	17.0
	T_{AX}	°F	26.0	31.1	43.6	57.6	68.4	77.6	80.4	78.9	71.9	59.5	44.3	30.6
	V	mi/hr	11.0	11.0	11.4	11.9	10.1	8.5	7.6	7.2	8.3	10.1	11.0	10.5
	I	Btu/ft^2/day	503	764	1135	1476	1718	1933	1904	1668	1348	903	551	422
	P_A	lb/in^2												
Mason City, IA	T_{AN}	°F	7.8	12.9	24.1	35.7	47.4	57.7	61.0	58.6	48.9	37.7	25.5	13.5
	T_{AX}	°F	23.6	29.0	41.6	57.7	68.9	78.5	81.6	79.4	72.9	59.8	42.9	28.7
	V	mi/hr	12.3	12.3	12.5	13.2	12.3	10.3	8.7	7.8	9.2	11.0	11.9	11.9
	I	Btu/ft^2/day	469	722	1111	1479	1707	1902	1944	1678	1308	878	538	388
	P_A	lb/in^2												
Sioux City, IA	T_{AN}	°F	11.0	16.5	26.3	37.9	49.7	59.7	63.9	61.6	51.2	39.2	26.2	15.3
	T_{AX}	°F	28.9	34.7	46.7	61.1	72.2	81.2	84.4	82.6	76.0	63.0	46.2	32.7

	V	mi/hr	11.0	11.0	11.4	12.5	11.6	9.6	8.3	7.8	9.2	10.1	10.7	10.7
	I	Btu/ft^2/day	522	787	1178	1532	1774	2010	2046	1787	1418	982	624	468
	P_A	lb/in^2												
Waterloo, IA	T_{AN}	°F	9.7	15.3	26.2	37.7	49.4	59.7	62.8	60.4	51.0	39.6	27.4	15.3
	T_{AX}	°F	26.3	31.5	44.6	59.6	70.6	80.0	82.7	80.8	74.7	61.5	45.3	31.2
	V	mi/hr	10.5	10.7	11.2	11.9	10.5	8.7	7.6	7.2	8.1	9.6	10.3	10.1
	I	Btu/ft^2/day	505	755	1131	1451	1722	1924	1952	1698	1357	909	554	418
	P_A	lb/in^2												
Concordia, KS	T_{AN}	°F	19.3	23.3	31.9	42.0	52.8	62.7	68.0	66.1	56.5	44.6	32.0	22.1
	T_{AX}	°F	37.6	43.2	53.9	64.0	73.7	84.3	89.7	87.9	79.3	66.8	51.6	40.0
	V	mi/hr	10.3	10.7	12.1	12.8	11.2	10.7	10.1	9.4	10.5	10.7	11.0	10.3
	I	Btu/ft^2/day	701	948	1319	1647	1881	2123	2140	1916	1544	1128	772	608
	P_A	lb/in^2												
Dodge City, KS	T_{AN}	°F	20.8	24.4	31.6	40.9	52.1	61.4	66.7	65.4	56.1	43.7	30.7	22.6
	T_{AX}	°F	43.6	48.3	57.2	66.7	76.6	86.0	91.9	89.7	81.5	69.2	55.1	44.6
	V	mi/hr	12.1	12.8	14.1	14.8	13.6	13.2	12.1	11.4	12.8	12.8	12.5	12.1
	I	Btu/ft^2/day	816	1068	1439	1786	2049	2230	2272	1980	1636	1239	889	740
	P_A	lb/in^2												
Goodland, KS	T_{AN}	°F	17.7	20.4	27.1	35.3	46.3	56.3	62.0	60.5	50.6	38.1	26.5	18.8
	T_{AX}	°F	41.8	45.4	54.4	62.7	72.9	83.2	89.2	86.3	78.5	65.6	51.7	42.9
	V	mi/hr	11.6	12.1	13.2	13.9	13.0	12.3	11.0	10.5	11.4	11.9	11.6	11.6
	I	Btu/ft^2/day	785	1014	1426	1762	2007	2274	2301	2013	1646	1216	826	681
	P_A	lb/in^2												
Russell, KS	T_{AN}	°F	18.8	22.8	31.4	40.9	52.3	62.4	67.6	66.3	56.5	43.7	30.5	21.3
	T_{AX}	°F	40.7	45.6	55.6	65.2	75.1	85.6	91.6	89.1	80.7	68.3	53.9	42.3
	V	mi/hr	11.4	12.1	13.4	14.3	12.8	12.5	11.9	11.2	12.3	12.8	12.3	11.6
	I	Btu/ft^2/day	739	986	1343	1669	1944	2144	2176	1927	1571	1153	818	655
	P_A	lb/in^2												
Topeka, KS	T_{AN}	°F	20.3	25.1	33.7	44.3	55.0	64.6	69.3	67.4	57.0	45.8	33.8	24.0
	T_{AX}	°F	39.0	45.3	55.7	65.9	75.4	83.9	89.0	88.5	79.6	68.1	53.9	42.3
	V	mi/hr	8.1	8.3	9.6	9.8	8.3	7.6	6.7	6.0	6.7	7.4	8.1	7.6
	I	Btu/ft^2/day	679	944	1277	1574	1809	2027	2069	1864	1497	1102	733	598
	P_A	lb/in^2												
Wichita, KS	T_{AN}	°F	23.1	27.4	35.7	45.2	56.2	65.5	70.3	69.3	60.0	47.7	35.5	25.8
	T_{AX}	°F	42.2	48.5	57.3	67.0	76.3	85.8	91.3	90.4	81.7	69.6	55.7	44.0

	V	mi/hr	11.0	11.4	12.8	13.4	11.6	11.6	10.7	10.1	10.7	11.2	11.4	10.7
	I	Btu/ft^2/day	763	1050	1345	1701	1930	2132	2179	1961	1567	1173	831	666
	P_A	lb/in^2												
Cincinnati, KY	T_{AN}	°F	23.8	26.2	34.1	44.3	53.7	62.5	66.1	65.4	57.4	45.9	36.2	27.4
	T_{AX}	°F	38.3	42.3	52.2	64.2	72.9	81.2	84.4	84.2	77.5	65.6	52.9	41.4
	V	mi/hr	9.4	9.6	9.8	9.6	7.8	6.9	6.5	6.3	6.7	7.4	8.7	8.9
	I	Btu/ft^2/day	553	832	1167	1532	1782	1956	1937	1768	1439	1027	644	487
	P_A	lb/in^2												
Jackson, KY	T_{AN}	°F	27.9	30.5	37.8	47.7	55.4	63.1	66.6	65.7	58.9	48.7	39.6	31.4
	T_{AX}	°F	43.1	46.9	56.2	67.4	73.7	80.4	83.2	83.4	77.3	67.4	55.9	46.2
	V	mi/hr	6.0	6.0	6.3	6.3	4.5	3.6	3.4	3.1	3.8	4.3	5.4	5.6
	I	Btu/ft^2/day	591	831	1165	1534	1745	1909	1882	1752	1416	1060	708	539
	P_A	lb/in^2												
Lexington, KY	T_{AN}	°F	25.9	28.5	35.9	45.6	55.0	63.4	66.9	65.8	58.3	47.1	37.4	28.9
	T_{AX}	°F	40.8	44.8	54.2	65.4	73.6	81.8	84.9	84.9	78.3	66.9	54.4	43.5
	V	mi/hr	9.4	9.2	9.2	9.2	7.6	6.5	6.0	5.8	6.3	7.2	8.3	8.7
	I	Btu/ft^2/day	571	841	1177	1572	1814	1963	1925	1782	1444	1079	688	517
	P_A	lb/in^2												
Louisville, KY	T_{AN}	°F	27.7	30.5	38.2	48.2	57.8	66.8	70.3	69.4	61.2	49.7	39.7	30.9
	T_{AX}	°F	42.3	46.8	56.6	67.9	76.0	84.1	87.3	87.4	80.6	69.2	56.6	44.9
	V	mi/hr	8.9	8.9	8.9	8.9	7.6	6.9	6.7	6.3	6.3	6.7	7.8	8.1
	I	Btu/ft^2/day	595	895	1206	1563	1816	1982	1963	1811	1471	1073	692	520
	P_A	lb/in^2												
Paducah, KY	T_{AN}	°F	27.4	30.6	38.3	47.8	57.2	65.7	69.1	66.8	58.2	47.5	38.2	30.0
	T_{AX}	°F	43.4	48.5	58.3	69.0	77.5	85.4	88.3	88.2	81.5	70.6	57.3	46.0
	V	mi/hr	8.3	8.3	8.9	8.5	6.9	5.8	5.4	4.7	5.1	6.0	7.4	7.8
	I	Btu/ft^2/day	630	893	1224	1607	1820	2017	2031	1888	1494	1121	726	556
	P_A	lb/in^2												
Baton Rouge, LA	T_{AN}	°F	42.2	44.5	50.5	56.9	65.5	71.4	73.9	73.2	68.6	58.1	48.2	42.8
	T_{AX}	°F	61.6	65.2	71.4	78.0	85.0	89.4	90.9	91.3	87.6	79.7	70.1	63.1
	V	mi/hr	7.2	7.4	7.4	7.4	6.5	5.4	4.9	4.5	5.1	5.4	5.8	6.5
	I	Btu/ft^2/day	822	1075	1375	1736	1894	1914	1896	1813	1553	1291	983	784
	P_A	lb/in^2												
Lake Charles, LA	T_{AN}	°F	43.4	46.1	52.1	59.0	67.5	73.4	75.4	74.6	69.9	60.3	50.5	44.6
	T_{AX}	°F	61.4	64.7	70.8	77.2	84.2	89.0	90.6	91.2	87.8	80.3	70.5	63.3

	V	mi/hr	8.7	8.9	8.9	8.7	7.4	6.3	5.4	5.1	6.5	7.2	7.6	8.5
	I	Btu/ft^2/day	833	1046	1395	1727	1920	1977	1930	1825	1575	1321	987	786
	P_A	lb/in^2												
New Orleans, LA	T_{AN}	°F	45.7	48.1	53.8	60.5	68.6	73.9	75.7	75.6	72.7	63.4	52.9	46.9
	T_{AX}	°F	61.8	65.1	70.9	77.5	84.7	88.9	90.6	90.4	87.0	79.5	70.5	63.6
	V	mi/hr	9.2	9.2	9.4	9.4	8.1	6.5	5.8	5.8	7.4	8.1	8.1	8.7
	I	Btu/ft^2/day	873	1114	1454	1798	1964	1928	1856	1791	1570	1328	1038	827
	P_A	lb/in^2												
Shreveport, LA	T_{AN}	°F	38.2	41.3	47.8	54.9	64.3	70.9	74.0	73.4	67.2	56.1	46.0	39.2
	T_{AX}	°F	57.2	61.4	68.5	76.1	83.3	89.6	92.9	93.3	87.6	77.8	66.5	58.4
	V	mi/hr	8.3	8.3	8.9	8.7	7.6	6.5	6.0	5.4	6.3	6.3	7.2	7.8
	I	Btu/ft^2/day	783	1001	1342	1709	1837	2007	2049	1915	1575	1251	884	732
	P_A	lb/in^2												
Bangor, ME	T_{AN}	°F	8.5	11.1	21.7	32.9	43.3	53.3	58.8	57.1	48.7	37.8	29.5	17.3
	T_{AX}	°F	27.0	30.5	39.7	52.7	64.9	74.4	79.1	78.3	69.7	56.8	45.1	33.8
	V	mi/hr	7.8	8.1	8.9	8.9	8.1	7.2	6.7	6.3	6.9	7.8	7.6	7.6
	I	Btu/ft^2/day	496	752	1059	1410	1639	1762	1751	1585	1227	792	491	411
	P_A	lb/in^2												
Caribou, ME	T_{AN}	°F	1.7	4.4	15.9	29.6	40.9	50.6	55.9	53.4	45.3	35.2	25.5	12.1
	T_{AX}	°F	19.0	22.9	33.5	46.8	61.6	71.2	75.1	73.9	65.4	51.4	38.5	26.5
	V	mi/hr	7.8	8.3	8.7	8.5	7.6	6.7	6.0	5.8	6.5	7.6	7.6	8.1
	I	Btu/ft^2/day	428	674	1034	1390	1684	1800	1703	1542	1136	689	424	353
	P_A	lb/in^2												
Portland, ME	T_{AN}	°F	14.9	17.1	25.8	35.3	44.8	54.8	60.2	59.2	51.5	40.0	31.9	21.9
	T_{AX}	°F	30.8	33.7	41.3	52.8	62.8	72.6	77.7	77.2	69.4	57.9	47.4	37.2
	V	mi/hr	8.1	8.5	9.2	9.2	8.1	7.2	6.7	6.5	6.9	7.6	7.6	8.1
	I	Btu/ft^2/day	530	803	1111	1471	1714	1838	1844	1688	1295	879	552	458
	P_A	lb/in^2												
Baltimore, MD	T_{AN}	°F	26.6	27.4	34.8	44.3	53.2	63.1	68.0	66.6	59.1	46.6	37.7	29.6
	T_{AX}	°F	42.2	44.7	53.5	65.1	73.9	82.8	86.9	85.3	78.0	66.7	56.2	45.5
	V	mi/hr	7.8	8.3	8.7	8.3	7.2	6.5	6.0	5.6	6.3	6.3	6.9	7.4
	I	Btu/ft^2/day	653	929	1231	1555	1774	1918	1866	1681	1350	1036	709	580
	P_A	lb/in^2												
Boston, MA	T_{AN}	°F	23.1	25.0	31.7	41.2	50.4	60.3	66.0	65.2	58.2	47.2	38.6	29.1
	T_{AX}	°F	36.2	38.3	45.1	55.8	65.7	75.8	80.8	79.3	72.1	61.3	51.1	41.4

	V	mi/hr	12.5	12.8	13.0	12.1	11.2	10.3	10.1	9.8	10.5	11.2	11.4	12.5
	I	Btu/ft^2/day	558	833	1113	1461	1703	1811	1830	1657	1284	913	576	475
	P_A	lb/in^2												
Worchester, MA	T_{AN}	°F	17.7	19.6	26.9	37.5	47.2	56.9	62.0	61.1	53.7	42.4	33.8	23.8
	T_{AX}	°F	31.2	34.0	42.2	55.0	65.2	73.5	77.9	76.7	68.9	57.8	47.3	36.6
	V	mi/hr	11.4	11.9	11.4	10.7	10.1	9.2	8.9	8.5	8.9	10.1	10.5	11.6
	I	Btu/ft^2/day	567	821	1123	1454	1675	1764	1848	1619	1276	903	584	477
	P_A	lb/in^2												
Alpena, MI	T_{AN}	°F	12.7	12.1	19.8	31.5	41.4	51.3	56.1	54.7	47.4	37.7	29.3	19.4
	T_{AX}	°F	26.9	29.1	38.3	51.6	63.9	74.3	78.0	76.8	69.1	56.1	43.1	32.3
	V	mi/hr	8.3	8.3	8.3	8.7	7.8	6.5	6.3	6.0	6.7	7.4	7.8	7.8
	I	Btu/ft^2/day	401	653	1103	1457	1771	1948	1896	1632	1232	752	439	346
	P_A	lb/in^2												
Detroit Metro AP, MI	T_{AN}	°F	19.6	21.6	28.8	39.9	49.9	60.5	64.1	63.4	55.2	44.0	34.6	24.9
	T_{AX}	°F	31.9	34.9	45.4	58.7	69.1	78.9	82.3	80.7	73.7	61.4	48.1	36.1
	V	mi/hr	11.0	10.3	10.1	10.3	8.9	8.1	8.1	7.2	7.6	9.2	10.1	10.3
	I	Btu/ft^2/day	479	755	1117	1442	1738	1922	1896	1620	1332	861	510	400
	P_A	lb/in^2												
Detroit - City, MI	T_{AN}	°F	20.9	22.5	29.3	40.1	50.3	61.1	65.5	64.6	56.6	45.4	35.8	26.1
	T_{AX}	°F	32.3	35.3	45.0	58.1	68.9	79.0	82.8	81.0	73.8	61.2	48.1	36.5
	V	mi/hr	10.1	9.8	9.6	9.8	8.7	7.6	7.6	6.9	7.4	8.5	9.2	9.6
	I	Btu/ft^2/day	469	746	1120	1437	1711	1884	1850	1585	1316	870	507	409
	P_A	lb/in^2												
Flint, MI	T_{AN}	°F	16.7	18.2	25.7	36.6	46.6	56.9	60.0	59.1	50.8	40.8	32.0	22.3
	T_{AX}	°F	29.8	33.0	43.4	57.1	68.1	77.9	81.1	79.4	72.4	59.7	46.5	34.4
	V	mi/hr	10.3	10.3	10.3	10.5	9.2	7.6	7.4	6.9	7.6	8.9	9.6	9.6
	I	Btu/ft^2/day	440	713	1104	1474	1747	1947	1921	1635	1309	839	491	394
	P_A	lb/in^2												
Grand Rapids, MI	T_{AN}	°F	18.2	19.7	26.7	37.5	47.8	58.0	61.7	60.8	52.4	41.8	32.6	23.7
	T_{AX}	°F	29.8	32.8	43.4	57.2	68.2	77.9	81.1	79.4	72.2	59.5	46.1	34.4
	V	mi/hr	11.0	10.5	10.5	11.0	9.8	8.3	8.1	7.4	7.8	9.4	10.1	10.3
	I	Btu/ft^2/day	405	684	1109	1461	1746	1943	1913	1635	1306	819	487	367
	P_A	lb/in^2												
Houghton Lake, MI	T_{AN}	°F	12.3	12.3	20.3	32.1	42.9	52.2	55.7	54.2	46.6	37.7	29.0	19.2
	T_{AX}	°F	26.1	29.1	39.7	53.5	65.5	75.5	78.6	76.9	69.1	55.8	42.3	31.0

	V	mi/hr	8.7	8.3	8.3	9.2	8.3	6.9	6.7	6.5	6.9	8.1	8.7	8.7
	I	Btu/ft^2/day	401	646	1089	1462	1708	1894	1874	1593	1219	763	439	363
	P_A	lb/in^2												
Lansing, MI	T_{AN}	°F	16.5	17.9	25.4	36.2	46.2	56.4	59.5	58.7	50.3	40.4	31.7	22.1
	T_{AX}	°F	29.8	32.9	43.6	57.3	67.9	77.7	81.0	79.2	72.3	59.6	46.3	34.3
	V	mi/hr	10.3	10.1	9.8	10.1	8.9	7.6	7.4	6.7	7.2	8.7	9.6	10.1
	I	Btu/ft^2/day	459	729	1109	1441	1707	1905	1863	1595	1303	833	494	398
	P_A	lb/in^2												
Muskegon, MI	T_{AN}	°F	20.2	20.8	26.7	37.0	46.7	56.7	61.3	60.8	52.4	42.6	33.7	25.2
	T_{AX}	°F	30.6	33.1	42.5	55.2	65.9	75.3	78.9	77.9	70.9	58.5	45.9	35.2
	V	mi/hr	11.2	10.7	10.3	10.7	9.4	8.3	8.1	7.8	8.3	9.8	11.0	11.0
	I	Btu/ft^2/day	391	659	1102	1479	1775	1986	1962	1671	1290	809	451	339
	P_A	lb/in^2												
Sault Ste Marie, MI	T_{AN}	°F	8.1	9.5	18.2	30.9	40.9	49.8	54.8	55.0	48.4	38.3	28.5	17.0
	T_{AX}	°F	22.2	25.2	34.2	47.8	61.1	70.8	74.2	73.8	65.8	52.4	39.6	29.0
	V	mi/hr	7.8	7.8	8.1	8.7	8.5	7.2	6.9	6.7	7.2	7.8	8.5	8.1
	I	Btu/ft^2/day	357	617	1042	1473	1794	1962	1837	1611	1128	677	378	291
	P_A	lb/in^2												
Traverse City, MI	T_{AN}	°F	17.0	16.5	23.3	33.3	43.2	54.2	58.7	58.2	51.0	40.9	31.7	22.8
	T_{AX}	°F	28.3	30.6	40.3	53.7	65.6	75.9	79.4	78.0	70.4	57.5	44.3	33.4
	V	mi/hr	8.3	8.3	7.6	8.1	6.9	6.3	6.5	6.0	6.5	7.6	8.1	7.8
	I	Btu/ft^2/day	403	648	1101	1462	1756	1921	1874	1619	1210	725	405	339
	P_A	lb/in^2												
Duluth, MN	T_{AN}	°F	2.6	7.1	18.2	30.7	41.4	50.6	55.9	55.4	47.2	35.7	23.0	9.4
	T_{AX}	°F	18.5	23.9	34.3	48.0	61.0	69.8	74.7	73.6	64.7	51.0	35.6	23.0
	V	mi/hr	10.5	10.3	10.5	11.0	10.7	9.4	8.7	8.7	9.6	10.5	10.7	10.3
	I	Btu/ft^2/day	461	707	1083	1499	1770	1844	1899	1627	1179	724	441	365
	P_A	lb/in^2												
International Falls, MN	T_{AN}	°F	-4.5	0.3	13.7	28.4	39.8	50.0	53.4	51.8	43.2	32.5	19.4	3.7
	T_{AX}	°F	15.0	21.9	34.5	50.4	63.3	72.4	76.2	75.0	65.4	50.6	33.8	20.0
	V	mi/hr	7.8	7.8	8.5	8.5	8.7	7.6	6.9	6.7	7.6	8.3	8.3	7.6
	I	Btu/ft^2/day	402	667	1041	1501	1708	1788	1807	1574	1102	657	375	300
	P_A	lb/in^2												
Minneapolis-St Paul, MN	T_{AN}	°F	8.3	13.6	24.6	37.9	49.6	59.7	64.5	62.5	53.3	40.9	27.5	14.4
	T_{AX}	°F	22.8	28.5	40.6	56.7	68.3	77.8	81.9	79.8	71.5	57.8	41.0	27.7

	V	mi/hr	9.4	9.4	9.8	10.7	10.3	9.2	8.5	8.3	9.2	9.8	9.6	9.2
	I	Btu/ft^2/day	490	752	1116	1476	1712	1856	1930	1655	1265	814	501	389
	P_A	lb/in^2												
Rochester,MN	T_{AN}	°F	7.3	12.2	23.6	36.0	47.4	57.5	60.7	58.8	50.1	38.6	26.2	13.3
	T_{AX}	°F	21.8	26.8	39.1	55.3	67.0	76.4	79.0	77.0	70.3	57.4	40.7	27.1
	V	mi/hr	13.0	13.0	13.0	13.4	12.8	10.7	9.6	8.9	10.3	11.6	12.8	13.0
	I	Btu/ft^2/day	474	708	1106	1489	1709	1891	1955	1664	1286	848	513	384
	P_A	lb/in^2												
St Cloud, MN	T_{AN}	°F	2.8	7.8	20.1	33.1	44.5	54.8	58.6	56.5	47.6	35.9	23.1	9.6
	T_{AX}	°F	20.4	26.3	38.2	55.0	67.6	76.4	80.7	78.8	70.3	56.2	38.9	25.4
	V	mi/hr	8.3	8.3	8.7	9.4	9.2	7.8	6.7	6.5	7.4	8.5	8.5	8.3
	I	Btu/ft^2/day	453	700	1094	1527	1754	1906	1967	1669	1259	802	481	367
	P_A	lb/in^2												
Jackson, MS	T_{AN}	°F	37.0	39.3	45.9	53.3	62.5	69.2	72.1	71.4	65.5	53.9	43.9	37.9
	T_{AX}	°F	56.5	60.8	68.1	75.7	83.0	89.0	91.1	91.2	86.5	77.1	66.3	58.1
	V	mi/hr	6.7	6.9	7.2	6.7	5.6	4.7	4.0	4.0	5.1	5.1	5.4	6.3
	I	Btu/ft^2/day	783	1039	1369	1762	1929	2025	1969	1849	1576	1262	922	726
	P_A	lb/in^2												
Meridian, MS	T_{AN}	°F	35.8	38.1	44.5	51.5	60.8	67.8	70.8	70.2	64.2	52.5	42.5	36.9
	T_{AX}	°F	57.1	61.4	68.8	76.2	83.4	88.8	91.4	91.1	86.5	77.3	66.9	58.5
	V	mi/hr	6.9	7.2	7.4	6.9	5.8	4.9	4.5	4.3	5.1	5.1	5.6	6.3
	I	Btu/ft^2/day	783	1044	1380	1726	1918	1989	1945	1823	1544	1252	924	727
	P_A	lb/in^2												
Tupelo, MS	T_{AN}	°F	33.2	35.9	43.0	51.0	60.2	68.1	71.5	70.6	63.4	51.6	42.0	34.8
	T_{AX}	°F	51.3	55.8	64.3	73.0	80.6	87.4	90.1	90.1	84.2	74.2	62.9	52.8
	V	mi/hr	7.6	7.8	8.1	7.6	6.3	5.4	4.7	4.7	5.6	5.6	6.0	6.9
	I	Btu/ft^2/day	730	964	1309	1682	1912	2026	1990	1849	1536	1201	832	648
	P_A	lb/in^2												
Columbia, MO	T_{AN}	°F	21.4	26.0	34.2	44.8	54.6	63.3	67.3	65.9	56.7	46.0	35.4	25.3
	T_{AX}	°F	37.6	43.9	54.5	65.4	74.0	82.2	86.6	86.5	77.8	66.7	53.2	41.4
	V	mi/hr	10.3	10.5	11.2	11.2	9.2	8.1	7.4	7.2	7.8	9.2	10.1	10.1
	I	Btu/ft^2/day	629	886	1251	1575	1808	2033	2027	1823	1490	1070	690	556
	P_A	lb/in^2												
Kansas City, MO	T_{AN}	°F	20.4	25.2	33.9	44.9	55.1	64.3	68.8	67.5	57.6	46.8	34.9	24.5
	T_{AX}	°F	37.1	43.4	54.2	64.8	74.2	82.7	87.2	86.8	78.1	66.5	52.5	40.8

	V	mi/hr	10.7	10.7	11.9	12.3	10.3	9.6	8.7	8.5	9.2	10.3	10.7	10.5
	I	Btu/ft^2/day	641	929	1273	1566	1815	1999	2028	1823	1488	1074	701	566
	P_A	lb/in^2												
Springfield, MO	T_{AN}	°F	24.3	28.5	35.8	45.6	55.5	63.9	68.3	67.3	58.2	47.3	36.6	27.1
	T_{AX}	°F	42.3	48.2	56.8	66.6	74.5	82.9	87.4	87.9	79.2	68.4	55.7	44.8
	V	mi/hr	9.8	10.1	11.0	10.7	8.9	8.1	7.2	7.2	7.8	8.9	9.8	9.8
	I	Btu/ft^2/day	677	929	1242	1593	1783	1996	2030	1868	1494	1129	742	601
	P_A	lb/in^2												
St Louis - Lambert, MO	T_{AN}	°F	24.6	28.7	37.2	47.9	58.2	67.2	71.3	70.0	60.9	49.6	38.5	28.5
	T_{AX}	°F	39.2	45.1	55.5	67.0	75.7	84.3	88.1	87.3	79.4	68.2	54.7	42.8
	V	mi/hr	9.8	10.1	10.5	10.5	9.2	8.1	7.6	7.2	7.4	8.5	9.4	9.6
	I	Btu/ft^2/day	598	882	1217	1557	1765	2007	1978	1802	1471	1076	703	537
	P_A	lb/in^2												
St Louis - Spirit, MO	T_{AN}	°F	22.6	26.7	34.6	44.9	55.0	63.9	67.9	66.0	56.3	45.4	35.4	26.2
	T_{AX}	°F	39.6	45.5	56.3	67.5	75.8	84.1	88.0	87.2	79.4	68.6	55.3	43.3
	V	mi/hr	8.1	8.1	8.5	8.7	6.7	5.8	5.4	4.9	4.9	6.3	7.4	7.4
	I	Btu/ft^2/day	604	888	1226	1570	1763	2009	1992	1811	1467	1073	694	545
	P_A	lb/in^2												
Billings, MT	T_{AN}	°F	18.0	21.8	27.3	35.2	44.2	52.5	59.6	58.0	48.8	37.7	27.3	19.6
	T_{AX}	°F	34.9	40.1	48.0	56.1	66.4	75.1	85.7	84.8	73.0	58.1	44.8	35.3
	V	mi/hr	12.8	11.6	10.7	10.5	9.8	9.4	8.9	8.9	9.4	10.5	11.9	12.5
	I	Btu/ft^2/day	478	784	1148	1514	1883	2048	2221	1912	1424	903	544	398
	P_A	lb/in^2												
Glasgow, MT	T_{AN}	°F	3.8	9.8	20.6	32.3	42.2	51.5	57.4	56.3	45.6	32.9	19.9	8.3
	T_{AX}	°F	21.7	28.4	41.4	56.4	66.5	74.7	83.9	83.7	72.1	55.9	39.4	26.3
	V	mi/hr	9.4	9.4	11.0	12.1	12.1	11.0	10.1	10.7	10.3	10.3	9.6	9.4
	I	Btu/ft^2/day	366	628	1068	1545	1889	2051	2180	1872	1340	834	444	311
	P_A	lb/in^2												
Great Falls, MT	T_{AN}	°F	15.9	18.8	23.7	31.6	39.9	47.0	53.0	51.7	44.0	34.2	25.2	17.7
	T_{AX}	°F	34.1	38.1	45.2	53.9	63.7	71.1	82.7	81.5	70.5	56.5	42.7	35.0
	V	mi/hr	13.4	11.9	11.9	11.2	10.5	9.8	8.9	8.9	10.1	11.9	13.4	13.6
	I	Btu/ft^2/day	428	706	1106	1450	1806	2001	2163	1857	1360	840	465	358
	P_A	lb/in^2												
Harve City, MT	T_{AN}	°F	6.4	12.0	20.7	31.4	40.8	48.9	54.1	52.5	42.6	31.1	20.4	9.9
	T_{AX}	°F	26.6	33.1	43.8	56.9	66.4	74.0	84.3	83.5	72.0	57.3	41.6	30.6

	V	mi/hr	9.6	9.2	9.8	10.5	10.5	9.6	8.7	8.7	8.9	9.4	10.1	9.8
	I	Btu/ft^2/day	371	632	1091	1522	1828	2035	2166	1862	1333	826	435	318
	P_A	lb/in^2												
Helena, MT	T_{AN}	°F	13.5	18.4	24.9	32.8	41.8	49.0	55.3	53.0	44.4	33.5	23.1	14.5
	T_{AX}	°F	31.2	37.6	46.8	55.6	65.6	73.3	84.6	83.3	72.2	57.0	41.8	31.6
	V	mi/hr	5.6	6.0	7.4	8.3	8.1	7.8	7.2	6.5	6.3	6.5	6.0	5.6
	I	Btu/ft^2/day	456	767	1185	1513	1832	2048	2214	1898	1420	889	503	390
	P_A	lb/in^2												
Kalispell, MT	T_{AN}	°F	17.2	20.0	25.5	31.9	39.4	45.2	49.1	47.2	39.6	30.5	24.8	18.3
	T_{AX}	°F	30.2	35.6	44.4	54.4	64.0	70.0	80.7	80.3	69.5	53.9	39.1	30.0
	V	mi/hr	4.0	4.3	5.8	6.7	6.5	5.8	5.4	5.1	4.7	4.5	4.0	3.8
	I	Btu/ft^2/day	322	605	1031	1440	1761	1895	2166	1812	1300	742	377	259
	P_A	lb/in^2												
Missoula, MT	T_{AN}	°F	19.0	22.1	27.8	33.2	40.5	47.0	52.7	50.9	43.0	33.4	25.3	19.0
	T_{AX}	°F	31.5	37.6	48.0	55.9	65.6	72.4	84.7	83.5	72.2	56.0	39.9	30.8
	V	mi/hr	3.8	4.3	5.8	6.5	6.3	6.5	6.3	5.8	4.9	4.5	4.0	4.0
	I	Btu/ft^2/day	387	676	1088	1451	1787	1966	2229	1883	1385	820	428	315
	P_A	lb/in^2												
Grand Island, NE	T_{AN}	°F	14.9	19.4	28.0	38.4	50.2	60.0	65.1	63.2	52.8	40.4	27.6	18.3
	T_{AX}	°F	34.7	39.7	50.4	61.8	72.0	81.9	86.5	84.7	77.6	64.3	49.1	37.4
	V	mi/hr	11.0	11.4	12.5	13.4	12.1	10.7	9.2	8.9	10.5	11.2	11.2	11.0
	I	Btu/ft^2/day	637	908	1284	1619	1846	2102	2100	1855	1492	1080	711	554
	P_A	lb/in^2												
Lincoln, NE	T_{AN}	°F	14.3	19.3	28.4	39.5	51.1	61.6	66.5	64.2	53.6	41.4	28.4	18.1
	T_{AX}	°F	34.1	39.8	51.5	63.2	73.5	82.9	87.8	86.1	78.3	65.4	49.7	37.8
	V	mi/hr	8.9	9.6	11.0	11.9	10.5	9.6	8.7	8.3	9.2	9.6	9.4	8.9
	I	Btu/ft^2/day	591	872	1205	1555	1782	1994	2017	1784	1465	1030	663	521
	P_A	lb/in^2												
Norfolk, NE	T_{AN}	°F	13.0	18.0	26.9	38.1	49.2	59.4	64.1	62.2	52.0	39.7	26.7	16.8
	T_{AX}	°F	31.9	37.1	48.3	60.8	71.7	80.9	85.5	83.5	76.3	63.2	47.2	34.8
	V	mi/hr	10.5	11.0	11.6	12.5	11.2	9.8	8.9	8.7	9.8	10.3	10.5	10.5
	I	Btu/ft^2/day	566	836	1226	1556	1807	2036	2063	1794	1452	1012	647	507
	P_A	lb/in^2												
North Platte, NE	T_{AN}	°F	12.7	16.5	24.5	34.2	45.3	55.5	61.7	59.7	48.3	35.0	22.3	14.1
	T_{AX}	°F	38.7	43.0	52.1	60.8	71.1	80.7	87.2	85.1	77.3	63.7	49.9	40.0

	V	mi/hr	8.3	8.9	10.3	11.4	10.3	9.4	8.5	8.1	8.9	8.9	8.7	8.3
	I	Btu/ft^2/day	666	938	1324	1642	1899	2170	2191	1905	1546	1097	710	587
	P_A	lb/in^2												
Omaha, NE	T_{AN}	°F	14.2	19.5	28.8	40.7	52.0	62.1	67.0	64.8	54.6	42.7	29.8	18.9
	T_{AX}	°F	31.7	37.7	49.9	62.7	73.0	82.3	86.2	84.4	77.2	64.5	48.4	35.9
	V	mi/hr	10.1	10.3	11.2	11.9	10.5	9.4	8.3	8.1	8.9	9.6	10.1	9.8
	I	Btu/ft^2/day	582	852	1204	1512	1776	1992	2001	1749	1447	1007	646	506
	P_A	lb/in^2												
Scottsbluff, NE	T_{AN}	°F	14.8	17.7	24.6	32.6	43.5	52.9	59.1	57.1	46.2	33.7	22.5	14.9
	T_{AX}	°F	39.8	44.0	52.2	60.0	70.8	80.8	88.7	86.5	77.2	63.0	49.2	40.1
	V	mi/hr	9.6	10.3	11.0	11.4	11.0	9.8	8.5	8.3	8.3	9.2	9.4	9.4
	I	Btu/ft^2/day	672	923	1295	1647	1955	2180	2261	1963	1571	1089	715	559
	P_A	lb/in^2												
Valentine, NE	T_{AN}	°F	11.5	15.7	23.8	33.8	44.6	54.7	60.8	59.2	48.3	34.8	22.2	13.5
	T_{AX}	°F	35.5	39.5	48.6	58.8	69.9	79.4	87.3	86.1	76.7	62.0	47.4	37.2
	V	mi/hr	9.4	9.8	10.5	11.4	11.4	10.3	9.2	9.6	10.3	10.1	9.8	9.6
	I	Btu/ft^2/day	601	853	1215	1539	1862	2066	2187	1883	1496	1011	643	514
	P_A	lb/in^2												
Ely, NV	T_{AN}	°F	13.1	16.9	22.9	27.7	34.4	42.0	49.2	48.1	38.7	28.9	19.8	12.6
	T_{AX}	°F	38.9	41.6	49.8	56.0	67.0	77.7	86.9	84.6	75.6	62.1	48.1	38.8
	V	mi/hr	9.2	8.9	9.6	9.8	9.4	9.6	9.4	9.6	9.2	9.2	8.7	8.9
	I	Btu/ft^2/day	724	1006	1454	1843	2146	2418	2371	2173	1800	1303	875	669
	P_A	lb/in^2												
Las Vegas, NV	T_{AN}	°F	39.4	43.2	49.2	55.6	65.8	74.3	81.2	79.8	71.4	58.7	46.3	38.7
	T_{AX}	°F	57.6	61.9	69.8	77.1	88.2	97.7	103.7	101.8	94.0	80.2	66.0	56.3
	V	mi/hr	6.5	7.2	8.7	10.3	10.1	10.1	8.9	8.5	7.8	7.2	6.5	6.5
	I	Btu/ft^2/day	965	1244	1732	2164	2466	2628	2439	2202	1938	1479	1093	885
	P_A	lb/in^2												
Lovelock, NV	T_{AN}	°F	20.8	25.3	29.2	35.2	44.8	51.9	58.3	54.6	45.3	35.2	24.4	19.3
	T_{AX}	°F	43.4	50.5	59.3	64.7	75.4	84.8	95.4	92.8	83.9	69.3	53.9	43.4
	V	mi/hr	4.9	6.0	7.4	8.3	8.5	8.3	7.6	6.9	6.0	5.8	5.1	4.7
	I	Btu/ft^2/day	687	992	1414	1822	2189	2471	2533	2252	1833	1274	802	587
	P_A	lb/in^2												
Mercury, NV	T_{AN}	°F	35.1	38.2	42.8	48.2	57.9	66.2	73.7	72.4	64.0	52.0	41.1	34.2
	T_{AX}	°F	55.2	58.3	65.8	72.0	82.9	92.2	99.0	97.3	89.6	76.4	63.3	54.1

	V	mi/hr	8.3	8.5	9.2	10.3	9.8	10.1	9.2	9.2	8.3	8.1	8.1	8.1
	I	Btu/ft^2/day	937	1212	1714	2151	2464	2664	2527	2313	1977	1482	1077	860
	P_A	lb/in^2												
Reno, NV	T_{AN}	°F	25.1	28.6	32.8	37.0	45.5	52.3	59.2	56.7	48.7	39.0	30.0	25.1
	T_{AX}	°F	45.5	50.3	57.7	62.3	72.6	81.9	91.7	89.7	81.8	68.5	54.8	45.2
	V	mi/hr	4.7	5.6	6.9	8.3	7.8	7.6	7.2	6.5	5.4	4.7	4.9	5.1
	I	Btu/ft^2/day	715	992	1471	1889	2232	2473	2512	2249	1854	1310	859	633
	P_A	lb/in^2												
Tonopah, NV	T_{AN}	°F	21.9	25.6	29.9	34.9	44.2	52.3	58.8	56.8	49.1	38.4	27.5	20.2
	T_{AX}	°F	44.5	48.3	56.5	62.7	73.5	83.5	91.4	89.2	80.6	67.6	53.7	43.8
	V	mi/hr	8.9	9.6	10.7	11.6	10.7	10.3	9.2	9.2	8.9	9.4	9.2	8.7
	I	Btu/ft^2/day	828	1128	1629	2056	2344	2586	2507	2304	1922	1430	997	779
	P_A	lb/in^2												
Winnemucca, NV	T_{AN}	°F	20.5	24.4	27.5	31.4	39.4	46.3	53.5	49.9	40.7	30.5	23.1	18.8
	T_{AX}	°F	41.4	47.0	55.3	60.4	71.3	81.5	92.8	90.4	81.1	66.1	51.3	41.1
	V	mi/hr	7.2	7.6	8.1	8.3	8.3	8.3	7.6	7.4	6.9	6.7	6.7	7.2
	I	Btu/ft^2/day	652	964	1380	1762	2147	2437	2523	2232	1795	1248	760	555
	P_A	lb/in^2												
Concord, NH	T_{AN}	°F	12.3	14.6	23.2	33.2	43.2	53.8	58.5	57.1	48.4	36.8	29.0	18.8
	T_{AX}	°F	30.5	34.0	43.0	57.0	68.1	77.0	81.4	80.6	72.3	59.8	47.8	36.3
	V	mi/hr	6.7	7.4	7.4	7.2	6.3	5.6	5.1	4.7	4.9	5.6	5.6	6.5
	I	Btu/ft^2/day	535	803	1097	1469	1684	1801	1844	1644	1267	869	556	446
	P_A	lb/in^2												
Atlantic City, NJ	T_{AN}	°F	25.5	25.9	32.7	41.9	50.5	61.0	66.5	65.0	57.5	45.6	37.1	28.7
	T_{AX}	°F	42.4	44.0	51.4	62.0	71.0	79.9	84.8	83.4	76.9	66.2	55.9	46.1
	V	mi/hr	9.8	10.1	10.5	10.3	8.7	7.8	7.4	6.7	7.4	7.6	8.5	9.4
	I	Btu/ft^2/day	646	924	1224	1581	1800	1935	1927	1733	1394	1048	720	578
	P_A	lb/in^2												
Newark, NJ	T_{AN}	°F	26.3	27.7	34.8	44.8	54.1	64.3	69.5	68.6	60.9	49.0	40.3	31.0
	T_{AX}	°F	39.6	42.1	50.5	62.0	72.0	81.3	85.7	84.2	76.7	65.2	54.6	43.8
	V	mi/hr	11.0	11.2	11.2	10.5	9.6	9.2	8.9	8.5	8.9	9.4	9.8	10.7
	I	Btu/ft^2/day	602	887	1195	1502	1748	1854	1838	1629	1324	975	638	521
	P_A	lb/in^2												
Albuquerque, NM	T_{AN}	°F	27.6	31.4	36.4	43.7	53.8	62.3	67.1	65.4	58.6	46.7	35.0	27.5
	T_{AX}	°F	48.1	53.7	61.2	69.4	79.8	88.8	90.5	87.8	81.4	69.9	56.6	47.1

	V	mi/hr	7.2	7.8	8.7	9.8	9.4	8.9	7.8	7.4	7.4	7.4	7.2	6.7
	I	Btu/ft^2/day	1003	1270	1699	2126	2356	2479	2312	2082	1846	1469	1114	904
	P_A	lb/in^2												
Gallup, NM	T_{AN}	°F	14.9	19.5	22.7	28.4	37.5	45.1	54.3	53.3	43.8	30.9	19.9	13.8
	T_{AX}	°F	44.1	48.7	56.4	64.0	74.3	83.9	87.5	84.3	78.5	67.0	54.2	44.0
	V	mi/hr	5.4	6.5	7.8	9.4	8.7	8.1	6.7	5.8	5.8	6.0	5.6	5.1
	I	Btu/ft^2/day	930	1194	1654	2095	2350	2507	2187	1943	1806	1466	1072	825
	P_A	lb/in^2												
Roswell, NM	T_{AN}	°F	27.8	32.5	38.5	46.1	56.4	64.5	68.5	67.0	59.5	47.9	35.2	27.7
	T_{AX}	°F	55.6	61.3	68.4	77.0	86.1	93.7	93.9	91.9	86.0	76.0	64.0	55.3
	V	mi/hr	7.6	8.7	9.6	10.5	10.1	10.1	8.5	7.6	7.8	7.8	7.6	7.4
	I	Btu/ft^2/day	1013	1323	1744	2125	2301	2434	2302	2085	1822	1452	1127	939
	P_A	lb/in^2												
Albany, NY	T_{AN}	°F	16.1	18.1	26.4	37.7	47.7	57.9	62.0	60.9	52.7	40.8	32.5	22.4
	T_{AX}	°F	31.0	34.1	43.8	57.8	68.7	77.6	81.3	80.0	72.0	59.3	47.7	35.9
	V	mi/hr	8.5	8.9	9.4	9.2	7.8	6.9	6.7	5.8	6.3	7.2	7.8	8.5
	I	Btu/ft^2/day	532	789	1096	1496	1739	1853	1872	1640	1300	882	534	422
	P_A	lb/in^2												
Binghamton, NY	T_{AN}	°F	16.6	17.6	25.1	36.3	46.5	56.1	59.9	59.1	51.3	40.9	32.0	22.0
	T_{AX}	°F	29.2	31.7	40.5	54.1	65.2	73.6	77.1	76.2	68.4	56.4	44.8	33.5
	V	mi/hr	9.8	9.8	9.8	9.6	8.5	7.8	7.4	6.9	7.8	8.5	8.9	9.6
	I	Btu/ft^2/day	500	745	1056	1449	1722	1839	1818	1614	1224	833	498	406
	P_A	lb/in^2												
Buffalo, NY	T_{AN}	°F	19.3	19.7	26.5	37.2	47.9	58.4	62.6	61.7	54.2	43.7	34.7	24.9
	T_{AX}	°F	31.5	32.9	41.3	54.7	66.1	75.3	78.9	78.1	71.1	58.7	47.4	36.1
	V	mi/hr	12.1	11.6	10.7	10.5	9.8	8.9	8.9	8.1	8.7	9.6	10.5	11.4
	I	Btu/ft^2/day	447	730	1070	1453	1793	1939	1865	1643	1273	808	478	382
	P_A	lb/in^2												
Long Island, NY	T_{AN}	°F	24.7	25.3	31.8	41.1	50.1	60.7	66.5	65.6	58.1	46.1	38.0	29.4
	T_{AX}	°F	38.9	40.4	47.3	58.0	67.6	76.6	81.8	80.5	73.8	63.2	53.3	43.9
	V	mi/hr	10.1	10.3	10.5	10.1	8.9	8.3	7.8	7.4	8.1	8.5	9.2	9.8
	I	Btu/ft^2/day	591	878	1196	1527	1785	1896	1890	1694	1347	988	643	518
	P_A	lb/in^2												
Massena, NY	T_{AN}	°F	6.6	8.0	19.5	33.8	44.8	54.8	59.3	57.2	48.9	38.2	28.6	16.0
	T_{AX}	°F	24.3	27.4	37.9	53.7	66.9	75.7	79.4	78.1	70.1	56.5	44.2	31.3

	V	mi/hr	8.7	8.5	8.7	8.9	7.8	6.7	6.5	5.8	6.3	7.6	8.3	8.5
	I	Btu/ft^2/day	445	741	1072	1452	1753	1876	1865	1646	1236	764	449	348
	P_A	lb/in^2												
New York-LaGuardia, NY	T_{AN}	°F	28.3	29.4	35.9	45.7	55.1	65.4	71.0	70.5	63.7	52.4	43.3	33.6
	T_{AX}	°F	39.6	41.6	49.0	60.5	70.3	79.8	84.7	83.2	75.9	64.7	54.1	44.1
	V	mi/hr	12.8	12.8	12.8	11.6	10.7	10.1	9.6	9.4	10.3	10.7	11.6	12.5
	I	Btu/ft^2/day	583	863	1154	1499	1760	1878	1859	1636	1314	962	627	511
	P_A	lb/in^2												
New York-Kennedy, NY	T_{AN}	°F	27.1	28.1	34.6	43.9	53.0	63.1	68.9	68.3	61.5	50.1	41.2	32.0
	T_{AX}	°F	39.2	41.0	48.2	58.5	67.8	77.2	82.4	81.4	75.0	63.8	53.5	43.6
	V	mi/hr	12.5	12.8	12.8	11.9	10.5	10.1	9.8	9.4	9.8	10.7	11.4	12.8
	I	Btu/ft^2/day	588	861	1175	1516	1760	1898	1867	1661	1328	969	630	513
	P_A	lb/in^2												
Rochester, NY	T_{AN}	°F	18.7	19.3	26.4	37.2	47.0	57.1	61.2	60.3	52.7	42.4	33.7	24.4
	T_{AX}	°F	31.9	33.8	42.1	55.6	67.1	76.4	80.0	78.8	71.5	59.3	47.7	36.6
	V	mi/hr	10.7	10.5	10.3	10.1	8.9	8.1	7.8	7.2	7.6	8.7	9.4	10.3
	I	Btu/ft^2/day	463	719	1059	1432	1759	1886	1849	1621	1242	788	480	385
	P_A	lb/in^2												
Syracuse, NY	T_{AN}	°F	17.0	18.0	25.7	36.9	47.0	57.2	61.7	60.6	52.7	42.2	33.5	23.4
	T_{AX}	°F	31.3	33.2	42.1	56.5	68.0	77.1	80.6	79.7	72.0	59.4	47.9	36.4
	V	mi/hr	9.8	9.6	9.4	9.2	8.1	7.2	7.2	6.5	7.2	7.8	8.7	9.6
	I	Btu/ft^2/day	457	685	1033	1468	1797	1896	1884	1651	1246	801	472	380
	P_A	lb/in^2												
Asheville, NC	T_{AN}	°F	28.4	30.3	36.1	44.0	52.3	60.3	64.0	63.5	56.7	45.2	36.0	29.7
	T_{AX}	°F	47.5	50.3	57.7	67.3	74.0	80.0	83.0	82.1	76.2	67.4	57.9	48.8
	V	mi/hr	8.5	8.3	8.3	7.6	6.0	4.9	4.7	4.3	4.7	5.6	6.9	7.6
	I	Btu/ft^2/day	802	1054	1361	1697	1862	1887	1872	1723	1455	1186	870	717
	P_A	lb/in^2												
Charlotte, NC	T_{AN}	°F	33.1	35.2	41.9	49.7	58.4	66.7	70.1	69.3	62.7	50.9	41.2	34.3
	T_{AX}	°F	51.5	55.0	62.9	71.9	78.7	85.5	88.6	87.4	81.3	71.8	62.1	52.9
	V	mi/hr	6.5	6.9	7.6	7.4	6.7	5.8	5.6	5.4	6.0	5.4	5.8	6.0
	I	Btu/ft^2/day	785	1029	1385	1741	1918	1996	1931	1731	1475	1177	866	707
	P_A	lb/in^2												
Raleigh-Durham, NC	T_{AN}	°F	32.1	33.8	40.3	48.6	56.9	66.0	69.9	68.7	61.9	49.7	40.4	33.5
	T_{AX}	°F	51.0	54.2	62.4	71.6	78.5	85.9	89.1	87.7	81.2	71.7	62.3	52.8

	V	mi/hr	6.9	6.9	7.8	7.8	6.9	6.0	6.0	5.4	5.8	5.1	5.6	6.0
	I	Btu/ft^2/day	771	1029	1359	1725	1911	1969	1931	1744	1435	1155	853	699
	P_A	lb/in^2												
Greensboro, NC	T_{AN}	°F	30.9	32.7	39.7	48.1	56.7	65.6	69.3	68.2	61.1	49.3	39.8	32.5
	T_{AX}	°F	48.4	51.7	60.0	69.7	76.5	83.7	86.8	85.6	79.0	69.6	59.8	50.1
	V	mi/hr	8.1	8.1	8.7	8.7	7.6	6.7	6.3	5.8	6.3	6.3	6.7	6.9
	I	Btu/ft^2/day	758	1023	1354	1701	1875	1956	1912	1717	1418	1146	851	692
	P_A	lb/in^2												
Wilmington, NC	T_{AN}	°F	36.9	38.0	44.2	52.5	60.7	69.2	73.0	71.5	66.2	55.1	45.3	38.1
	T_{AX}	°F	56.3	58.8	65.5	73.7	79.7	85.7	88.7	87.2	82.6	74.8	66.7	58.4
	V	mi/hr	8.1	8.3	8.9	9.2	8.3	7.4	6.9	6.5	7.2	6.5	6.9	7.4
	I	Btu/ft^2/day	811	1068	1426	1808	1938	1942	1917	1722	1405	1178	910	747
	P_A	lb/in^2												
Bismarck, ND	T_{AN}	°F	2.1	8.4	19.3	31.3	43.0	52.9	57.8	56.1	46.1	33.1	20.0	8.4
	T_{AX}	°F	21.6	27.6	39.9	55.9	67.3	76.2	83.4	83.0	72.3	56.7	39.5	26.8
	V	mi/hr	8.9	9.2	10.1	10.7	10.7	9.6	8.7	8.9	9.2	9.4	8.9	9.2
	I	Btu/ft^2/day	411	666	1092	1523	1811	1994	2092	1798	1335	859	488	348
	P_A	lb/in^2												
Fargo, ND	T_{AN}	°F	0.3	5.7	19.3	33.5	45.3	56.0	59.6	57.8	48.6	36.1	21.6	7.9
	T_{AX}	°F	16.7	22.7	35.2	54.3	67.6	76.3	80.5	80.0	70.8	55.2	37.1	22.7
	V	mi/hr	11.0	11.4	12.1	12.3	12.3	10.3	9.2	9.6	10.5	11.4	11.4	11.2
	I	Btu/ft^2/day	383	606	1023	1562	1804	1914	1984	1716	1261	785	445	313
	P_A	lb/in^2												
Minot, ND	T_{AN}	°F	3.5	8.8	19.3	32.1	43.3	53.4	58.2	56.2	47.0	34.4	20.9	8.9
	T_{AX}	°F	19.4	24.9	36.4	53.9	65.4	73.7	80.2	80.5	70.1	54.4	36.7	23.9
	V	mi/hr	12.1	11.6	11.6	11.4	11.9	10.5	9.6	9.8	10.5	11.6	11.9	12.1
	I	Btu/ft^2/day	380	628	1069	1537	1781	1928	2042	1735	1249	793	433	299
	P_A	lb/in^2												
Williston, ND	T_{AN}	°F	0.5	7.4	18.4	30.9	40.9	50.6	56.6	54.9	43.8	31.3	18.1	6.0
	T_{AX}	°F	20.3	26.9	39.3	55.5	66.0	74.9	82.9	82.8	71.5	55.2	37.7	25.0
	V	mi/hr	8.3	8.5	9.2	10.1	10.3	9.4	8.3	8.7	8.7	8.9	8.5	8.5
	I	Btu/ft^2/day	369	634	1067	1545	1838	2010	2154	1817	1312	813	445	311
	P_A	lb/in^2												
Akron, OH	T_{AN}	°F	20.1	21.7	29.0	39.7	49.2	58.9	62.5	61.5	53.9	43.0	34.1	24.7
	T_{AX}	°F	33.4	36.1	46.0	59.6	69.0	77.8	81.3	80.1	72.8	60.8	48.5	36.9

	V	mi/hr	10.7	10.5	10.3	10.1	8.7	7.6	7.4	6.7	7.4	8.5	9.6	10.3
	I	Btu/ft^2/day	490	720	1075	1421	1683	1840	1859	1645	1327	892	538	432
	P_A	lb/in^2												
Cleveland, OH	T_{AN}	°F	21.6	23.2	29.8	40.4	50.0	60.1	64.1	63.2	55.8	45.3	36.3	26.4
	T_{AX}	°F	34.2	36.7	45.2	58.3	68.5	77.9	81.3	80.0	73.3	61.7	49.7	37.9
	V	mi/hr	11.2	10.5	10.5	10.3	9.2	8.3	8.1	7.6	8.3	9.4	10.5	11.0
	I	Btu/ft^2/day	462	689	1067	1430	1756	1944	1923	1672	1335	851	511	380
	P_A	lb/in^2												
Columbus, OH	T_{AN}	°F	23.0	25.0	32.7	43.1	52.4	62.3	65.7	64.6	56.8	45.2	36.2	27.2
	T_{AX}	°F	36.5	39.9	50.3	63.4	72.5	81.1	84.1	83.3	76.7	64.7	51.9	40.1
	V	mi/hr	9.2	8.9	8.9	8.9	7.6	6.7	6.3	5.8	6.0	6.9	8.1	8.7
	I	Btu/ft^2/day	527	743	1080	1472	1716	1889	1866	1692	1388	971	601	456
	P_A	lb/in^2												
Dayton, OH	T_{AN}	°F	21.1	23.6	31.6	42.3	52.2	61.9	64.9	63.6	55.4	44.7	34.9	25.4
	T_{AX}	°F	34.9	38.7	49.1	62.1	71.3	80.0	83.2	82.4	75.9	63.9	50.7	38.4
	V	mi/hr	11.4	11.0	11.0	11.0	9.4	8.3	7.8	7.2	7.8	9.2	10.3	10.7
	I	Btu/ft^2/day	517	759	1122	1479	1747	1925	1936	1738	1409	993	607	456
	P_A	lb/in^2												
Mansfield, OH	T_{AN}	°F	19.4	21.3	28.8	39.3	48.9	58.6	61.9	61.0	53.2	42.9	33.6	24.4
	T_{AX}	°F	32.8	35.6	45.4	59.1	68.9	77.7	80.8	79.5	72.9	61.3	48.1	37.1
	V	mi/hr	11.2	10.7	10.5	10.7	9.2	7.8	7.4	6.7	7.4	8.9	10.3	10.7
	I	Btu/ft^2/day	492	700	1071	1438	1709	1882	1904	1643	1329	918	553	423
	P_A	lb/in^2												
Toledo, OH	T_{AN}	°F	19.4	21.5	28.9	39.7	49.4	59.5	62.8	61.8	53.5	42.9	33.7	24.1
	T_{AX}	°F	32.4	35.7	46.2	59.8	70.3	80.1	83.5	81.6	75.1	62.5	48.9	36.3
	V	mi/hr	10.5	9.8	9.8	10.3	8.7	7.2	6.9	6.3	6.7	8.3	9.4	9.6
	I	Btu/ft^2/day	485	754	1125	1446	1747	1939	1938	1656	1360	912	537	408
	P_A	lb/in^2												
Youngstown, OH	T_{AN}	°F	20.1	21.3	28.2	38.8	47.3	56.6	60.2	59.2	52.1	42.0	34.3	24.7
	T_{AX}	°F	33.3	36.0	45.5	59.3	68.9	77.5	80.9	79.8	72.4	60.6	48.7	36.9
	V	mi/hr	10.1	9.6	9.6	9.6	8.3	7.2	6.9	6.5	7.2	8.1	9.2	9.6
	I	Btu/ft^2/day	476	714	1070	1410	1680	1842	1839	1631	1295	859	520	423
	P_A	lb/in^2												
Oklahoma City, OK	T_{AN}	°F	28.7	32.8	40.5	49.1	59.3	67.4	71.5	70.6	62.5	51.0	39.5	30.9
	T_{AX}	°F	48.7	54.1	62.1	70.8	78.9	86.9	92.8	92.1	83.2	72.6	60.3	50.4

	V	mi/hr	11.4	11.9	13.4	13.4	11.4	10.7	9.8	9.2	9.6	11.0	11.6	11.4
	I	Btu/ft^2/day	831	1090	1389	1757	1898	2111	2215	1982	1600	1235	889	751
	P_A	lb/in^2												
Tulsa, OK	T_{AN}	°F	28.9	32.9	40.9	50.1	60.2	68.6	73.4	72.2	62.6	51.3	40.4	31.3
	T_{AX}	°F	47.4	53.4	61.7	71.0	78.7	86.5	92.3	92.4	83.2	72.6	60.2	49.6
	V	mi/hr	9.2	9.4	10.7	11.2	9.6	9.2	8.7	7.6	7.8	8.7	9.4	9.2
	I	Btu/ft^2/day	748	1023	1320	1671	1822	2027	2152	1938	1523	1166	816	682
	P_A	lb/in^2												
Astoria, OR	T_{AN}	°F	38.7	38.1	39.5	41.9	46.5	50.7	54.1	54.1	50.4	45.3	41.0	38.6
	T_{AX}	°F	49.1	51.3	52.7	55.3	59.8	63.2	66.8	67.7	66.8	60.0	53.2	48.6
	V	mi/hr	8.5	7.8	7.8	7.8	7.6	7.8	8.1	7.2	6.7	6.7	7.8	8.7
	I	Btu/ft^2/day	343	600	877	1252	1537	1627	1708	1492	1196	728	391	302
	P_A	lb/in^2												
Burns, OR	T_{AN}	°F	17.3	19.4	25.6	29.5	37.3	42.5	48.4	45.6	37.3	28.3	22.3	16.0
	T_{AX}	°F	35.1	39.3	49.0	55.6	65.8	74.0	86.0	84.4	76.0	61.2	45.0	34.7
	V	mi/hr	5.1	5.6	6.9	7.8	7.6	7.2	6.7	6.5	6.0	5.8	5.4	5.1
	I	Btu/ft^2/day	475	707	1195	1606	2000	2285	2459	2155	1691	1098	573	384
	P_A	lb/in^2												
Eugene, OR	T_{AN}	°F	35.6	36.0	38.0	40.5	44.7	48.3	52.7	52.2	48.4	42.4	38.6	35.5
	T_{AX}	°F	47.1	50.9	55.4	59.6	66.2	72.1	82.5	82.0	76.7	63.4	51.8	45.9
	V	mi/hr	6.9	6.9	7.2	6.9	6.5	6.9	7.4	7.2	6.7	6.5	6.7	7.2
	I	Btu/ft^2/day	396	673	998	1386	1739	1961	2238	1960	1491	839	449	322
	P_A	lb/in^2												
Medford, OR	T_{AN}	°F	33.0	34.5	37.2	40.6	47.0	52.1	58.7	57.5	50.8	42.2	36.4	33.1
	T_{AX}	°F	47.6	54.3	58.8	63.4	72.6	80.0	90.7	89.6	83.9	69.2	52.9	45.8
	V	mi/hr	3.4	4.0	4.5	4.7	5.1	5.4	5.1	4.7	3.6	3.1	2.9	3.4
	I	Btu/ft^2/day	502	774	1143	1490	1917	2257	2415	2117	1649	1051	541	430
	P_A	lb/in^2												
Pendleton, OR	T_{AN}	°F	29.5	31.4	35.4	39.6	46.4	52.0	58.4	57.5	50.6	40.8	34.0	29.1
	T_{AX}	°F	41.1	46.2	54.3	60.8	69.4	77.1	87.9	86.2	77.4	62.6	48.3	40.1
	V	mi/hr	7.2	7.2	8.9	9.4	9.2	9.2	8.7	8.5	8.1	7.6	7.4	7.2
	I	Btu/ft^2/day	376	678	1117	1628	1970	2228	2372	2058	1541	960	460	309
	P_A	lb/in^2												
Salem, OR	T_{AN}	°F	36.0	35.9	38.3	40.9	46.1	50.3	54.9	54.3	50.2	43.7	39.4	35.7
	T_{AX}	°F	47.4	51.6	55.6	59.9	67.1	72.6	81.8	81.3	76.3	63.4	52.2	46.6

	V	mi/hr	7.2	6.7	7.2	6.7	6.3	6.5	6.3	5.8	5.4	5.6	6.9	7.4
	I	Btu/ft^2/day	370	638	951	1355	1703	1859	2099	1846	1392	807	416	307
	P_A	lb/in^2												
Allentown, PA	T_{AN}	°F	22.0	23.1	30.5	40.3	49.7	59.7	63.9	62.5	54.6	42.8	34.5	25.9
	T_{AX}	°F	36.7	39.5	49.0	61.4	71.1	79.8	83.8	82.5	75.0	63.3	52.1	40.8
	V	mi/hr	8.3	8.7	8.9	8.7	7.4	6.7	6.3	5.6	6.3	6.5	6.9	7.8
	I	Btu/ft^2/day	568	845	1165	1495	1739	1841	1869	1636	1309	950	614	495
	P_A	lb/in^2												
Bradford, PA	T_{AN}	°F	15.5	15.9	22.9	33.2	41.6	50.7	54.1	53.5	46.4	36.9	30.0	20.0
	T_{AX}	°F	29.2	31.7	40.9	54.6	64.9	73.0	75.8	74.9	67.6	56.1	44.3	32.9
	V	mi/hr	8.9	8.7	8.5	8.3	6.9	5.8	5.4	5.1	5.8	6.7	7.6	8.3
	I	Btu/ft^2/day	483	742	1056	1439	1651	1781	1759	1563	1218	820	508	412
	P_A	lb/in^2												
Erie, PA	T_{AN}	°F	22.0	22.0	28.3	39.0	49.1	59.7	64.2	63.4	56.5	46.1	37.3	27.5
	T_{AX}	°F	33.7	35.0	42.6	55.4	65.8	75.4	78.9	78.0	71.3	60.2	49.0	38.0
	V	mi/hr	11.9	10.7	10.5	10.1	9.2	8.3	8.1	7.8	8.9	9.8	11.2	11.6
	I	Btu/ft^2/day	367	647	994	1425	1756	1946	1921	1661	1281	825	474	327
	P_A	lb/in^2												
Middletown, PA	T_{AN}	°F	24.1	25.3	33.2	43.2	53.1	63.2	67.5	66.1	58.0	45.5	37.1	28.4
	T_{AX}	°F	37.9	40.9	50.4	62.9	72.5	81.4	85.4	83.8	76.0	64.4	53.3	42.2
	V	mi/hr	8.9	9.2	9.8	9.2	7.6	6.7	6.3	5.8	6.3	6.5	7.8	8.5
	I	Btu/ft^2/day	580	840	1164	1497	1754	1889	1852	1639	1304	967	630	512
	P_A	lb/in^2												
Philadelphia, PA	T_{AN}	°F	27.4	28.3	35.5	45.4	54.8	64.9	70.2	69.0	61.6	49.6	40.5	31.5
	T_{AX}	°F	40.7	43.2	52.1	63.9	73.3	82.3	86.5	85.0	77.7	66.1	55.3	44.5
	V	mi/hr	10.3	10.5	11.0	10.3	8.9	8.7	8.5	8.1	8.5	8.7	9.2	10.1
	I	Btu/ft^2/day	611	911	1190	1537	1778	1917	1891	1698	1357	1015	678	549
	P_A	lb/in^2												
Pittsburgh, PA	T_{AN}	°F	22.2	23.5	30.8	41.3	50.2	59.6	63.5	62.5	54.8	43.4	35.3	26.2
	T_{AX}	°F	36.2	38.9	48.7	62.0	70.6	78.9	81.9	81.2	73.9	62.4	50.7	39.5
	V	mi/hr	9.4	9.2	9.4	9.2	7.6	6.9	6.5	6.0	6.3	6.9	8.1	8.7
	I	Btu/ft^2/day	520	760	1080	1440	1691	1846	1823	1636	1306	919	566	459
	P_A	lb/in^2												
Scranton, PA	T_{AN}	°F	20.3	21.5	28.7	39.2	48.6	57.8	61.7	60.7	53.2	42.2	34.5	25.0
	T_{AX}	°F	33.8	36.5	45.8	59.1	69.5	77.6	81.6	80.2	72.4	60.4	49.2	37.7

	V	mi/hr	7.6	8.1	8.1	7.8	6.9	6.0	6.0	5.6	6.0	6.3	6.9	7.4
	I	Btu/ft^2/day	538	789	1115	1455	1710	1843	1852	1616	1261	888	548	455
	P_A	lb/in^2												
Williamsport, PA	T_{AN}	°F	20.8	21.8	29.5	39.5	48.5	58.6	62.3	61.3	53.7	42.0	34.0	25.0
	T_{AX}	°F	34.9	37.9	47.9	61.3	71.4	79.8	83.5	82.0	73.8	62.1	50.2	38.6
	V	mi/hr	7.6	7.8	7.8	7.6	6.5	5.6	5.4	4.7	5.1	5.6	6.5	7.2
	I	Btu/ft^2/day	550	803	1122	1457	1714	1846	1830	1603	1233	884	545	449
	P_A	lb/in^2												
Providence, RI	T_{AN}	°F	22.5	24.0	30.7	40.2	49.2	59.3	64.9	64.0	56.6	44.9	36.8	27.6
	T_{AX}	°F	37.4	39.5	47.0	58.1	67.7	76.9	82.2	80.9	73.5	62.5	52.4	42.2
	V	mi/hr	9.6	10.1	10.5	10.3	9.4	8.7	8.5	8.1	8.1	8.5	8.7	9.4
	I	Btu/ft^2/day	579	859	1150	1477	1738	1847	1840	1640	1301	937	604	501
	P_A	lb/in^2												
Charleston, SC	T_{AN}	°F	39.6	41.6	47.8	54.8	63.2	70.7	74.0	73.3	68.3	57.7	48.0	41.1
	T_{AX}	°F	59.2	62.1	68.9	75.8	82.3	87.3	90.2	88.7	84.1	76.5	68.6	60.9
	V	mi/hr	8.3	8.5	9.2	9.2	8.3	7.6	7.2	6.7	7.4	7.2	7.2	7.6
	I	Btu/ft^2/day	852	1111	1471	1856	1992	1943	1951	1723	1438	1210	972	797
	P_A	lb/in^2												
Columbia, SC	T_{AN}	°F	35.3	37.4	43.9	51.7	60.7	68.8	72.2	71.5	65.2	52.7	42.4	35.7
	T_{AX}	°F	56.2	59.6	67.4	75.7	82.9	88.6	91.6	90.0	84.5	75.3	66.1	57.4
	V	mi/hr	6.7	6.7	7.4	7.4	6.7	6.0	5.6	5.1	5.6	5.1	5.1	5.8
	I	Btu/ft^2/day	824	1073	1415	1781	1944	1975	1949	1756	1497	1206	923	761
	P_A	lb/in^2												
Greer, SC	T_{AN}	°F	33.5	35.5	41.9	49.5	58.1	66.1	69.8	69.2	62.5	51.1	41.6	34.7
	T_{AX}	°F	51.7	55.2	62.9	71.7	78.6	85.4	88.8	87.3	81.1	71.4	61.9	52.8
	V	mi/hr	7.4	7.6	8.3	7.8	6.9	6.0	5.8	5.4	5.8	5.8	6.3	6.7
	I	Btu/ft^2/day	812	1057	1401	1767	1936	1988	1945	1780	1493	1196	888	741
	P_A	lb/in^2												
Aberdeen, SD	T_{AN}	°F	2.2	8.2	20.4	32.9	45.2	55.7	60.1	57.3	47.2	34.4	20.4	8.5
	T_{AX}	°F	21.1	27.6	39.7	56.2	68.3	77.2	82.2	81.0	72.4	57.6	40.1	26.5
	V	mi/hr	10.1	10.5	11.2	12.1	12.1	10.3	8.7	8.7	10.1	10.3	10.3	10.3
	I	Btu/ft^2/day	435	703	1115	1559	1815	1996	2073	1799	1358	880	520	372
	P_A	lb/in^2												
Huron, SD	T_{AN}	°F	6.7	12.0	22.6	34.6	46.5	57.0	61.9	59.9	49.7	36.3	23.1	11.9
	T_{AX}	°F	25.0	31.3	42.9	57.8	69.2	78.4	84.6	83.1	74.4	59.9	42.6	29.3

	V	mi/hr	10.5	10.7	11.4	11.9	11.4	9.8	9.2	9.2	10.1	10.3	10.5	10.5
	I	Btu/ft^2/day	483	770	1131	1556	1845	2014	2094	1817	1404	919	562	403
	P_A	lb/in^2												
Pierre, SD	T_{AN}	°F	10.0	14.7	23.7	34.8	45.9	56.0	62.1	60.4	50.5	37.2	24.6	14.6
	T_{AX}	°F	28.7	34.7	45.4	58.9	69.5	79.2	87.7	86.7	77.2	60.6	44.6	32.6
	V	mi/hr	10.7	10.7	11.9	12.1	11.9	10.5	10.3	10.3	10.7	11.0	10.5	11.0
	I	Btu/ft^2/day	506	772	1135	1521	1857	2054	2099	1853	1428	927	553	421
	P_A	lb/in^2												
Rapid City, SD	T_{AN}	°F	13.6	16.6	23.8	32.7	43.0	52.3	59.1	57.6	47.4	35.4	23.4	15.5
	T_{AX}	°F	35.5	39.0	47.3	56.5	66.6	76.4	85.9	85.7	75.5	60.6	46.4	37.2
	V	mi/hr	9.8	10.7	11.4	12.1	11.6	10.1	9.4	9.4	9.8	10.7	10.3	9.8
	I	Btu/ft^2/day	599	844	1212	1588	1906	2092	2150	1920	1505	1016	619	503
	P_A	lb/in^2												
Sioux Falls, SD	T_{AN}	°F	7.9	13.1	23.5	35.4	47.2	57.9	62.5	60.6	50.6	37.8	24.2	12.7
	T_{AX}	°F	25.2	31.2	42.5	57.5	68.9	78.4	82.9	81.0	73.2	59.6	42.7	29.4
	V	mi/hr	10.1	10.3	11.2	11.9	11.2	9.8	9.2	8.7	9.6	9.8	10.1	9.8
	I	Btu/ft^2/day	507	777	1169	1523	1751	1979	2046	1762	1393	947	576	442
	P_A	lb/in^2												
Bristol, TN	T_{AN}	°F	27.2	29.5	35.5	44.0	52.5	61.2	64.9	63.7	56.4	44.7	35.6	28.9
	T_{AX}	°F	45.5	49.2	58.0	67.9	75.5	82.1	84.6	84.5	78.8	68.8	57.7	47.9
	V	mi/hr	5.4	5.6	6.0	5.6	4.7	3.8	3.6	2.9	3.1	3.6	4.0	4.7
	I	Btu/ft^2/day	682	901	1249	1616	1853	1928	1885	1780	1483	1128	790	611
	P_A	lb/in^2												
Chattanooga, TN	T_{AN}	°F	32.7	34.8	41.6	49.7	58.5	66.8	70.6	70.0	63.0	50.8	40.5	34.2
	T_{AX}	°F	50.4	54.3	63.0	72.5	79.4	86.1	89.2	89.0	83.0	72.8	61.4	51.9
	V	mi/hr	5.8	6.0	6.5	6.0	4.9	4.3	4.3	3.8	4.0	4.0	4.5	5.4
	I	Btu/ft^2/day	722	965	1295	1662	1859	1950	1915	1796	1471	1170	824	654
	P_A	lb/in^2												
Knoxville, TN	T_{AN}	°F	30.8	33.3	40.0	48.7	57.3	65.6	69.2	68.3	61.4	49.2	39.3	32.4
	T_{AX}	°F	47.3	51.4	60.2	69.8	77.5	84.2	87.2	87.0	81.1	70.4	59.1	49.1
	V	mi/hr	6.5	6.7	7.2	6.9	6.3	5.4	5.4	4.5	4.7	4.7	5.4	6.0
	I	Btu/ft^2/day	692	933	1270	1656	1877	1970	1925	1808	1484	1160	798	625
	P_A	lb/in^2												
Memphis, TN	T_{AN}	°F	34.0	37.1	44.7	53.9	63.1	70.9	74.1	73.2	65.8	54.6	43.9	36.2
	T_{AX}	°F	49.7	54.3	62.9	72.4	80.7	88.1	90.8	90.7	84.6	74.0	61.6	51.7

	V	mi/hr	9.2	9.2	9.8	9.6	8.5	7.4	6.9	6.7	7.2	7.2	8.1	8.7
	I	Btu/ft^2/day	696	939	1275	1661	1860	2008	1967	1832	1508	1165	794	626
	P_A	lb/in^2												
Nashville, TN	T_{AN}	°F	30.5	32.9	40.2	49.3	58.5	66.7	70.8	69.8	62.1	50.3	40.2	32.8
	T_{AX}	°F	47.2	51.5	60.5	70.4	77.9	85.2	88.6	88.6	82.2	71.4	59.5	49.5
	V	mi/hr	8.1	8.1	8.3	8.1	6.7	6.0	5.8	5.6	5.8	6.3	7.2	7.6
	I	Btu/ft^2/day	654	896	1261	1614	1798	1955	1886	1778	1467	1128	772	583
	P_A	lb/in^2												
Abilene, TX	T_{AN}	°F	34.2	37.8	44.9	52.6	62.1	69.1	72.6	72.0	64.4	54.6	43.4	35.2
	T_{AX}	°F	56.5	60.6	68.0	76.6	83.9	89.9	93.6	92.8	85.9	76.8	65.4	57.4
	V	mi/hr	11.0	11.4	12.5	13.2	11.9	11.2	10.1	8.7	8.9	10.3	10.7	10.7
	I	Btu/ft^2/day	959	1205	1557	1936	2052	2245	2252	2006	1701	1375	1046	902
	P_A	lb/in^2												
Amarillo, TX	T_{AN}	°F	24.9	28.0	34.1	42.4	52.8	61.7	65.8	64.8	56.9	45.3	33.2	25.8
	T_{AX}	°F	50.1	54.4	61.9	70.0	78.9	87.1	90.5	88.3	81.8	71.3	59.0	50.1
	V	mi/hr	12.1	12.5	13.9	14.8	13.6	13.9	12.3	11.6	12.1	12.5	12.5	12.1
	I	Btu/ft^2/day	882	1232	1607	1972	2156	2357	2313	2021	1748	1388	1057	877
	P_A	lb/in^2												
Austin, TX	T_{AN}	°F	40.3	43.9	49.9	57.5	66.3	71.9	73.8	73.5	68.2	58.8	48.3	41.0
	T_{AX}	°F	61.6	65.3	71.6	78.9	85.9	91.5	94.4	95.5	89.8	81.4	70.5	63.1
	V	mi/hr	8.3	8.7	9.2	8.9	8.5	8.1	7.4	6.5	6.3	6.9	7.6	7.8
	I	Btu/ft^2/day	868	1085	1368	1699	1812	2094	2135	2023	1645	1313	956	806
	P_A	lb/in^2												
Brownsville, TX	T_{AN}	°F	52.8	56.0	60.7	66.6	72.7	76.4	76.9	76.8	73.6	67.6	59.9	53.5
	T_{AX}	°F	70.6	73.7	78.1	82.8	88.0	91.6	92.8	93.5	89.6	84.7	78.0	71.6
	V	mi/hr	10.1	11.2	11.9	12.5	12.1	11.0	11.0	9.2	7.4	8.7	9.2	9.6
	I	Btu/ft^2/day	899	1152	1425	1673	1913	2051	2061	1951	1616	1386	1040	846
	P_A	lb/in^2												
Corpus Christi, TX	T_{AN}	°F	48.4	51.9	57.3	63.9	70.6	74.5	75.3	75.5	72.5	65.3	56.2	49.6
	T_{AX}	°F	66.9	70.6	75.5	81.1	86.2	90.4	92.4	93.8	89.3	83.7	75.1	68.5
	V	mi/hr	12.1	12.5	13.4	14.1	12.5	10.5	10.7	9.8	9.2	10.7	11.4	11.6
	I	Btu/ft^2/day	891	1113	1385	1636	1850	2072	2110	1975	1662	1397	1040	838
	P_A	lb/in^2												
Dallas-Fort Worth, TX	T_{AN}	°F	37.0	40.8	47.8	55.8	65.4	72.6	76.3	76.1	68.6	57.8	47.1	38.8
	T_{AX}	°F	56.2	60.7	67.8	75.7	83.4	91.0	95.3	95.3	87.8	78.0	66.2	57.7

	V	mi/hr	10.5	10.7	11.9	12.1	11.0	10.5	9.8	8.5	8.3	9.4	10.3	10.3
	I	Btu/ft^2/day	837	1089	1388	1744	1860	2087	2171	1981	1623	1263	933	795
	P_A	lb/in^2												
El Paso, TX	T_{AN}	°F	34.6	38.8	44.3	52.2	62.3	69.8	72.2	70.6	64.5	53.3	40.8	33.9
	T_{AX}	°F	58.2	63.2	70.3	78.7	88.2	95.4	94.4	92.4	87.4	78.3	66.1	57.3
	V	mi/hr	7.8	8.9	10.1	11.0	10.1	9.2	8.1	7.4	7.4	7.6	7.4	7.4
	I	Btu/ft^2/day	1125	1406	1856	2259	2494	2537	2276	2106	1895	1574	1244	1048
	P_A	lb/in^2												
Houston, TX	T_{AN}	°F	43.8	47.0	52.7	59.6	67.9	73.4	75.1	74.7	69.9	61.0	51.2	44.9
	T_{AX}	°F	62.6	66.4	72.3	78.7	85.9	90.7	93.1	93.4	88.9	81.2	71.2	64.1
	V	mi/hr	7.8	8.3	8.5	8.9	8.1	6.7	5.8	5.6	6.0	6.7	7.2	7.6
	I	Btu/ft^2/day	832	1022	1333	1635	1828	1915	1930	1804	1567	1288	930	767
	P_A	lb/in^2												
Lubbock, TX	T_{AN}	°F	28.0	31.6	38.2	46.8	57.3	65.4	69.0	67.5	59.6	48.6	36.6	28.5
	T_{AX}	°F	54.0	58.8	66.1	74.7	83.3	90.3	92.3	90.6	84.0	74.8	62.7	54.6
	V	mi/hr	11.6	12.3	13.9	14.3	13.6	13.0	11.0	9.8	10.1	11.0	11.4	11.4
	I	Btu/ft^2/day	968	1252	1627	2008	2166	2352	2283	2060	1728	1406	1081	904
	P_A	lb/in^2												
Lufkin, TX	T_{AN}	°F	39.3	42.4	48.6	55.6	64.7	70.7	72.8	72.1	66.8	56.5	46.8	40.3
	T_{AX}	°F	59.8	64.0	70.5	77.5	84.6	90.0	93.1	93.6	88.3	79.5	68.8	61.1
	V	mi/hr	6.9	7.4	7.6	7.6	6.9	5.8	5.4	4.9	5.4	5.8	6.3	6.5
	I	Btu/ft^2/day	796	1027	1342	1686	1856	1988	2043	1915	1590	1275	913	747
	P_A	lb/in^2												
Midland, TX	T_{AN}	°F	31.8	35.9	42.1	50.1	60.9	68.5	71.0	69.7	62.7	52.4	39.8	32.1
	T_{AX}	°F	57.4	62.2	69.4	78.4	87.1	93.0	93.8	92.4	86.0	77.5	65.6	58.1
	V	mi/hr	10.1	11.0	12.1	12.8	12.3	12.3	10.7	9.6	9.6	10.3	9.8	9.8
	I	Btu/ft^2/day	1015	1294	1695	2089	2226	2365	2272	2073	1776	1458	1140	973
	P_A	lb/in^2												
Port Arthur, TX	T_{AN}	°F	44.6	47.7	53.2	60.1	68.0	73.5	75.0	74.7	70.6	61.5	51.7	45.7
	T_{AX}	°F	61.9	65.3	71.2	77.3	84.3	89.1	91.0	91.5	87.8	80.2	70.5	63.4
	V	mi/hr	9.6	10.1	10.3	10.3	9.2	7.6	6.0	5.8	7.2	8.1	8.5	9.2
	I	Btu/ft^2/day	824	1017	1355	1646	1868	1931	1918	1801	1552	1300	955	773
	P_A	lb/in^2												
San Angelo, TX	T_{AN}	°F	34.4	38.0	45.2	52.8	62.8	69.6	72.1	71.3	64.0	53.8	42.7	35.1
	T_{AX}	°F	59.5	63.7	70.7	79.5	87.4	92.4	95.1	94.0	87.4	78.6	67.4	60.5

	V	mi/hr	9.6	10.1	10.7	11.4	10.5	10.1	9.2	8.1	7.8	8.5	9.2	9.4
	I	Btu/ft^2/day	968	1229	1591	1961	2072	2236	2220	2021	1711	1382	1090	921
	P_A	lb/in^2												
San Antonio, TX	T_{AN}	°F	42.0	45.8	51.8	59.1	67.6	73.2	75.2	75.3	69.8	60.8	50.5	43.1
	T_{AX}	°F	62.9	67.2	73.1	79.9	86.6	91.9	94.0	95.0	89.5	81.6	71.3	64.3
	V	mi/hr	7.6	7.8	8.9	9.4	9.4	9.2	8.5	7.8	6.9	7.4	7.6	7.4
	I	Btu/ft^2/day	893	1083	1377	1682	1821	2059	2081	1961	1640	1323	985	825
	P_A	lb/in^2												
Victoria, TX	T_{AN}	°F	44.5	48.0	53.7	60.5	68.3	73.3	74.8	74.4	70.1	61.6	51.9	45.5
	T_{AX}	°F	64.6	68.2	73.5	79.6	86.1	91.0	93.1	94.0	89.5	82.7	73.1	66.1
	V	mi/hr	9.8	10.1	10.5	11.0	10.3	9.2	8.3	7.4	7.4	8.3	8.7	9.2
	I	Btu/ft^2/day	849	1038	1328	1597	1823	2009	2029	1887	1596	1328	989	801
	P_A	lb/in^2												
Waco, TX	T_{AN}	°F	37.6	41.3	48.1	55.7	64.7	71.7	75.0	74.4	67.3	57.2	46.9	39.0
	T_{AX}	°F	58.4	62.4	69.2	77.1	84.7	91.5	95.8	96.0	89.4	79.8	68.0	59.7
	V	mi/hr	9.8	10.1	11.0	11.2	10.1	9.6	9.6	8.5	7.8	8.7	9.4	9.4
	I	Btu/ft^2/day	864	1081	1387	1732	1890	2135	2198	2022	1674	1302	958	823
	P_A	lb/in^2												
Cedar City, UT	T_{AN}	°F	19.2	23.3	28.3	33.5	42.2	50.9	59.0	57.7	47.7	36.0	25.0	18.7
	T_{AX}	°F	41.9	46.0	54.6	61.1	72.3	82.5	89.5	87.2	79.3	65.7	51.7	41.5
	V	mi/hr	6.3	6.7	8.1	8.9	8.7	8.7	7.6	7.6	7.2	6.7	6.3	6.3
	I	Btu/ft^2/day	818	1072	1548	1969	2299	2534	2285	2082	1827	1355	944	741
	P_A	lb/in^2												
Salt Lake City, UT	T_{AN}	°F	23.3	26.9	34.4	40.2	49.0	57.3	66.4	64.9	54.3	42.2	31.1	24.1
	T_{AX}	°F	37.7	43.1	53.4	60.3	71.5	81.8	92.4	90.1	78.9	64.0	48.7	38.0
	V	mi/hr	6.7	7.2	8.7	9.6	8.9	9.2	8.9	9.6	8.7	8.1	7.4	7.2
	I	Btu/ft^2/day	596	877	1348	1685	2071	2336	2338	2052	1689	1144	700	469
	P_A	lb/in^2												
Burlington, VT	T_{AN}	°F	11.6	13.1	22.7	35.1	46.1	56.4	61.0	59.2	51.5	40.2	31.6	19.8
	T_{AX}	°F	27.0	29.8	39.6	54.1	66.8	76.2	79.9	78.6	70.3	56.6	45.1	33.2
	V	mi/hr	8.9	8.5	8.5	8.7	8.1	7.4	6.9	6.9	7.6	8.1	8.7	8.9
	I	Btu/ft^2/day	474	733	1046	1449	1720	1874	1835	1642	1239	770	464	377
	P_A	lb/in^2												
DC-Dulles, VA	T_{AN}	°F	25.8	26.7	33.9	43.4	52.3	61.9	66.5	65.4	57.6	44.8	36.2	28.2
	T_{AX}	°F	42.4	45.2	54.4	66.3	74.0	82.5	86.4	85.9	78.3	67.0	56.2	45.2

	V	mi/hr	7.8	8.1	8.5	8.1	6.7	6.0	5.8	5.6	6.0	6.0	6.7	7.2
	I	Btu/ft^2/day	653	939	1233	1567	1771	1900	1862	1684	1376	1062	711	590
	P_A	lb/in^2												
DC-Reagan, VA	T_{AN}	°F	30.0	31.2	38.3	47.9	57.0	66.7	71.5	70.4	63.2	51.2	41.7	33.3
	T_{AX}	°F	43.6	46.3	55.2	66.3	74.6	83.3	87.6	86.3	79.0	67.6	57.0	46.5
	V	mi/hr	9.6	9.6	10.5	9.8	8.9	8.5	8.1	7.8	8.3	8.1	8.7	8.9
	I	Btu/ft^2/day	653	934	1246	1578	1767	1903	1864	1712	1371	1045	718	587
	P_A	lb/in^2												
Lynchburg, VA	T_{AN}	°F	27.6	29.1	35.9	44.7	53.0	61.9	65.8	64.7	57.5	45.5	36.5	29.1
	T_{AX}	°F	45.5	48.3	57.2	67.9	74.6	82.2	85.6	84.7	77.9	67.9	57.7	47.4
	V	mi/hr	6.0	6.0	6.7	6.5	5.6	4.7	4.3	3.8	4.3	4.3	4.9	5.1
	I	Btu/ft^2/day	740	1006	1334	1655	1855	2001	1913	1758	1439	1128	807	662
	P_A	lb/in^2												
Norfolk, VA	T_{AN}	°F	34.5	35.2	41.6	50.2	58.7	68.1	72.7	71.6	66.4	54.8	45.1	37.2
	T_{AX}	°F	49.3	50.9	58.3	68.1	75.1	83.1	87.2	85.2	79.3	70.0	60.6	52.1
	V	mi/hr	9.8	10.1	10.5	10.7	9.8	8.7	8.3	7.8	9.2	8.7	8.9	9.2
	I	Btu/ft^2/day	723	962	1312	1674	1872	1989	1940	1743	1406	1101	807	655
	P_A	lb/in^2												
Richmond, VA	T_{AN}	°F	30.2	31.0	38.0	47.2	55.8	65.2	69.5	68.3	61.2	49.2	40.2	32.3
	T_{AX}	°F	47.5	50.5	59.0	69.7	76.6	84.7	88.5	86.9	80.3	70.2	60.2	50.1
	V	mi/hr	8.3	8.5	9.2	8.9	7.8	7.2	6.7	6.3	6.9	6.7	7.4	7.6
	I	Btu/ft^2/day	723	993	1305	1650	1856	1986	1890	1735	1415	1099	798	649
	P_A	lb/in^2												
Roanoke, VA	T_{AN}	°F	29.4	31.0	37.9	46.7	54.7	63.4	67.2	66.2	58.8	47.7	38.7	31.3
	T_{AX}	°F	45.8	48.7	57.3	67.8	75.0	82.3	85.9	85.1	78.0	68.4	57.7	47.4
	V	mi/hr	8.1	8.1	8.3	7.8	6.5	5.8	5.6	4.9	5.1	5.6	6.5	7.4
	I	Btu/ft^2/day	729	986	1293	1611	1795	1892	1860	1699	1395	1104	781	646
	P_A	lb/in^2												
Olympia, WA	T_{AN}	°F	33.8	32.9	35.3	38.0	43.4	47.8	51.3	50.9	46.4	40.9	36.6	33.4
	T_{AX}	°F	45.7	49.3	53.2	58.0	64.9	69.7	76.7	76.6	71.5	59.7	50.2	44.5
	V	mi/hr	6.0	5.6	6.3	6.3	6.0	6.0	5.4	4.9	4.7	5.1	6.0	6.0
	I	Btu/ft^2/day	319	562	866	1257	1574	1721	1876	1624	1257	676	352	264
	P_A	lb/in^2												
Quillayute, WA	T_{AN}	°F	36.4	35.6	37.0	39.1	43.5	47.9	51.2	51.0	47.5	42.4	38.6	35.7
	T_{AX}	°F	47.1	49.5	50.8	54.2	59.1	62.7	66.9	67.6	65.8	57.9	50.7	46.5

	V	mi/hr	6.5	6.0	6.3	5.8	5.4	4.9	4.7	4.5	4.0	4.9	6.0	6.3
	I	Btu/ft^2/day	304	556	831	1225	1520	1600	1681	1469	1170	653	351	257
	P_A	lb/in^2												
Seattle, WA	T_{AN}	°F	37.6	37.8	39.7	42.8	48.0	52.4	56.4	56.5	52.9	46.5	40.5	36.8
	T_{AX}	°F	46.4	49.4	52.4	57.2	63.7	68.5	75.1	74.8	69.5	58.6	50.3	45.4
	V	mi/hr	8.5	8.3	8.5	7.8	7.6	7.6	7.2	6.9	6.7	7.2	8.1	8.7
	I	Btu/ft^2/day	316	595	882	1329	1678	1842	1951	1679	1235	671	356	267
	P_A	lb/in^2												
Spokane, WA	T_{AN}	°F	24.3	26.4	30.9	36.4	43.8	49.9	56.7	55.7	47.7	37.3	29.3	23.7
	T_{AX}	°F	34.1	39.7	48.1	56.0	65.8	72.5	83.2	82.2	72.8	57.2	41.5	33.0
	V	mi/hr	8.3	8.3	9.6	9.6	9.4	9.2	8.5	8.1	7.8	8.1	8.3	8.3
	I	Btu/ft^2/day	345	650	1060	1497	1893	2071	2274	1947	1430	841	401	283
	P_A	lb/in^2												
Stampede Pass, WA	T_{AN}	°F	24.0	25.7	28.6	31.8	37.8	42.4	49.0	49.3	45.5	36.7	29.2	23.5
	T_{AX}	°F	30.7	33.8	37.9	43.1	51.0	56.6	65.7	65.7	60.0	47.3	36.2	30.1
	V	mi/hr	7.4	7.4	6.9	6.7	6.9	7.4	7.4	6.9	6.7	6.7	6.9	7.4
	I	Btu/ft^2/day	345	595	857	1281	1599	1703	1946	1676	1218	678	366	286
	P_A	lb/in^2												
Yakima, WA	T_{AN}	°F	24.1	27.1	30.8	35.5	43.5	49.6	55.1	53.0	45.0	35.2	27.5	23.4
	T_{AX}	°F	38.1	46.0	55.3	62.6	71.8	78.6	87.9	86.2	77.9	63.0	47.3	36.6
	V	mi/hr	4.3	5.4	6.7	7.4	7.4	7.6	7.2	6.7	6.3	5.6	4.7	4.0
	I	Btu/ft^2/day	399	740	1187	1639	1987	2252	2374	2033	1537	937	483	315
	P_A	lb/in^2												
Beckley, WV	T_{AN}	°F	24.2	26.2	32.9	42.7	50.3	58.6	62.0	61.1	54.2	43.8	35.2	27.0
	T_{AX}	°F	39.5	42.2	50.7	62.6	69.3	76.0	78.7	78.4	72.3	62.8	51.9	41.6
	V	mi/hr	8.3	8.1	8.1	7.8	6.7	5.6	5.1	4.9	5.6	6.3	6.9	7.6
	I	Btu/ft^2/day	632	847	1144	1499	1680	1797	1752	1643	1346	1018	691	538
	P_A	lb/in^2												
Charleston, WV	T_{AN}	°F	26.8	28.6	35.1	44.9	52.6	61.6	65.2	64.3	56.6	45.0	36.4	29.2
	T_{AX}	°F	43.1	46.3	55.5	68.1	74.5	81.6	84.4	83.9	77.7	67.6	56.3	45.5
	V	mi/hr	5.4	5.1	5.1	5.1	4.0	3.4	3.1	2.7	2.9	3.1	4.0	4.7
	I	Btu/ft^2/day	579	814	1126	1524	1737	1916	1843	1721	1378	1024	667	512
	P_A	lb/in^2												
Elkins, WV	T_{AN}	°F	20.6	21.5	28.1	37.0	45.9	55.1	58.9	58.3	50.7	38.1	30.3	22.9
	T_{AX}	°F	39.7	42.3	51.2	63.3	70.5	77.7	80.5	80.3	73.9	64.0	52.7	42.2

	V	mi/hr	5.8	5.8	5.8	5.8	4.5	3.6	3.1	2.7	2.9	3.6	4.7	5.1
	I	Btu/ft^2/day	574	794	1113	1461	1619	1793	1738	1611	1293	972	618	498
	P_A	lb/in^2												
Huntington, WV	T_{AN}	°F	26.7	28.9	35.9	45.8	53.7	62.5	66.1	65.0	57.1	45.7	37.2	29.4
	T_{AX}	°F	42.4	45.9	55.5	67.7	74.7	82.0	85.0	84.7	78.2	67.6	55.7	44.9
	V	mi/hr	6.9	6.7	6.9	6.7	5.6	4.9	4.7	4.3	4.5	4.9	5.8	6.3
	I	Btu/ft^2/day	570	828	1163	1545	1751	1915	1856	1725	1404	1045	676	519
	P_A	lb/in^2												
Eau Claire, WI	T_{AN}	°F	6.6	11.2	22.0	34.8	46.1	56.4	60.5	58.9	49.8	38.1	25.7	12.8
	T_{AX}	°F	22.7	28.6	40.7	56.9	68.6	77.6	81.4	79.6	71.2	57.7	41.2	27.9
	V	mi/hr	7.4	7.6	7.6	8.7	8.3	7.2	6.5	6.3	6.9	7.6	7.6	7.2
	I	Btu/ft^2/day	485	734	1116	1485	1716	1866	1895	1616	1234	802	484	377
	P_A	lb/in^2												
Green Bay, WI	T_{AN}	°F	10.7	14.0	23.7	35.1	45.5	55.9	59.2	58.0	49.6	39.1	28.4	16.9
	T_{AX}	°F	24.9	29.1	39.9	54.3	66.2	75.7	79.6	78.1	70.8	57.5	43.1	30.3
	V	mi/hr	9.6	9.4	9.4	10.5	9.2	7.6	7.2	6.7	7.6	8.7	9.2	8.9
	I	Btu/ft^2/day	426	678	1103	1501	1748	1923	1900	1624	1274	820	504	373
	P_A	lb/in^2												
La Crosse, WI	T_{AN}	°F	9.9	15.0	25.7	38.7	49.5	59.6	63.6	61.9	53.2	41.6	29.3	16.5
	T_{AX}	°F	25.6	31.4	43.7	58.7	70.1	79.5	83.2	81.0	73.2	60.0	43.8	30.4
	V	mi/hr	8.7	8.9	9.2	9.8	9.2	8.1	7.6	7.4	8.3	9.2	9.4	8.7
	I	Btu/ft^2/day	507	767	1131	1445	1723	1887	1895	1615	1260	829	512	397
	P_A	lb/in^2												
Madison, WI	T_{AN}	°F	12.1	16.2	25.4	36.7	47.3	57.6	61.5	59.8	51.0	40.1	29.3	17.6
	T_{AX}	°F	26.7	31.6	43.3	57.0	68.3	77.8	81.0	79.2	72.1	59.4	44.5	31.4
	V	mi/hr	8.5	8.5	8.9	9.6	8.3	6.9	6.5	6.0	6.7	7.8	8.5	8.1
	I	Btu/ft^2/day	441	718	1122	1478	1735	1931	1911	1634	1324	871	541	422
	P_A	lb/in^2												
Milwaukee, WI	T_{AN}	°F	16.9	20.6	28.5	38.1	47.7	58.5	64.2	64.1	55.9	44.6	33.0	21.9
	T_{AX}	°F	29.5	33.1	42.5	53.6	64.5	75.0	79.6	78.4	71.5	59.6	46.1	33.8
	V	mi/hr	11.0	10.7	10.7	11.6	10.3	8.7	8.9	8.5	8.9	10.1	10.5	10.5
	I	Btu/ft^2/day	477	755	1096	1444	1729	1926	1894	1612	1322	873	536	411
	P_A	lb/in^2												
Casper, WY	T_{AN}	°F	16.2	18.1	23.7	30.0	38.7	46.7	54.4	53.3	43.4	32.7	23.8	16.4
	T_{AX}	°F	35.1	38.5	47.8	55.6	66.5	77.7	87.6	85.6	74.2	59.0	44.7	35.1

	V	mi/hr	14.8	13.4	12.5	11.6	10.5	10.3	9.2	9.4	9.8	11.0	13.4	15.0
	I	Btu/ft^2/day	601	877	1259	1631	1980	2243	2292	1988	1552	1046	650	505
	P_A	lb/in^2												
Cheyenne, WY	T_{AN}	°F	18.8	19.8	25.1	31.3	40.7	49.2	56.1	54.6	45.4	34.4	25.1	19.1
	T_{AX}	°F	38.8	40.4	47.3	53.7	63.9	74.3	82.6	80.2	71.3	58.0	45.8	38.6
	V	mi/hr	14.1	13.6	13.6	13.2	12.1	11.0	9.8	9.8	10.5	11.9	13.2	13.9
	I	Btu/ft^2/day	712	975	1360	1668	1919	2196	2163	1883	1588	1131	761	609
	P_A	lb/in^2												
Lander, WY	T_{AN}	°F	12.5	16.2	24.9	32.5	41.6	49.6	57.5	56.1	46.4	34.2	21.8	13.2
	T_{AX}	°F	32.0	36.2	46.9	55.1	65.7	76.0	86.2	84.3	73.0	57.8	42.6	32.3
	V	mi/hr	4.9	4.9	6.7	7.4	7.4	7.4	7.2	6.9	6.5	5.6	5.1	4.9
	I	Btu/ft^2/day	640	920	1320	1658	2026	2242	2256	1966	1564	1086	696	551
	P_A	lb/in^2												
Rock Springs, WY	T_{AN}	°F	13.6	15.5	23.8	29.7	38.6	46.8	55.0	53.3	43.6	33.2	22.1	14.2
	T_{AX}	°F	29.2	32.3	42.8	51.9	62.7	73.0	82.9	80.2	69.4	55.5	39.9	29.6
	V	mi/hr	12.1	11.2	12.1	12.3	11.2	10.7	9.4	8.9	9.4	11.0	11.2	11.4
	I	Btu/ft^2/day	654	928	1342	1738	2044	2307	2301	2019	1673	1186	716	564
	P_A	lb/in^2												
Sheridan, WY	T_{AN}	°F	13.0	16.8	23.4	31.4	39.8	47.9	54.8	53.2	43.5	32.5	21.5	13.6
	T_{AX}	°F	34.4	38.5	47.5	55.7	65.4	74.8	85.9	85.2	74.0	58.8	45.5	35.4
	V	mi/hr	6.5	6.9	7.8	8.9	8.3	7.2	6.5	6.0	6.3	6.7	6.5	6.5
	I	Btu/ft^2/day	482	767	1145	1509	1850	2030	2152	1860	1419	909	569	429
	P_A	lb/in^2												

[a] Reference 14. Data for this table are 20-year averages for the years 1991 through 2010, prepared by the National Renewable Energy Laboratory and compiled in the Na

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40.4
58.3
8.5
1147
14.08
50.3
71.1

11.2
1479
14.01
51.1
70.8
9.2
1407
14.36
44.9
57.9
7.6
1005
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1386
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62.8
6.9
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43.6
67.4
4.0
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13.69
42.1
62.6
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1308
13.92
43.8
63.0

6.5
1145
14.59
42.5
61.3
7.4
1210
14.49
35.1
53.8
7.2
1119
13.62
42.9
56.9
9.8
1135
14.32
45.4
62.6
7.6
1219
14.53
48.2
64.2
9.4
1261
14.69
42.8
60.4
7.8
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14.10
41.1
58.6

6.9
1173
14.21
41.4
60.3
6.5
1170
14.42
43.4
60.0
9.2
1206
14.66
56.7
75.4
7.8
1443
14.68
53.1
74.6
6.0
1425
14.58
51.1
70.7
6.7
1417
14.20
32.7
54.1
10.5
1219
14.01
35.2
56.5

10.5
1250
14.03
36.2
58.8
11.0
1261
13.81
35.0
59.4
10.5
1329
13.11
36.1
56.0
10.1
1239
13.95
45.3
66.7
4.5
1325
13.92
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71.1
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14.18
54.3
71.8

8.3
1361
14.55
50.3
69.4
6.9
1316
14.39
53.6
75.6
11.0
1603
13.79
44.7
70.3
12.8
1634
12.95
57.8
79.1
7.8
1484
14.33
66.1
82.9
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1501
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81.1
11.6
1497
14.68
57.0
76.3

10.3
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1818
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1432
14.55
51.4
76.7
11.0
1698
13.26
60.5
77.8
8.5
1412
14.68
53.5
78.0

9.6
1617
13.71
59.5
79.8
8.1
1477
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60.5
80.1
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14.63
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1505
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1623
12.01
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63.3
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1442
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6.9
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50.2
66.1
8.9
1282
14.69
46.0
66.4
5.1
1358
14.20
53.0
68.3
9.2
1349
14.68
49.0
68.7
7.6
1341
14.61
47.8
66.6
6.7
1316
14.10
40.9
60.0
5.6
1029
14.58
42.2
56.6

5.4
968
14.59
45.7
59.3
7.8
1067
14.47
38.5
57.2
8.7
1224
13.40
35.3
46.5
7.2
1046
12.73
37.5
62.6
6.0
1324
14.14
43.2
60.5
6.7
1216
13.42
45.5
65.4
4.0
1237
14.16
39.0
61.5

4.5
1173
13.69
46.2
65.3
5.6
1250
14.26
35.2
54.5
7.4
1151
14.23
36.3
54.1
8.7
1156
14.33
38.7
56.7
8.7
1164
14.36
37.9
56.0
7.8
1177
14.24
41.2
55.6
10.1
1173
14.34
33.1
58.9

11.6
1385
12.13
35.0
57.9
12.3
1414
11.78
33.9
57.3
6.3
1411
12.02
32.5
54.1
11.0
1456
13.05
32.6
58.4
6.9
1260
12.73

tional Solar Radiation Database. Only Class I sites are summarized in this table, but similar meteorological data for several hundred Class II sites may be obtained from this referen

Table 7.1-6. PAINT SOLAR ABSORPTANCE FOR FIXED ROOF TANKS (a)

	Surface Color	Shade or Type	Reflective Condition	
			New	Average
AluminumSpecularNew	Aluminum	Specular	0.39	0.44
AluminumDiffuseNew	Aluminum	Diffuse	0.60	0.64
AluminumMill finish, unpai	Aluminum	Mill finish, unpainted	0.10	0.12
Beige/CreamNANew	Beige/Cream	NA	0.35	0.42
BlackNANew	Black	NA	0.97	0.97
BrownNANew	Brown	NA	0.58	0.62
GrayLightNew	Gray	Light	0.54	0.58
GrayMediumNew	Gray	Medium	0.68	0.71
GreenNANew	Green	NA	0.89	0.90
RedNANew	Red	NA	0.89	0.90
RustNANew	Rust	NA	0.38	0.44
TanNANew	Tan	NA	0.43	0.49
WhiteNANew	White	NA	0.17	0.25
AluminumSpecularAverage	Aluminum	Specular	0.39	0.44
AluminumDiffuseAverage	Aluminum	Diffuse	0.60	0.64
AluminumMill finish, unpai	Aluminum	Mill finish, unpainted	0.10	0.12
Beige/CreamNAAverage	Beige/Cream	NA	0.35	0.42
BlackNAAverage	Black	NA	0.97	0.97
BrownNAAverage	Brown	NA	0.58	0.62
GrayLightAverage	Gray	Light	0.54	0.58
GrayMediumAverage	Gray	Medium	0.68	0.71
GreenNAAverage	Green	NA	0.89	0.90
RedNAAverage	Red	NA	0.89	0.90
RustNAAverage	Rust	NA	0.38	0.44
TanNAAverage	Tan	NA	0.43	0.49
WhiteNAAverage	White	NA	0.17	0.25
AluminumSpecularAged	Aluminum	Specular	0.39	0.44
AluminumDiffuseAged	Aluminum	Diffuse	0.60	0.64
AluminumMill finish, unpai	Aluminum	Mill finish, unpainted	0.10	0.12
Beige/CreamNAAged	Beige/Cream	NA	0.35	0.42
BlackNAAged	Black	NA	0.97	0.97
BrownNAAged	Brown	NA	0.58	0.62
GrayLightAged	Gray	Light	0.54	0.58
GrayMediumAged	Gray	Medium	0.68	0.71
GreenNAAged	Green	NA	0.89	0.90
RedNAAged	Red	NA	0.89	0.90
RustNAAged	Rust	NA	0.38	0.44
TanNAAged	Tan	NA	0.43	0.49
WhiteNAAged	White	NA	0.17	0.25

Notes:

(a) Reference 8. If specific information is not available, a white shell and roo
paint in good condition, can be assumed to represent the most common or
tank surface in use. If the tank roof and shell are painted a different color, is
determined from = (R + S)/2; where R is the tank roof paint solar absorptan
the tank shell paint solar absorptance.

(b) This refers to aluminum as the base metal, rather than aluminum-colore
(c) EPA added the color black to the table March, 2008. NA = not applicable

ı	Footnotes:
Aged	
0.49	
0.68	
0.15	(b)
0.49	
0.97	(c)
0.67	
0.63	
0.74	
0.91	
0.91	
0.50	
0.55	
0.34	
0.49	
0.68	
0.15	(b)
0.49	
0.97	(c)
0.67	
0.63	
0.74	
0.91	
0.91	
0.50	
0.55	
0.34	
0.49	
0.68	
0.15	
0.49	
0.97	
0.67	
0.63	
0.74	
0.91	
0.91	
0.50	
0.55	
0.34	

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Dropdown Menu Options

Type of Tank:	Vertical Fixed Roof Tank	Locations with Data:
	Horizontal Fixed Roof Tank	
	Internal Floating Roof Tank	
Heated:	Yes	
	No	
Insulated:	Uninsulated	
	Partially Insulated	
	Fully Insulated	
Paint Color:	Aluminum	
	Beige/Cream	
	Black	
	Brown	
	Gray	
	Green	
	Red	
	Rust	
	Tan	
	White	
Paint Shade:	Specular	
	Diffuse	
	Mill finish, unpainted	
	Light	
	Medium	
	Dark	
	Primer	
	Red iron oxide	
	NA	
Paint Condition:	New	
	Average	
	Aged	
Type of Roof:	Cone	
	Dome	
	Flat	
Type of Material:	Petroleum Liquid	
	Organic Liquid	
	Other	
Internal Floating Roof:		

Construction:	Welded
	Riveted
Type of Seal:	Mechanical-Shoe Seal
	Liquid-Mounted Seal
	Vapor-Mounted Seal
Additional Seals:	Primary Only
	Shoe-mounted secondary
	Rim-mounted secondary
	Primary only
	Weather shield
	Rim-mounted secondary
Tank Color:	White Do we still need this?
	Aluminum
	Gray
	Black
Stock Liquid Tempera	Known
	Unknown
Shell Condition	Light Rust
	Dense Rust
	Gunite Lining
Other:	Manually Enter Name
	Acetaldehyde
	Acetic acid
	Acetic anhydride{acetic acid anhydride}
	Acetone
	Acetonitrile
	Acrylamide
	Acrylic acid {2-propenoic acid}
	Acrylonitrile {2- propenenitrile}
	Allyl alcohol
	Allyl chloride{3-chloro-1-propene}
	Aniline
	Benzene
	Benz[a]anthracene
	Benzo[a]pyrene
	Benzo[ghi]perylene
	Biphenyl
	Butadiene (1,3) {divinyl}

Butane (n)
Butene (1)
Butene (cis-2)
Butene (2-methyl-1)
Butene (trans-2)
Butyl alcohol (n) {butanol (1)}
Butyl alcohol (tert) {1,1- dimethyl ethanol}
Butyl chloride (-n){1-chloro-butane}
Butyl ether (di-tert)
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chlorobutane (2)
Chloroform
Chloroprene {2-chloro- 1,3-butadiene}
Chlorotoluene (o) {1- chloro-2methylbenzene}
Chrysene{benzo[a]phenanthrene}
Cresol (m){3-methyl-phenol}
Cresol (o){2-methyl-phenol}
Cresol (p){4-methyl-phenol}
Cyclohexane
Cyclohexanol
Cyclohexanone
Cyclohexene
Cyclopentane
Cyclopentanone
Cyclopentene
Decane (-n)
Dibromopropane (1,2)
Dibromopropane (1,3)
Dichloroethane (1,1)
Dichloroethane (1,2)
Dichloroethylene (1,2){1,2 dichloroethene}
Dichloroethylene (trans- 1,2)
Dichlorotoluene (3,4)
Diethoxyethane (1,1)
Diethoxymethane
Diethyl (n,n) aniline {N,N- diethylbenzenamine}
Diethyl ketone {3-pentanone}
Diethyl sulfide
Diethylamine {N-ethyl ethanamine}
Diethylbenzene (1,2)
Diethylbenzene (1,3)
Diethylbenzene (1,4)
Di-isopropyl ether
Dimethoxyethane (1,2)
Dimethyl formamide (n,n)

Dimethyl hydrazine (1,1)
Dimethyl phthalate
Dimethylbutane (2,3)
Dimethylcyclopentane (1,1)
Dimethylpentane (2,2)
Dimethylpentane (2,3)
Dimethylpentane (2,4)
Dimethylpentane (3,3)
Dioxane (1,4)
Dipropyl ether {di-n- propyl ether}
Dodecane (n)
Epichlorohydrin{chloromethyl oxirane}
Ethane
Ethanolamine (mono)
Ethyl acetate
Ethyl acrylate {ethyl ester 2-propenoic acid}
Ethyl alcohol {ethanol}
Ethyl chloride
Ethyl ether {diethyl ether}
Ethylamine
Ethylbenzene
Ethylcyclopentane
Ethylene {ethene}
Ethyleneoxide
Ethylpentane (3)
Fluoranthene
Fluorobenzene
Formic acid
Freon 11 {trichlorofluoromethane}
Furan
Furfural {2-furancarboxaldehyde}
Heneicosane (n)
Heptane (n)
Heptene (1)
Hexadiene (1,5)
Hexane (n)
Hexanol (1)
Hexene (1)
Hydrogen cyanide {hydrocyanic acid}
Isobutane {methylpropane (2)}
Isobutene {methylpropene (2)}
Isobutyl alcohol {2-methyl 1-propanol}
Isooctane {2,2,4-trimethylpentane}
Isopentane {2-methyl butane}
Isopentene {2-methyl 2-butene}
Isoprene {2-methyl 1,3-butadiene}
Isopropyl alcohol {isopropanol}

Isopropyl benzene {cumene}
Isopropylbenzene (1-methyl-2)
Methacrylonitrile {2-methyl 2- propenenitrile}
Methane
Methyl acetate {methyl ester acetic acid}
Methyl acrylate {methyl ester 2- propenoic acid}
Methyl alcohol {methanol}
Methyl ethyl ketone {2-butanone}
Methyl isobutyl ketone
Methyl methacrylate
Methyl propyl ether
Methyl styrene (alpha)
Methylcyclohexane
Methylcyclopentane
Methyldichlorosilane
Methylene chloride
Methylhexane (2)
Methylhexane (3)
Methylpentane (2)
Methyl-tert-butyl ether {MTBE}
Morpholine
Naphthalene
Nitrobenzene
Nitromethane
Nonadecane (n)
Nonane (n)
Octadecane (n)
Octane (n)
Octanol (1)
Octene (1)
Pentachloroethane
Pentadiene (1,2)
Pentadiene (1,4)
Pentadiene (2,3)
Pentane (n)
Pentene (1)
Pentyne (1)
Phenanthrene
Phenol
Phosgene
Picoline (3) {3-methyl pyridine}
Propane
Propanethiol (1)
Propanethiol (2)
Propyl alcohol (n) {propanol (1)}
Propyl nitrate (n) {propyl ester nitric acid}
Propylamine (n) {1-propanamine}

Propylene {propene}
Propylene glycol (1,2) {1,2 propanediol}
Propylene oxide
Pyridine
Resorcinol
Styrene
Tetrachloroethane (1,1,1,2)
Tetrachloroethane (1,1,2,2)
Tetrachloroethylene
Tetrahydrofuran
Toluene
Trichloroethane (1,1,1)
Trichloroethane (1,1,2)
Trichloroethylene
Trichloropropane (1,2,3)
Tridecane (n)
Trifluoroethane (1,1,2-trichloro-1,2,2)
Trimethylbenzene (1,2,4)
Trimethylchlorosilane {chlorotrimethylsilane}
Trimethylpentane (2,2,3)
Trimethylpentane (2,3,3)
Trimethylpentane (2,3,4)
Undecane (n)
Vinyl acetate {acetic acid ethenyl ester}
Vinylidene chloride {1,1-dichloro ethene}
Xylene (m) {1,3-dimethyl benzene}
Xylene (o) {1,2-dimethyl benzene}
Xylene (p) {1,4-dimethyl benzene}
Water (H_2O)

Midcontinent Crude Oil
Refined PetroleumStocks
Motor Gasoline RVP 13
Motor Gasoline RVP 10
Motor Gasoline RVP 7
Light Naphtha RVP 9-14
Naphtha RVP 2-8
Aviation Gasoline
Jet Naphtha (JP-4)
Jet Kerosene (Jet A)
No. 2 Fuel Oil (Diesel)
No. 6 Fuel Oil
Vacuum Residual Oil

Birmingham, AL
Huntsville, AL
Mobile, AL
Montgomery, AL
Fort Smith, AR
Little Rock, AR
Phoenix, AZ
Prescott, AZ
Tucson, AZ
Arcata, CA
Bakersfield, CA
Bishop, CA
Daggett, CA
Fresno, CA
Long Beach, CA
Los Angeles AP, CA
Redding, CA
Sacramento, CA
San Diego, CA
San Francisco AP, CA
Santa Barbara, CA
Santa Maria, CA
Stockton, CA
Alamosa, CO
Colorado Springs, CO
Denver, CO
Grand Junction, CO
Limon, CO
Pueblo, CO
Bridgeport, CT
Hartford, CT
Wilmington, DE
Daytona Beach, FL
Fort Myers, FL
Gainesville, FL
Jacksonville, FL
Key West, FL
Miami, FL
Orlando, FL
Pensacola, FL
Tallahassee, FL
Tampa, FL
Vero Beach, FL
West Palm Beach, FL
Athens, GA

Atlanta, GA
Augusta, GA
Columbus, GA
Macon, GA
Savannah, GA
Hilo, HI
Honolulu, HI
Kahului, HI
Lihue, HI
Des Moines, IA
Dubuque, IA
Mason City, IA
Sioux City, IA
Waterloo, IA
Boise, ID
Lewiston, ID
Pocatello, ID
Chicago, IL
Moline, IL
Peoria, IL
Rockford, IL
Springfield, IL
Evansville, IN
Fort Wayne, IN
Indianapolis, IN
South Bend, IN
Concordia, KS
Dodge City, KS
Goodland, KS
Russell, KS
Topeka, KS
Wichita, KS
Cincinnati, KY
Jackson, KY
Lexington, KY
Louisville, KY
Paducah, KY
Baton Rouge, LA
Lake Charles, LA
New Orleans, LA
Shreveport, LA
Boston, MA
Worchester, MA
Bangor, ME
Caribou, ME
Portland, ME
Baltimore, MD

Alpena, MI
Detroit Metro AP, MI
Detroit - City, MI
Flint, MI
Grand Rapids, MI
Houghton Lake, MI
Lansing, MI
Muskegon, MI
Sault Ste Marie, MI
Traverse City, MI
Duluth, MN
International Falls, MN
Minneapolis-St Paul, MN
Rochester, MN
St Cloud, MN
Jackson, MS
Meridian, MS
Tupelo, MS
Columbia, MO
Kansas City, MO
Springfield, MO
St Louis - Lambert, MO
St Louis - Spirit, MO
Billings, MT
Glasgow, MT
Great Falls, MT
Harve City, MT
Helena, MT
Kalispell, MT
Missoula, MT
Asheville, NC
Charlotte, NC
Raleigh-Durham, NC
Greensboro, NC
Wilmington, NC
Bismarck, ND
Fargo, ND
Minot, ND
Williston, ND
Grand Island, NE
Lincoln, NE
Norfolk, NE
North Platte, NE
Omaha, NE
Scottsbluff, NE
Valentine, NE
Concord, NH

Atlantic City, NJ
Newark, NJ
Albuquerque, NM
Gallup, NM
Roswell, NM
Ely, NV
Las Vegas, NV
Lovelock, NV
Mercury, NV
Reno, NV
Tonopah, NV
Winnemucca, NV
Albany, NY
Binghamton, NY
Buffalo, NY
Long Island, NY
Massena, NY
New York-LaGuardia, NY
New York-Kennedy, NY
Rochester, NY
Syracuse, NY
Akron, OH
Cleveland, OH
Columbus, OH
Dayton, OH
Mansfield, OH
Toledo, OH
Youngstown, OH
Oklahoma City, OK
Tulsa, OK
Astoria, OR
Burns, OR
Eugene, OR
Medford, OR
Pendleton, OR
Salem, OR
Allentown, PA
Bradford, PA
Erie, PA
Middletown, PA
Philadelphia, PA
Pittsburgh, PA
Scranton, PA
Williamsport, PA
Providence, RI
Charleston, SC
Columbia, SC

Greer, SC
Aberdeen, SD
Huron, SD
Pierre, SD
Rapid City, SD
Sioux Falls, SD
Bristol, TN
Chattanooga, TN
Knoxville, TN
Memphis, TN
Nashville, TN
Abilene, TX
Amarillo, TX
Austin, TX
Brownsville, TX
Corpus Christi, TX
Dallas-Fort Worth, TX
El Paso, TX
Houston, TX
Lubbock, TX
Lufkin, TX
Midland, TX
Port Arthur, TX
San Angelo, TX
San Antonio, TX
Victoria, TX
Waco, TX
Cedar City, UT
Salt Lake City, UT
Burlington, VT
DC-Dulles, VA
DC-Reagan, VA
Lynchburg, VA
Norfolk, VA
Richmond, VA
Roanoke, VA
Olympia, WA
Quillayute, WA
Seattle, WA
Spokane, WA
Stampede Pass, WA
Yakima, WA
Eau Claire, WI
Green Bay, WI
La Crosse, WI
Madison, WI
Milwaukee, WI

Beckley, WV
Charleston, WV
Elkins, WV
Huntington, WV
Casper, WY
Cheyenne, WY
Lander, WY
Rock Springs, WY
Sheridan, WY