

**Alaska Department of Environmental Conservation**  
**AIR QUALITY CONSTRUCTION PERMIT APPLICATION**  
**Project Information Form**



**Section 1 Stationary Source Information**

Stationary Source Name: <b>Donlin Gold Project</b>		SIC: <b>1041</b>	
Project Name (if different):		Stationary Source Contact: <b>Dan Graham, General Manager</b>	
Source Physical Address: <b>Within T22N and 23N / R48W and T22N and 23N / R49W, Seward Meridian</b>		City: <b>Anchorage</b>	State: <b>AK</b> Zip: <b>99503</b>
		Telephone: <b>907-273-0200</b>	
		E-Mail Address: <b>dgraham@donlingold.com</b>	
UTM Coordinates (m) or Latitude/Longitude:		Northings:	Easting:   Zone:
		Latitude: <b>62.02°</b>	Longitude: <b>-158.2° (NAD 83)</b>

**Section 2 Legal Owner**

Name: <b>Donlin Gold LLC</b>		
Mailing Address: <b>2525 C St., Suite 400</b>		
City: <b>Anchorage</b>	State: <b>AK</b>	Zip: <b>99503</b>
Telephone: <b>907-273-0200</b>		
E-Mail Address:		

**Section 3 Operator (if different from owner)**

Name:		
Mailing Address:		
City:	State:	Zip:
Telephone:		
E-Mail Address:		

**Section 4 Designated Agent (for service of process)**

Name: <b>Dan Graham, General Manager</b>		
Mailing Address: <b>2525 C St., Suite 450</b>		
City: <b>Anchorage</b>	State: <b>AK</b>	Zip: <b>99503</b>
Physical Address: <b>2525 C St., Suite 450</b>		
City: <b>Anchorage</b>	State: <b>AK</b>	Zip: <b>99503</b>
Telephone: <b>907-273-0200</b>		
E-Mail Address: <b>dgraham@donlingold.com</b>		

**Section 5 Billing Contact Person (if different from owner)**

Name:		
Mailing Address:		
City:	State:	Zip:
Telephone:		
E-Mail Address:		

**Section 6 Application Contact**

Name: <b>Enrique Fernandez, Permitting and Environmental Manager</b>		
Mailing Address: <b>2525 C St., Suite 450</b>		
City: <b>Anchorage</b>	State: <b>AK</b>	Zip: <b>99503</b>
Telephone: <b>907-273-0200</b>		
E-Mail Address: <b>efernandez@donlingold.com</b>		

**Section 7 Major Permit Classification(s)**

(Check all that apply)

- ☒ 18 AAC 50.306
- ☐ 18 AAC 50.311
- ☐ 18 AAC 50.316

**Section 8 Minor Permit Classification(s)**

(Check all that apply)

- ☐ 18 AAC 50.502(b)(1)
- ☐ 18 AAC 50.502(b)(2)
- ☐ 18 AAC 50.502(b)(3)
- ☐ 18 AAC 50.502(b)(4)
- ☐ 18 AAC 50.502(b)(5)
- ☐ 18 AAC 50.502(b)(6)
- ☐ 18 AAC 50.502(c)(2)(A)
- ☐ 18 AAC 50.502(c)(2)(B)
- ☐ 18 AAC 50.502(c)(3)
- ☐ 18 AAC 50.508(3)
- ☐ 18 AAC 50.508(5)
- ☐ 18 AAC 50.508(6)

PROJECT IDENTIFICATION FORM

Section 9     Project Description

Provide/attach a short narrative describing the project. Discuss the purpose for conducting this project, what emission units/activities will be added/modified under this project (i.e., project scope), and the project timeline. If the project is a modification to an existing stationary source, describe how this project will affect the existing process. Include any other discussion that may assist the Department in understanding your project or processing your application. Include a schedule of construction and the desired date for permit issuance.

If this application includes an Owner Requested Limit or a request to revise an existing permit term or condition, describe the intent of the limit, and provide sample language for the limit, and for monitoring, record keeping, and reporting for showing compliance with the limit.

*Add additional pages if necessary.*

See attached PSD Construction Permit Application Report.

PROJECT IDENTIFICATION FORM

Section 10 Certification

This certification applies to the Air Quality Control Construction Permit Application for the Donlin Gold Project  
submitted to the Department on: \_\_\_\_\_ (Stationary Source Name)

Type of Application

- ☒ Initial Application  
☐ Change to Initial Application

The application is **NOT** complete unless the certification of truth, accuracy, and completeness on this form bears the **signature of a responsible official** of the firm making the application. (18 AAC 50.205)

CERTIFICATION OF TRUTH, ACCURACY, AND COMPLETENESS

“Based on information and belief formed after reasonable inquiry, I certify that the statements and information in and attached to this document are true, accurate, and complete.”

Signature:	Date:
Printed Name: Enrique Fernandez	Title: Permitting and Environmental Manager

Section 11 Attachments

- ☒ Attachments Included. List attachments:
- PSD Construction Permit Application Report
  - 
  - 
  -

Section 12 Mailing Address

Submit the construction permit application to the Permit Intake Clerk in the Department’s Anchorage office. Submitting to a different office will delay processing. The mailing address and phone number for the Anchorage office is:

Permit Intake Clerk  
Alaska Department of Environmental  
Conservation Air Permit Program  
555 Cordova Street  
Anchorage, Alaska 99501  
(907) 269-3070



AIR SCIENCES INC.

DENVER • PORTLAND

**PSD Construction  
Permit Application  
Report**

**Donlin Gold  
Project, Alaska**

PREPARED FOR:  
DONLIN GOLD LLC

PROJECT NO. 281-21B-1  
OCTOBER 27, 2021



# TABLE OF CONTENTS

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List of Abbreviations.....	v
1.0 Introduction .....	1
2.0 Project Description.....	2
2.1 Process Description and Emission Sources .....	4
2.1.1 Open-Pit Mining .....	7
2.1.2 Ore Crushing and Grinding, and Flotation .....	7
2.1.3 Acidulation and CCD Washing .....	8
2.1.4 Autoclaving.....	9
2.1.5 CCD POX Thickening and Washing, and CIL Neutralization.....	9
2.1.6 CIL Circuit.....	10
2.1.7 Cyanide Destruction System.....	10
2.1.8 Carbon Acid Washing, Elution, and Reactivation.....	10
2.1.9 Electrowinning and Refining .....	10
2.1.10 Power Generation .....	11
2.1.11 Emergency Equipment.....	11
2.1.12 Ancillary Sources .....	11
2.2 Pollutants and Emissions.....	12
2.2.1 Operation Emissions.....	12
2.2.2 Construction Emissions.....	13
3.0 Owner Requested Limit .....	14
4.0 Regulatory Applicability Analysis.....	17
4.1 Applicable Regulations.....	17
4.1.1 Prevention of Significant Deterioration Construction Permit .....	17
4.1.2 Best Available Control Technology Review .....	17
4.1.3 Ambient Air Quality Analysis .....	17
4.1.4 Mandatory Greenhouse Gas Reporting .....	17
4.1.5 National Emission Standards for Hazardous Air Pollutants.....	18
4.1.5.1 Subpart ZZZZ – NESHAP for Stationary Reciprocating Internal Combustion Engines.....	18
4.1.5.2 Subpart EEEEEEE – NESHAP: Gold Mine Ore Processing and Production Area Source Category .....	18
4.1.6 New Source Performance Standards.....	19

4.1.6.1 Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units.....	19
4.1.6.2 Subpart LL – Standards of Performance for Metallic Mineral Processing Plants....	19
4.1.6.3 Subpart CCCC – Standards of Performance for Commercial and Industrial Solid Waste Incineration Units.....	20
4.1.6.4 Subpart LLLL – Standards of Performance for New Sewage Sludge Incineration Units.....	20
4.1.6.5 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines .....	21
4.1.6.6 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines.....	21
4.1.7 Alaska Air Quality Control Regulations (18 AAC 50) .....	21
4.1.7.1 Federal Standards Adopted by Reference (18 AAC 50.040).....	21
4.1.7.2 Incinerator Emission Standards (18 AAC 50.050) .....	22
4.1.7.3 Industrial Processes and Fuel-Burning Equipment (18 AAC 50.055).....	22
4.1.7.4 Insignificant Sources (18 AAC 50.326).....	22
4.2 Inapplicable Regulations .....	23
4.2.1 NESHAP .....	23
4.2.1.1 Subpart E – National Emission Standard for Mercury .....	23
4.2.1.2 Subpart CCCCCC – NESHAP for Source Category: Gasoline Dispensing Facilities .....	23
4.2.1.3 Subpart JJJJJJ – NESHAP for Industrial, Commercial, and Institutional Boilers Area Sources .....	23
4.2.2 NSPS .....	24
4.2.2.1 Subpart Db – Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units.....	24
4.2.2.2 Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels.....	24
4.2.2.3 Subpart KKKK – Standards of Performance for Stationary Combustion Turbines.	24

## Tables

Table 2-1. Project Maximum Potential Emissions Summary (ton/yr).....	12
Table 2-2. Project Construction Emissions Summary (ton).....	13
Table 4-1. Project Potential Emissions and PSD Major Source Thresholds (ton/yr).....	17

## **Figures**

Figure 2-1. Project Location .....	3
Figure 2-2. Process Flow Diagram – Process Sources .....	5
Figure 2-3. Process Flow Diagram – Power Generation and Ancillary Sources .....	6

## **Appendices**

Appendix A – Process, Power Generation, and Ancillary Source Information
Appendix B – Detailed Emission Calculations
Appendix C – Best Available Control Technology Review
Appendix D – Air Quality Analysis
Appendix E – Fugitive Dust Control Plan
Appendix F – Vendor Data

# LIST OF ABBREVIATIONS

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°F	Degrees Fahrenheit
µm	Micron
AAC	Alaska Administrative Code
Air Permit	Air Quality Control Construction Permit No. AQ0934CPT01 issued June 30, 2017
ANFO	Ammonium Nitrate and Fuel Oil
BACT	Best Available Control Technology
CCD	Counter-Current Decantation
CFR	Code of Federal Regulations
CI	Compression Ignition
CIL	Carbon-in-Leach
CISWI	Commercial and Industrial Solid Waste Incineration
CO	Carbon Monoxide
Donlin Gold	Donlin Gold LLC
HAP	Hazardous Air Pollutant
hr	Hour
ICE	Internal Combustion Engine
kW	Kilowatt
lb	Pound
LOM	Life of Mine
MCF2	Mill-Chemical-Float-Mill-Chemical-Float
MMBtu	Million British Thermal Units
MW	Megawatt
NESHAP	National Emission Standards for Hazardous Air Pollutants
NG	Natural Gas
NO <sub>x</sub>	Oxides of Nitrogen
NSPS	New Source Performance Standards
ORL	Owner Requested Limit

PM	Particulate Matter
PM <sub>10</sub>	Particulate Matter less than 10 Microns in Aerodynamic Diameter
PM <sub>2.5</sub>	Particulate Matter less than 2.5 Microns in Aerodynamic Diameter
POX	Pressure Oxidation
Project	Donlin Gold
PSD	Prevention of Significant Deterioration
RICE	Reciprocating Internal Combustion Engine
ROM	Run-of-Mine
SAG	Semi-Autogenous Grinding
SO <sub>2</sub>	Sulfur Dioxide
SSI	Sewage Sludge Incineration
ton	Short Ton
ULSD	Ultra-Low-Sulfur Diesel
VOC	Volatile Organic Compound
yr	Year

# 1.0 INTRODUCTION

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Donlin Gold LLC (Donlin Gold) is proposing to construct and operate the Donlin Gold mine: a hard rock, open-pit, gold mine (Project). The Project is located in southwest Alaska, approximately 280 miles west of Anchorage. Donlin Gold is an Alaskan operated company that is owned by Barrick Gold U.S. Inc., a subsidiary of Barrick Gold Corporation, and NovaGold Resources Alaska Inc., a subsidiary of NovaGold Resources, Inc.

With regards to air pollutant emissions presented in Section 2.2, the Project is a major stationary source subject to the Prevention of Significant Deterioration (PSD) regulations of 40 Code of Federal Regulations (CFR) 52.21, adopted by reference in 18 Alaska Administrative Code (AAC) 50.040(h). As such, the Project is subject to the PSD permitting per 18 AAC 50.302(a)(1) and 50.306.

The Alaska Department of Environmental Conservation (ADEC) issued Air Quality Control Construction Permit No. AQ0934CPT01 for the Project on June 30, 2017 (Air Permit). Because the Project has not yet commenced construction, ADEC has request that a new PSD application be submitted. The information provided in this application validates and remains consistent with the terms and conditions currently established in the Air Permit.

This following PSD Construction Permit Application Report provides a description of the Project, a location map, process flow diagrams, a potential emissions summary, an Owner Requested Limit (ORL), and a regulatory applicability analysis. Additional information is provided in the following appendices at the end of this report:

- Appendix A – Process, Power Generation, and Ancillary Source Information
- Appendix B – Detailed Emission Calculations
- Appendix C – Best Available Control Technology Review
- Appendix D – Air Quality Analysis
- Appendix E – Fugitive Dust Control Plan
- Appendix F – Vendor Data

## 2.0 PROJECT DESCRIPTION

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The Donlin Gold deposit is located on the western slopes of the Kuskokwim Mountains in the Yukon-Kuskokwim region of southwestern Alaska, a remote area with no existing road or rail access or other public infrastructure. Beyond mining and processing operations, the Project will require the construction of significant infrastructure, including a natural gas (NG) pipeline, power generation facilities, an onsite employee accommodation complex, an access road, ports, shipping and barging infrastructure, and an airstrip. The 28-mile-long access road will be required to transport cargo and supplies from the Jungjuk port<sup>1</sup> to the mine site. The Project location is presented in Figure 2-1.

The Project will have an operating mine life of 27 years. Conventional open-pit methods will be used to extract ore and waste rock, including drilling, blasting, excavating, and hauling. Hydraulic shovels and front-end loaders will be used to load ore and waste material into haul trucks. Waste rock will be hauled to the waste rock facility (some waste rock will be backfilled to the pit later in the mine life). Ore will be hauled to the primary crusher, where it will be directly fed to the crusher dump pocket or stockpiled; or it will be hauled to a long-term ore stockpile for later transfer to the primary crusher. The gold will be recovered through conventional ore crushing and milling, followed by flotation, pressure oxidation (POX), and carbon-in-leach (CIL) circuits. The process plant will be rated at a nominal production rate of 59,000 short tons (ton) of ore per day.

Donlin Gold anticipates the following schedule for permitting and construction:

- November 2021 – Submit application.
- June 2023 – Receive air quality control construction permit.
- Commence construction within 18 months<sup>2</sup> after construction permit issuance.

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<sup>1</sup> The Jungjuk port will include power generators and emergency and ancillary equipment. A separate construction permit application will be submitted for the sources at the Jungjuk port.

<sup>2</sup> Commencing construction more than 18 months after permit issuance would require approval from the Alaska Department of Environmental Conservation.

Figure 2-1. Project Location

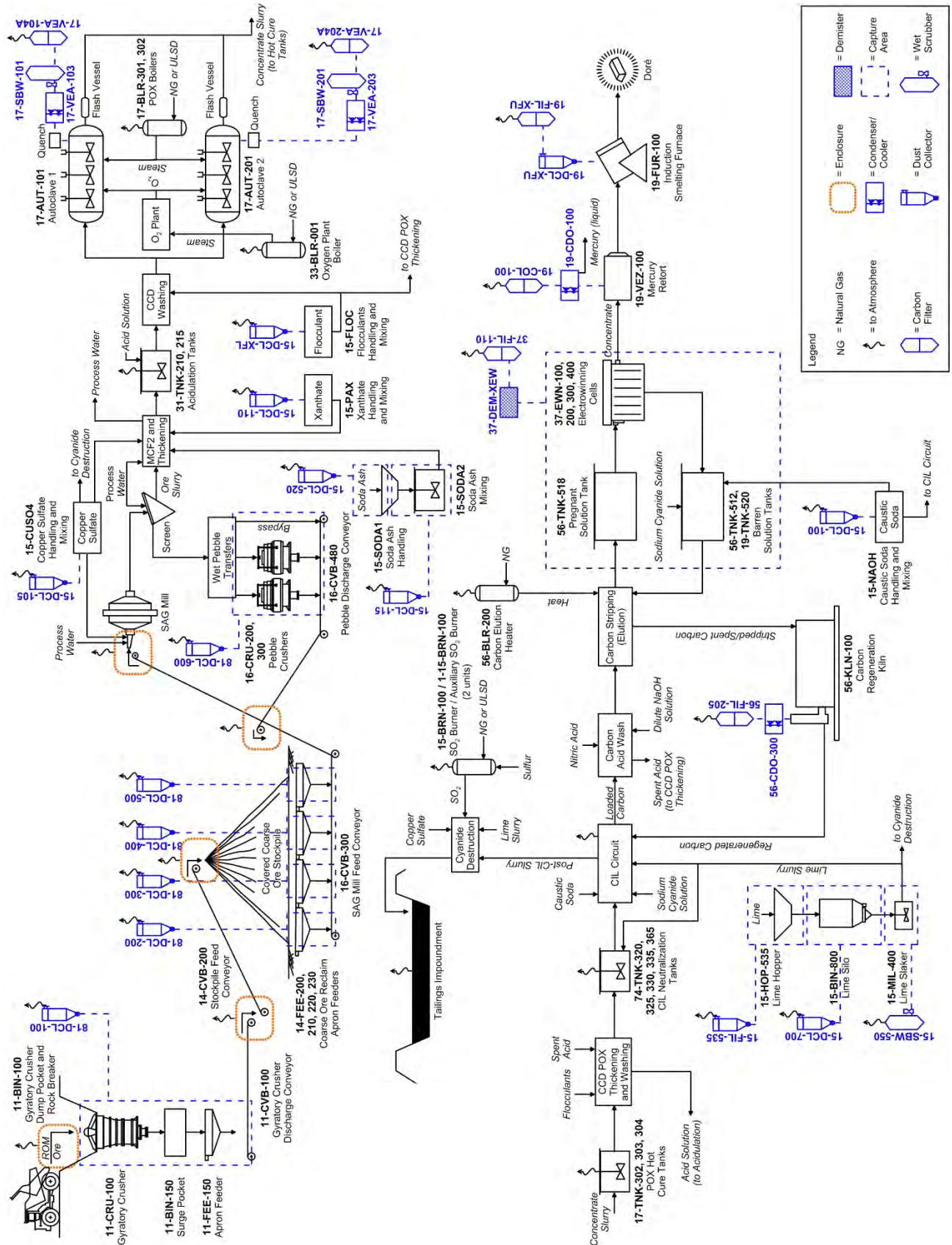




## **2.1 Process Description and Emission Sources**

The Donlin Gold deposit has been divided into two main deposit areas, ACMA and Lewis, which will ultimately be mined in a single open-pit. These areas have similar mineralization characteristics, with ore-grade gold hosted in both intrusive and sedimentary rock units. The mine and process operations will operate on a continuous, 24-hour-per-day basis. A process flow diagram showing the ore process emission sources and controls is provided in Figure 2-2, and the power generation and ancillary sources are shown in Figure 2-3. All the process, power generation, and ancillary sources and controls are labeled by source identification codes (also referenced in this report) on each process flow diagram. A summary of all sources and control identification codes is provided in Appendix A.

Figure 2-2. Process Flow Diagram - Process Sources



The diagram illustrates the industrial process flow of the Kalamia Island Water Treatment Plant, organized into several functional areas:

- Power Plant:** Features a grid of 12 water heaters (W1-W12) and two HRSGs (Heat Recovery Steam Generators). Feedwater is supplied by a Fire Pump (FP1) and a Water Pump (WP). Steam is generated and used for space heating and power generation. A Steam Turbine is connected to the HRSGs.
- Building Heating:** Utilizes Natural Gas (NG) and Ultra-Low-Sulfur Diesel (ULSD) for space heating in various buildings, including the PBH1-20 (Portable Building Heaters) and the Mine Site Emergency Equipment.
- Mine Site Emergency Equipment:** Includes a Fire Pump (FP2) and a Water Pump (WP) for emergency response.
- Operations Water Treatment Plant:** Processes water for the plant's operations, involving a Fire Pump (FP3) and a Water Pump (WP).
- Camp Site Incinerators:** Includes a Sewage Sludge Incinerator (SSI) and a Camp Waste Incinerator (CWI) for waste management.
- Camp Site Emergency Equipment:** Features two Emergency Generator Engines (CEDG1 and CEDG2) powered by ULSD.
- Airport Generator Engines:** Includes two Airport Generator Engines (ADG1 and ADG2) powered by ULSD.
- Fuel Storage:** Stores Jet Fuel B (AJTNK1, AJTNK2) and 100 LL Fuel (ACTNK1, ACTNK2).
- Laboratories:** Includes a Sample Receiving and Preparation Laboratory (24-LAB1), an Assay Laboratory (24-LAB2), and a Metallurgical Laboratory (24-LAB3).
- Water Conditioning:** Involves a Conditioner for water conditioning.

**Legend:**

- ULSD = Ultra-Low-Sulfur Diesel
- HRSG = Heat Recovery Steam Generator
- NG = Natural Gas
- SCR = Selective Catalytic Reduction
- Dust Collector
- To Atmosphere
- Generator
- Wet Scrubber
- Oxidation Catalyst
- Control To Be Determined

### **2.1.1 Open-Pit Mining**

The initial step of the mining process will include surveying and drilling of blast holes. Each hole will be loaded with an ammonium nitrate and fuel oil (ANFO)-based explosive emulsion. Once a pattern is blasted, a surveying crew will demark the ore and waste boundaries.

The ore and waste will be loaded by front-end loaders and hydraulic shovels into 400-ton payload capacity end-dump haul trucks. A 95-foot-wide, two-way haul road will be built between the pit phases and the ore and waste destinations. Waste rock will be hauled to the waste rock facility. Ore will be hauled to the gyratory crusher (11-CRU-100), where it will be directly fed to the gyratory crusher dump pocket (with a rock breaker) (11-BIN-100) or stockpiled; or it will be hauled to a long-term ore stockpile for later transfer to the gyratory crusher (11-CRU-100).

Pollutant emissions from open-pit mining will consist of fugitive dust from drilling, blasting, hauling, loading, and unloading activities; fugitive dust from wind erosion from the various ore and waste stockpiles and exposed surfaces; and products of combustion from explosive detonation and equipment tailpipes. Fugitive dust will be minimized by employing dust control measures and best practical methods, detailed in the Fugitive Dust Control Plan provided in Appendix E.

### **2.1.2 Ore Crushing and Grinding, and Flotation**

Haul trucks will unload run-of-mine (ROM) ore from the open-pits into the gyratory crusher dump pocket (with a rock breaker) (11-BIN-100). Emissions from the gyratory crusher dump pocket are controlled by an enclosure. ROM ore will be crushed in the gyratory crusher (11-CRU-100) at a maximum rate of 5,100 tons per hour (ton/hr) (122,400 tons per day [ton/day]). The gyratory crusher circuit will be located south of the open-pits and housed in a concrete building equipped with a dust collector (81-DCL-100) to control dust emissions from crushing and associated ore handling. The crushed ore will discharge onto the gyratory crusher discharge conveyor (11-CVB-100) via the surge pocket (11-BIN-150) and the apron feeder (11-FEE-150), located underneath the crusher. The crushed ore will be transferred onto the stockpile feed conveyor (14-CVB-200) and finally discharged onto a covered coarse ore stockpile.

A coarse ore reclaim tunnel and reclaim feeder chamber with four coarse ore reclaim apron feeders (14-FEE-200, 210, 220, 230) will be installed underneath the coarse ore stockpile to transfer the coarse ore to a semi-autogenous grinding (SAG) mill via the SAG mill feed conveyor (16-CVB-300). The coarse ore reclaim and discharge system will be equipped with multiple dust collectors (81-DCL-200, 300, 400, 500) to control dust emissions.

The overall grinding configuration will consist of an open-circuit SAG mill followed by the “mill-chemical-float-mill-chemical-float” (MCF2) circuit. The SAG mill will be designed to operate at a maximum rate of 3,303 ton/hr. Process water (primarily overflow from the MCF2

circuit) will be added to the SAG mill feed to provide correct dilution for grinding. Copper sulfate will also be added to the SAG mill feed to activate sulfide mineralization. The SAG mill discharge will be screened, and oversized pebbles (larger than 0.5-inch material) will be conveyed to the two large cone pebble crushers (16-CRU-200, 300). Crushed pebbles will be returned to the SAG mill feed conveyor (16-CVB-300) via the pebble discharge conveyor (16-CVB-480). The pebble handling and crushing circuit will be equipped with a dust collector (81-DCL-600) for dust control. All conveyor transfer points (11-CVB-100, 14-CVB-200, 16-CVB-300, 16-CVB-480) will be enclosed to control dust emissions. The MCF2 circuit following the SAG mill will consist of a primary ball mill and primary rougher flotation followed by a secondary ball mill, secondary rougher flotation, and thickening.

Several reagents, such as acidic solution from the POX counter-current decantation (CCD) washing circuit, lime, copper sulfate, potassium amyl xanthate, soda ash, caustic soda, flocculants, dispersants, and frothers, will be added during different processing stages to condition the concentrate slurry. Sources of emissions from reagent handling and mixing include the following:

- Lime hopper (15-HOP-535) controlled by a dust collector (15-FIL-535)
- Lime silo (15-BIN-800) controlled by a dust collector (15-DCL-700)
- Lime slaker (15-MIL-400) controlled by a wet scrubber (15-SBW-550)
- Flocculants handling and mixing (15-FLOC) controlled by a dust collector (15-DCL-XFL)
- Caustic soda handling and mixing (15-NAOH) controlled by a dust collector (15-DCL-100)
- Copper sulfate handling and mixing (15-CUSO<sub>4</sub>) controlled by a dust collector (15-DCL-105)
- Xanthate handling and mixing (15-PAX) controlled by a dust collector (15-DCL-110)
- Soda ash handling (15-SODA1) controlled by a dust collector (15-DCL-520)
- Soda ash mixing (15-SODA2) controlled by a dust collector (15-DCL-115)

### **2.1.3 Acidulation and CCD Washing**

The thickener concentrate slurry will proceed to an acidulation circuit (31-TNK-210, 215). Acidic solution recovered from the POX CCD washing circuit will be added to the concentrate slurry to reduce its carbonate gangue component. The acidulated concentrate slurry will be washed in a three-thickener CCD circuit to remove chlorides and pumped to the POX circuit.



### **2.1.4 Autoclaving**

Concentrate POX is carried out within the autoclave circuit. This circuit includes two autoclaves (17-AUT-101, 201) operating in parallel. POX refers to the oxidation of gold-bearing sulfide minerals to metal sulfates using a combination of heat, acid, and oxygen sparging in a specifically designed pressure vessel (i.e., autoclave). The oxidation of the sulfide minerals effectively releases the gold locked within the mineral matrix, rendering it amenable to leaching by cyanidation. High-pressure steam will be supplied to this process when needed by the two dual-fuel (NG and ultra-low-sulfur diesel [ULSD]) POX boilers (17-BLR-301, 302). High-pressure steam is not required for normal operation, but it is required for autoclave heat-up.

Each autoclave will have a design processing rate of 210 ton/hr of ore concentrate. The autoclave feed slurry will be pre-heated before entering the autoclaves. An onsite air separation plant consisting of the dual-fuel (NG and ULSD) oxygen plant boiler (33-BLR-001) will provide high pressure oxygen gas for the POX reaction. The autoclaves will discharge into flash vessels to depressurize the autoclaved concentrate slurry, which will then be transferred to three POX hot cure tanks (17-TNK-302, 303, 304).

Exhaust gas from each autoclave will discharge into a vent gas quench vessel. The quench vessel will reduce the temperature of the exhaust gas and the quantity of steam (through condensation) that will be fed to downstream exhaust treatment equipment. Vent gas from the quench vessel will be piped to a condenser vessel (17-VEA-103, 203), where cooling water will accomplish further gas cooling and steam condensation. The gas will then pass through a venturi scrubber (17-SBW-101, 201), where it will be further cleaned of particulates. Finally, the gas will pass through a two-chamber carbon filter (17-VEA-104A, 204A). The first chamber will contain activated carbon to remove organic compounds followed by sulfur-impregnated carbon in the second chamber, specifically designed to adsorb mercury.

### **2.1.5 CCD POX Thickening and Washing, and CIL Neutralization**

Concentrate slurry flow from the POX circuit will be washed in a four-thickener CCD circuit. Reclaim water will be added to the last thickener in a flow direction counter to the solids to decrease the acidity of the pulp. Washed concentrate slurry in the underflow from the final thickener will be pumped to the CIL solids neutralization circuit, and the overflow will be clarified and used within the plant to provide acidification to the acidulation circuit (31-TNK-210, 215).

The CIL neutralization circuit will consist of mechanically agitated tanks (74-TNK-320, 325, 330, 335, 365), where lime slurry will be added to the concentrate slurry in the presence of oxygen to bring the pH to approximately 9 before it is pumped to the CIL circuit.

### **2.1.6 CIL Circuit**

The CIL circuit will consist of six CIL tanks, each retaining the concentrate slurry for four hours. Sodium cyanide solution will be pumped to the CIL circuit for cyanide leaching of gold. Lime slurry and caustic soda will be added to maintain a pH of approximately 10.5.

### **2.1.7 Cyanide Destruction System**

The cyanide destruction system will consist of an agitated tank where compressed air and gaseous sulfur dioxide (SO<sub>2</sub>) generated in the NG-fired SO<sub>2</sub> burner (15-BRN-100) will be added to the post-CIL concentrate slurry to oxidize (destruct) the residual cyanide. Copper sulfate solution will be added to maintain the reaction kinetics, and lime slurry will be used to maintain the pH level.

### **2.1.8 Carbon Acid Washing, Elution, and Reactivation**

The loaded carbon from the CIL circuit will be washed with a 3 percent nitric acid solution, neutralized with a caustic solution in two acid wash vessels, and then pumped to two similar-sized strip vessels. Barren solution composed of 1 percent sodium hydroxide and 1 percent sodium cyanide will be pumped through the bottom of the strip vessels to strip the gold adsorbed on the carbon. The dual-fuel (NG and ULSD) carbon elution heater (56-BLR-200) will provide hot glycol solution for heat exchange in this process. The pregnant solution (containing stripped gold) will exit the vessels, pass through a heat exchanger, and go to the pregnant solution tank (56-TNK-518). The stripped carbon will be washed and sent to the carbon regeneration kiln (56-KLN-100, electrically heated) for reuse in the CIL circuit. The exhaust gas from the carbon regeneration kiln will pass through an off-gas cooler (56-CDO-300) and a carbon filter (56-FIL-205) before exiting to the atmosphere.

### **2.1.9 Electrowinning and Refining**

The pregnant solution will be pumped through two parallel trains of electrowinning cells (37-EWN-100, 200, 300, 400) at a nominal flow rate of 211 gallons per minute. Once precious metals are removed in the electrowinning cells, the solution will return to the barren solution tanks (56-TNK-512, 19-TNK-520) for recirculation through the strip vessels. The electrowinning circuit (which includes the pregnant and barren tanks) exhaust controls will include a demister (37-DEM-XEW) followed by a carbon filter (37-FIL-110). The precious-metal-bearing sludge recovered in the electrowinning process will be washed, press-filtered, and loaded into the mercury retort (19-VEZ-100), where it will be electrically heated to a temperature of approximately 1,200°F for 12 hours to remove mercury. The exhaust controls on the mercury retort will consist of a condenser (19-CDO-100) and a carbon filter (19-COL-100).

After retorting, the sludge will be mixed with smelting fluxes and charged to the induction smelting furnace (19-FUR-100). Doré bars will be poured from the smelting furnace and shipped

offsite for further refining. The induction smelting furnace will be equipped with a dust collector (19-DCL-XFU) and a carbon filter (19-FIL-XFU) for emissions control.

### **2.1.10 Power Generation**

Electric power for the mine will be generated from a dual-fuel (NG and ULSD) reciprocating-engine onsite power plant with a steam turbine utilizing waste heat recovered from the engines (combined cycle power plant). The combined cycle power plant will consist of 12 Wärtsilä Model 18V50DF engines (W1 to W12), each rated at approximately 17 megawatts (MW), for a total of 205 MW (gross) from the engines and an additional 15 MW (gross) from the steam turbine. The total gross power output from the plant will be 220 MW. Each Wärtsilä engine will be equipped with selective catalytic reduction and oxidation catalysts to control combustion emissions. Initially, 10 engines will be installed with a provision to install 2 additional engines at a later stage for N+2 redundancy, thus allowing uninterrupted operation during planned maintenance and outages.

These engines will be supported by two black start ULSD-fired generators (BEDG1, 2), each rated at approximately 600 kilowatts (kW), to restore the power plant operations in the event of a plant shutdown.

Two dedicated ULSD-fired generators (ADG1, 2), rated at approximately 200 kW each, will be used to power the airstrip and associated operations.

### **2.1.11 Emergency Equipment**

Four ULSD-fired emergency generators (CEDG1 to 4), rated at approximately 1,500 kW each, will be used to provide power to the camp site during emergency situations. Three ULSD-fired fire pumps (FP1 to 3), rated at approximately 252 horsepower each, will be installed at strategic locations within the facility for safety and emergency situations.

### **2.1.12 Ancillary Sources**

The Project will also include the following ancillary sources:

- An auxiliary ULSD-fired SO<sub>2</sub> burner (1-15-BRN-100) will be installed as a backup for the primary NG-fired SO<sub>2</sub> burner (15-BRN-100).
- Two dual-fuel (NG and ULSD) heaters (PP-HEU-100, 200) to provide auxiliary heat to power plant engines and space heating.
- Building space heating (81-HEU-1 to 138; 81-HVA-104 to 107, 109, 111 to 113, 126, 127, 201 to 207, 220, 230; 81-HVA-108, 119, 231, 233, 234, 253, 257) will be provided by NG-fired heaters. ULSD-fired portable building heaters (PBH1 to 20) will also be used to provide on-demand heating and backup heat in the event of an NG pipeline shutdown.



- A water conditioning system (61-COND) equipped with a dust collector (54-DCL-710) will be used at the operations water treatment plant.
- A camp waste incinerator (CWI) and a sewage sludge incinerator (SSI) will be utilized for disposal of the waste generated at the camp and mine sites. Both of the incinerators will be equipped with appropriate emission control equipment to meet the applicable regulatory emission standards.
- The mine site will also include a sample preparation laboratory (24-LAB1), an assay analysis laboratory (24-LAB2), and a metallurgical analysis laboratory (24-LAB3) to perform sampling and analysis activities. Each laboratory will be equipped with a dust collector (24-DCL-XL1, XL2, XL3).
- A number of fuel storage tanks (36-TNK-870 to 881, 885 to 887, 896, 897, 903, 904, 913, ANFOTNK1, FPTNK1 to 3, ADTNK1, AGTNK1, AJTNK1 to 2) will be used at various locations throughout the project site. All tanks will be submerged fill to control volatile organic compound (VOC) emissions.

## 2.2 Pollutants and Emissions

This section describes the maximum potential emissions from the operation and construction phases of the Project.

### 2.2.1 Operations Emissions

In addition to dust emissions (particulate matter [PM], particulate matter less than 2.5 micrometers [ $\mu\text{m}$ ] in aerodynamic diameter [ $\text{PM}_{2.5}$ ] and less than 10  $\mu\text{m}$  in aerodynamic diameter [ $\text{PM}_{10}$ ]) from mining activities (drilling, blasting, material handling, and hauling) and ore preparation activities (crushing, milling, and conveyance), the Project will also generate combustion emissions ( $\text{PM}_{2.5}$ ,  $\text{PM}_{10}$ , carbon monoxide [CO], oxides of nitrogen [ $\text{NO}_x$ ],  $\text{SO}_2$ , and VOC) from blasting, primary and backup power generation, process and ancillary equipment, and mobile machinery tailpipes. The maximum potential Project total annual emissions in tons per year (ton/yr) are provided in Table 2-1.

**Table 2-1. Project Maximum Potential Emissions Summary (ton/yr)**

Source Category	CO	$\text{NO}_x$	$\text{PM}_{2.5}$	$\text{PM}_{10}$	PM	$\text{SO}_2$	VOC
Point Sources	1,256	1,225	639	656	688	23	1,168
Fugitive Sources	1,925	54	169	1,350	4,775	0.18	0.18
Mobile Machinery	2,046	1,979	23	22	22	3.9	111
Project Total	5,227	3,258	831	2,028	5,485	27	1,279
LOM Year	19	19	16	20	20	19	19

The emissions provided in Table 2-1 are based on the maximum design rates for the process and ancillary sources (ore processing, power generation, and ancillary equipment), including emissions based on all 12 Wärtsilä engines operating continuously on ULSD. In the case of dual-fuel boilers, the higher emissions for each pollutant associated with either fuel are provided in this table. The mining activity (fugitive sources) and mobile machinery total emissions represent the maximum annual emissions over the Project life. As shown in Table 2-1, the total maximum emissions occur during life of mine (LOM) year 16 for PM<sub>2.5</sub>; LOM year 19 for CO, NO<sub>x</sub>, SO<sub>2</sub>, and VOC; and LOM year 20 for PM<sub>10</sub> and PM.

Process, power generation, and ancillary source specifications, annual potential emissions, and exhaust parameters are presented in Appendix A. The source parameters listed in Appendix A are release-point-specific.

In addition to the criteria pollutant emissions discussed in this section, Hazardous Air Pollutants (HAP) will be emitted from the Project. The estimated potential HAP emissions from the Project are less than 10 ton/yr of a single HAP or 25 ton/yr of combined HAPs. Therefore, the Project will be classified as an area (or minor) source for HAPs. Detailed emission calculations, including HAPs, are provided in Appendix B.

## 2.2.2 Construction Emissions

Construction of the Project is expected to occur over a three-to-four-year period. The total construction emissions during this period are summarized in Table 2-2.

**Table 2-2. Project Construction Emissions Summary (ton)**

Source Category	CO	NO <sub>x</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM	SO <sub>2</sub>	VOC
Fugitive Sources	152	4	105	749	3,011	0	0
Mobile Machinery	2,055	861	16	16	16	4	152
Project Total	2,207	865	121	765	3,027	4	152

As shown in Table 2-2, the total construction emissions are significantly less than the annual emissions during operation shown in Table 2-1.

### 3.0 OWNER REQUESTED LIMIT

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Donlin Gold intends to limit formaldehyde emissions from the 12 Wärtsilä engines (EU IDs 1 through 12) at the power plant to less than 10 ton/yr to avoid being classified as a HAP major source. To accomplish this, Donlin Gold is requesting an ORL per 18 AAC 50.225 for formaldehyde across all 12 Wärtsilä engines. Donlin Gold proposes that the formaldehyde emissions from all 12 Wärtsilä engines combined be limited to 9.7 ton/yr on a 12-month rolling basis. Compliance with the annual limit will be achieved by the following requirements taken from Condition 46 of the current Air Permit:

46. The Permittee shall limit the total formaldehyde from EU IDs 1 through 12 to no more than 9.7 tons per 12-month rolling period. To show compliance with the formaldehyde limit the Permittee shall:

- 46.1 Operate and maintain, according to the manufacturer's recommendation, an oxidation catalyst control for EU IDs 1 through 12 for removing formaldehyde to less than or equal to 0.184 lb/hr per engine.
  - a. The Permittee shall submit to the Department vendor verification of the 0.184 lb/hr per engine formaldehyde emission rate at least 60 days before initial startup of any of EU IDs 1 through 12.
  - b. The Permittee shall conduct an initial formaldehyde source test on any three of EU IDs 1 through 12, within 365 days of any of EU IDs 1 through 12 becoming fully operational on natural gas as outlined in Conditions 46.1b(i) through 46.1b(vi).
    - (i) Conduct each source test while firing natural gas.
    - (ii) Conduct each source test downstream of each oxidation catalyst.
    - (iii) Use the applicable test method set out in 40 C.F.R. 60, Appendix A. The Permittee shall source test downstream of the oxidation catalyst.
    - (iv) Each source test shall consist of at least three 1-hour or longer valid test runs. Emission results shall be reported as the arithmetic average of all valid test runs and shall be in terms of pounds per hour.
    - (v) During each test run, the inlet temperature and pressure drop across each of the oxidation catalyst units shall be measured.

- (vi) The Permittee shall report the results of the source test(s) to the Department within 60 calendar days after completing the test(s).
- c. Conduct a source test for formaldehyde on a replacement engine that is not an identical make/ model for the engine being replaced for any of EU IDs 1 through 12 according to Conditions 46.1b(i) through 46.1b(vi) and within 120 days of initial startup of a replacement engine.
- d. Conduct a source test for formaldehyde on a replacement oxidation catalyst unit that is not an identical make/ model for the oxidation catalyst being replaced for any of EU IDs 1 through 12 according to Conditions 46.1b(i) through 46.1b(vi) and within 120 days of the oxidation catalyst unit replacement.
- e. In the source test report required by Condition 46.1b(vi) compare the annual formaldehyde emissions assuming continuous operation of EU IDs 1 through 12 to the maximum 9.7 tons per year specified in Condition 46. If the annual formaldehyde emissions are greater than 9.7 tons per year report as excess emissions and permit deviations under Condition 52.3

46.2 Monitor the oxidation catalyst operating parameters as follows:

- a. Install temperature sensing devices to monitor the inlet temperature of each installed oxidation catalyst unit.
  - (i) Monitor engine exhaust temperature at the inlet to each oxidation catalyst unit at least once per hour during all periods of operation. Record for each calendar day the minimum and maximum inlet gas temperature of each oxidation catalyst unit. Data capture and recording may be electronic.
  - (ii) Report the minimum and maximum daily inlet gas temperature of each oxidation catalyst unit for each calendar month in the operating report required by Condition 53.4
  - (iii) Report in accordance with Condition 52, whenever the inlet gas temperature of an oxidation catalyst unit is outside the acceptable range

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<sup>3</sup> Condition 52 of the Air Permit is: Excess Emissions and Permit Deviation Reports.

<sup>4</sup> Condition 53 of the Air Permit is: Operating Reports. The Permittee shall submit to the Department an operating report by August 1 for the period January 1 through June 30 of the current year and by February 1 for the period July 1 through December 31 of the previous year.

identified in the manufacturer's specifications. The report should include any corrective actions taken.

- b. Install gauges before and after the oxidation catalyst controls to monitor the pressure drop across each installed oxidation catalyst unit.
  - (i) Maintain the oxidation catalyst controls such that the pressure drop across each oxidation unit is within the acceptable range identified in the manufacturer's specifications.
  - (ii) If the pressure drop exceeds the acceptable differential identified in the manufacturer's specifications, the oxidation catalyst unit shall be inspected, cleaned, or replaced, as necessary.
  - (iii) Report in accordance with Condition 52, whenever the pressure drop across an oxidation catalyst unit is outside the acceptable range identified in the manufacturer's specifications. The report should include any corrective actions taken.

## 4.0 REGULATORY APPLICABILITY ANALYSIS

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This section presents the federal and Alaska regulatory applicability determination analysis for the Project sources.

### 4.1 Applicable Regulations

#### 4.1.1 Prevention of Significant Deterioration Construction Permit

A comparison of the Project stationary source emissions with the applicable PSD major source thresholds is provided in Table 4-1 (fugitive and mobile machinery emissions are not included for a PSD major source determination per 40 CFR 52.21(b)(1)(iii)).

**Table 4-1. Project Potential Emissions and PSD Major Source Thresholds (ton/yr)**

Parameter	CO	NO <sub>x</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM	SO <sub>2</sub>	VOC
Process and Ancillary Source Emissions	1,256	1,225	639	656	688	23	1,168
PSD Major Source Threshold	250	250	250	250	250	250	250
PSD Review Triggered	Yes	Yes	Yes	Yes	Yes	No	Yes

This table shows that the Project has the potential to emit 250 ton/yr or more of a regulated New Source Review pollutant; therefore, it is subject to PSD permitting requirements pursuant to the 18 AAC 50.302(a)(1), 50.306, and 40 CFR 52.21(a)(2)(iii). This PSD Construction Permit Application Report is submitted with the intent to obtain a PSD construction permit in order to comply with the applicable PSD permitting requirements.

#### 4.1.2 Best Available Control Technology Review

The Project is classified as a PSD major source; therefore, it is subject to the Best Available Control Technology (BACT) review under 40 CFR 52.21(j)(2) for each regulated pollutant (including greenhouse gases) with the potential to emit greater than the applicable PSD major source or significant emission thresholds. A detailed source specific BACT analysis is provided in Appendix C.

#### 4.1.3 Ambient Air Quality Analysis

As a part of a PSD construction permit application, Donlin Gold is required to conduct an air quality analysis per 40 CFR 51.21(m). An air quality analysis report showing the Project compliance with the applicable ambient standards and increments is provided in Appendix D.

#### 4.1.4 Mandatory Greenhouse Gas Reporting

The Project is subject to the mandatory greenhouse gas reporting requirement of 40 CFR 98 because it meets the requirements listed in §98.2(a)(3).

All applicable recordkeeping and reporting requirements will be met according to the requirements of this regulation.

#### **4.1.5 National Emission Standards for Hazardous Air Pollutants**

The HAP emission calculations for the Project are provided in Appendix B. Based on these calculations and the ORL (addressed in Section 3.0), the Project is classified as an area source for HAP emissions. The National Emission Standards for Hazardous Air Pollutants (NESHAP) from 40 CFR 63 applicable to the Project are outlined in the following sections.

##### **4.1.5.1 Subpart ZZZZ – NESHAP for Stationary Reciprocating Internal Combustion Engines**

40 CFR 63, Subpart ZZZZ, applies to all stationary reciprocating internal combustion engines (RICE) operated at an area source of HAP emissions. For new (constructed after June 12, 2006, per §63.6590(a)(2)(iii)) stationary RICE operated at an area source of HAP emissions, the compliance requirements of 40 CFR 63, Subpart ZZZZ, are met by complying with the requirements of 40 CFR 60, Subparts IIII and/or JJJJ.

All stationary RICE located at the Project will be classified as new sources per this subpart and, therefore, will be subject to the compliance requirements of 40 CFR 60, Subparts IIII and/or JJJJ per §63.6590(c)(1).

##### **4.1.5.2 Subpart EEEEEEE – NESHAP: Gold Mine Ore Processing and Production Area Source Category**

40 CFR 63, Subpart EEEEEEE, applies to gold mine ore processing and production facilities at an area source of HAP emissions, as defined under §63.11651. According to §63.11651, the following emission sources at the Project are subject to this subpart:

- Autoclaves
- Carbon regeneration kiln
- Electrowinning circuit – Electrowinning cells and pregnant solution tanks
- Mercury retort
- Induction smelting furnace

Per §63.11645(e), the proposed autoclaves are subject to the mercury emission standard of less than or equal to 84 pounds per million tons of ore processed. The remaining sources are subject to the mercury emission standard of less than or equal to 0.8 lb/ton of concentrate processed, per §63.11645(f).

All applicable compliance, monitoring, recordkeeping, testing, and reporting requirements will be met according to the requirements of this subpart.

## **4.1.6 New Source Performance Standards**

The New Source Performance Standards (NSPS) from 40 CFR 60 applicable to the Project are outlined in the following sections.

### **4.1.6.1 Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units**

40 CFR 60, Subpart Dc, applies to each steam generating unit constructed after June 9, 1989, with a maximum heat input capacity of greater than 10 MMBtu/hr and less than 100 MMBtu/hr, per §60.40c(a).

The oxygen plant boiler, carbon elution heater, and two power plant auxiliary heaters meet the applicability requirements of this subpart. These sources are required to meet the following emission standards per §60.42c(d):

1. SO<sub>2</sub> limit of no more than 0.5 lb/MMBtu; or
2. Sulfur limit of no more than 0.5 percent weight

These units are rated at less than 30 MMBtu/hr each; therefore, they are not subject to the PM and opacity limits of §60.43c.

The two proposed POX boilers are classified as “process heaters”<sup>5</sup> per §60.41c; therefore, they are not subject to this subpart. The air handler heaters are also not subject to NSPS Dc because they do not heat “any heat transfer medium” (§60.41c) across a physical barrier (i.e., heat exchanger).

All applicable compliance, monitoring, recordkeeping, testing, and reporting requirements will be met according to the requirements of this subpart.

### **4.1.6.2 Subpart LL – Standards of Performance for Metallic Mineral Processing Plants**

40 CFR 60, Subpart LL, applies to metallic mineral processing plants that use the specified processing equipment listed in §60.380.

The following are the proposed ore processing sources at the Project with emissions vented through stacks, and that are subject to the requirements of 40 CFR 60, Subpart LL:

- Gyratory crushing circuit

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<sup>5</sup> “Process heater means a device that is primarily used to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst.” [40 CFR 60.41c] In this case, the POX boilers produce steam (i.e., “heat a material”), which is injected directly into the autoclaves along with oxygen, to promote the oxidation reaction.



- Coarse ore reclaim apron feeders
- Pebble crushers

These sources are required to meet the following emission standards per §60.382(a)(1) and (2):

1. PM limit of no more than 0.05 grams per dry standard cubic meter
2. Opacity limit of no more than 7 percent

The dust emissions from the proposed gyratory crusher dump pocket and conveyor transfer points at the Project will be fugitive (i.e., not vented through stacks) and are only subject to the opacity standard of no more than 10 percent, per §60.382(b).

All applicable compliance, monitoring, recordkeeping, testing, and reporting requirements will be met according to the requirements of this subpart.

#### **4.1.6.3 Subpart CCCC – Standards of Performance for Commercial and Industrial Solid Waste Incineration Units**

40 CFR 60, Subpart CCCC, applies to new commercial and industrial solid waste incineration (CISWI) units that meet the definition of CISWI in §60.2265, and that commence construction after June 4, 2010, and that are not exempt under §60.2020.

The camp waste incinerator proposed at the Project will combust less than 12 tons of waste per day (but potentially more than 3 tons per day) and will comply with the applicability requirements of this subpart.

The emission standards for incinerators listed in Table 5 of this subpart apply to this source. Appropriate control equipment will be selected as needed to comply with this subpart.

All applicable emission standards, compliance, monitoring, recordkeeping, testing, and reporting requirements will be met according to the requirements of this subpart.

#### **4.1.6.4 Subpart LLLL – Standards of Performance for New Sewage Sludge Incineration Units**

40 CFR 60, Subpart LLLL, applies to new sewage sludge incineration (SSI) units that meet the definition of an SSI unit in §60.4930, and that commence construction after October 14, 2010, and that are not exempt under §60.4780.

The SSI unit proposed at the Project will combust approximately 0.058 tons of sewage sludge per day and meets the applicability requirements of this subpart.

The emission standards for new multiple hearth SSI units listed in Table 2 of this subpart apply to this source. Appropriate control equipment will be selected as needed to comply with this subpart.

All applicable emission standards, compliance, monitoring, recordkeeping, testing, and reporting requirements will be met according to the requirements of this subpart.

#### **4.1.6.5 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines**

All stationary compression ignition (CI) internal combustion engines (ICE) proposed at the Project will be ordered after the applicable trigger dates specified in §60.4200, and they are therefore subject to the compliance requirements of this subpart.

The emission standards applicable to these engines are provided in Appendix B.

All applicable emission standards, compliance, monitoring, recordkeeping, testing, and reporting requirements will be met according to the requirements of this subpart.

#### **4.1.6.6 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines**

The proposed power plant will consist of 12 dual-fuel (NG and ULSD) engines. These engines will primarily operate on NG and will be ordered after the applicable trigger date specified in §60.4230. They are therefore subject to the compliance requirements of this subpart.

The emission standards applicable to these engines are provided in Appendix B.

All applicable emission standards, compliance, monitoring, recordkeeping, testing, and reporting requirements will be met according to the requirements of this subpart.

### **4.1.7 Alaska Air Quality Control Regulations (18 AAC 50)**

The Alaska Air Quality Control regulations (18 AAC 50) applicable to the Project are described in this section.

#### **4.1.7.1 Federal Standards Adopted by Reference (18 AAC 50.040)**

The federal regulations addressed in the preceding sections have been adopted by reference in 18 AAC 50.040.

#### **4.1.7.2 Incinerator Emission Standards (18 AAC 50.050)**

The camp waste and sewage sludge incinerators proposed at the Project are subject to the opacity standards of no more than 20 percent per 18 AAC 50.050(a). These sources are not subject to the PM limit per 18 AAC 50.050(b) because they are rated at less than 1,000 lb/hr.

Both incinerators proposed at the Project will meet the opacity limit of this regulation.

#### **4.1.7.3 Industrial Processes and Fuel-Burning Equipment (18 AAC 50.055)**

The proposed industrial processes and fuel-burning equipment at the Project are subject to the following emission standards specified in 18 AAC 50.055:

1. PM limit of no more than 0.05 grains per dry standard cubic foot.
2. Opacity limit of no more than 20 percent.
3. SO<sub>2</sub> limit of no more than 500 parts per million.

All proposed sources at the Project will meet the respective applicable emission standards of this regulation.

#### **4.1.7.4 Title V Operating Permits Insignificant Sources (18 AAC 50.326)**

The following proposed units at the Project are insignificant sources based on their emission rates per 18 AAC 50.326(e):

- Auxiliary SO<sub>2</sub> Burner

The following proposed units at the Project are insignificant sources based on their size per 18 AAC 50.326(g):

- Primary SO<sub>2</sub> Burner
- Air Handler Heaters (2.5 MMBtu/hr rated units)
- Portable Heaters
- Building Heaters
- ANFO Mixing Plant Tank
- Mill, Tank Farm, and Camp Fire Pump Tanks
- POX Boiler Tank
- Oxygen Plant Boiler Tank

- Carbon Elution Heater Tank
- Jet Fuel Tanks 1 and 2
- Auxiliary SO<sub>2</sub> Burner Tank
- Airport Generator Tank

## **4.2 Inapplicable Regulations**

### **4.2.1 NESHAP**

The NESHAP regulations from 40 CFR Parts 61 and 63 that do not apply to the Project are addressed in this section.

#### **4.2.1.1 Subpart E – National Emission Standard for Mercury**

40 CFR 61, Subpart E, applies to sources that process mercury ore to recover mercury, use mercury chlor-alkali cells to produce chlorine gas and alkali metal hydroxide, and incinerate or dry wastewater treatment plant sludge. Operations at the Project do not include processing mercury ore for mercury recovery or use mercury chlor-alkali cells to produce chlorine gas and alkali metal hydroxide. Also, the proposed sewage sludge incinerator will not incinerate wastewater sludge from the mercury processes mentioned in this subpart. Therefore, the Project is not subject to this subpart.

#### **4.2.1.2 Subpart CCCCCC – NESHAP for Source Category: Gasoline Dispensing Facilities**

40 CFR 63, Subpart CCCCCC, applies to each gasoline dispensing facility located at an area source. This includes each gasoline cargo tank during delivery of the product to a gasoline dispensing facility and each storage tank. The loading of aviation gasoline into storage tanks at an airport and the transfer of aviation gasoline within an airport is not subject to this regulation per §63.11111(g). Therefore, the proposed 5,000-gallon aviation gasoline tank at the Project airport site is not subject to this subpart.

#### **4.2.1.3 Subpart JJJJJJ – NESHAP for Industrial, Commercial, and Institutional Boilers Area Sources**

40 CFR 63, Subpart JJJJJJ, applies to industrial, commercial, and institutional boilers operated at an area source of HAP emissions. Per §63.11194(a)(2), an affected source must fall within a boiler subcategory listed in §63.11200 and meet the definition of the subcategory in §63.11237.

The ULSD-fired auxiliary SO<sub>2</sub> burner rated at 2 MMBtu/hr does not meet the definition of “boiler” per §63.11237. Therefore, this burner is not subject to this subpart.

The ULSD-fired portable heaters meet the definition of temporary boilers in §63.11237 and, therefore, are exempt from 40 CFR 63 Subpart JJJJJJ per §63.11195(h).

All other proposed boilers at the Project will be primarily fired with NG; some (dual fuel) boilers may utilize ULSD, but only in the event of gas supply interruption. Therefore, these boilers meet the definition of gas-fired boilers listed in §63.11237. Gas-fired boilers are not subject to this subpart per §63.11195(e).

#### **4.2.2 NSPS**

The NSPS regulations from 40 CFR Part 60 that do not apply to the Project are addressed in this section.

##### **4.2.2.1 Subpart Db – Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units**

40 CFR 60 Subpart Db applies to steam generating units with a heat input capacity of greater than 100 MMBtu/hr per §60.40b(a). All the proposed steam generating units at the Project are rated at less than 100 MMBtu/hr; therefore, they are not subject to this subpart.

##### **4.2.2.2 Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels**

All the proposed fuel storage tanks at the Project that are less than 75 cubic meters are not subject to this subpart per §60.110b(a). All the proposed fuel storage tanks at the Project that are greater than 75 cubic meters will only store ULSD, which has a true vapor pressure of less than 3.5 kilopascals; therefore, they are not subject to this subpart per §60.110b(b).

##### **4.2.2.3 Subpart KKKK – Standards of Performance for Stationary Combustion Turbines**

The steam turbine proposed for the Project power plant is not a combustion turbine; therefore, it is not subject to this subpart.

## **Appendix A – Process, Power Generation, and Ancillary Source Information**

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## **Process, Power Generation, and Ancillary Source Information**

### **Donlin Gold Project, Alaska**

PREPARED FOR:  
DONLIN GOLD LLC

PROJECT NO. 281-21B-1  
OCTOBER 27, 2021

Process, Power Generation, and Ancillary Source Specifications and Potential Emissions

Model ID	Source ID	Permit EU ID	Source Description	Release Points	Per Release Point									
					Rating	Control	Control ID	Control EU ID	CO (ton/yr)	NO <sub>x</sub> (ton/yr)	PM <sub>2.5</sub> (ton/yr)	PM <sub>10</sub> (ton/yr)	SO <sub>2</sub> (ton/yr)	VOC (ton/yr)
Ore Crushing, Grinding, Flotation, and Reagents														
OREDUMP	11-BIN-100	38	Gyratory Crusher Dump Pocket and Rock Breaker	1	5,100 ton/hr	Enclosure	--	--	--	--	0.762	5.033	--	--
81DCL100	11-CRU-100, 11-BIN-150, 11-FEE-150	41-43	Gyratory Crusher, Surge Pocket, Apron Feeder (common exhaust)	1	5,100 ton/hr	Dust Collector	81-DCL-100	40	--	--	9.391	9.391	--	--
ORETRFER	11-CVB-100	44	Gyratory Crusher Discharge Conveyor	1	5,100 ton/hr	Enclosure	--	--	--	--	0.762	5.033	--	--
ORESTKP	14-CVB-200	45	Stockpile Feed Conveyor	1	5,100 ton/hr	Enclosure			--	--	0.762	5.033	--	--
81DCL200	14-FEE-200, 210, 220, 230	46, 48, 50, 52	Coarse Ore Reclaim Apron Feeder	4	3,303 ton/hr, total	Dust Collector	81-DCL-200, 300, 400, 500	47, 49, 51, 53	--	--	2.099	2.099	--	--
SAGFEED	16-CVB-300	54	SAG Mill Feed Conveyor	1	3,303 ton/hr	Enclosure	--		--	--	0.494	3.259	--	--
81DCL600	16-CRU-200, 300	55-56	Pebble Crushers (common exhaust)	1	660 ton/hr, total	Dust Collector	81-DCL-600	57	--	--	11.269	11.269	--	--
480TO300	16-CVB-480	58	Pebble Discharge Conveyor	1	660 ton/hr	Enclosure	--	--	--	--	0.099	0.651	--	--
15FIL535	15-HOP-535	59	Lime Hopper	1	34,491 ton/yr	Dust Collector	15-FIL-535	60	--	--	1.126	1.126	--	--
15DCL700	15-BIN-800	61	Lime Silo	1	34,491 ton/yr	Dust Collector	15-DCL-700	62	--	--	1.126	1.126	--	--
15SBW550	15-MIL-400	63	Lime Slaker	1	34,491 ton/yr	Wet Scrubber	15-SBW-550	64	--	--	0.472	0.472	--	--
15DCLXFL	15-FLOC	65	Flocculant Handling and Mixing	1	3,662 ton/yr	Dust Collector	15-DCL-XFL	66	--	--	0.631	0.631	--	--
15DCL100	15-NAOH	67	Caustic Soda Handling and Mixing	1	304 ton/yr	Dust Collector	15-DCL-100	68	--	--	0.994	0.994	--	--
15DCL105	15-CUSO4	69	Copper Sulfate Handling and Mixing	1	2,436 ton/yr	Dust Collector	15-DCL-105	70	--	--	2.254	2.254	--	--
15DCL110	15-PAX	71	Xanthate Handling and Mixing	1	4,306 ton/yr	Dust Collector	15-DCL-110	72	--	--	2.254	2.254	--	--
15DCL520	15-SODA1	73	Soda Ash Handling	1	1,076 ton/yr	Dust Collector	15-DCL-520	74	--	--	1.502	1.502	--	--
15DCL115	15-SODA2	75	Soda Ash Mixing	1	1,076 ton/yr	Dust Collector	15-DCL-115	76	--	--	2.254	2.254	--	--
Acidulation and CCD Washing														
--	31-TNK-210, 215	124	Acidulation Tanks (common exhaust)	1	--	--	--		--	--	--	--	--	--
Autoclaving														
ACLAVE1	17-AUT-101, 201	77, 81	Autoclave	2	210 ton/hr	Condenser Venturi Scrubber VOC/Hg Carbon Filter	17-VEA-103, 203 17-SBW-101, 201 17-VEA-104, 204	78, 82 79, 83 80, 84	385.518	--	0.966	0.966	4.896	0.185
17BLR301	17-BLR-301, 302	15, 16	POX Boiler	2	29.29 MMBtu/hr		--	--	10.565	19.712	0.956	0.986	0.199	0.692
33BLR001	33-BLR-001	17	Oxygen Plant Boiler	1	20.66 MMBtu/hr		--	--	7.453	13.906	0.674	0.695	0.141	0.488
17STKXHC	17-TNK-302, 303, 304	85-87	POX Hot Cure Tank (common exhaust)	1	--	Good Operating Practices (GOP)	--	--	--	--	1.749	1.749	--	--



Process, Power Generation, and Ancillary Source Specifications and Potential Emissions

Model ID	Source ID	Permit EU ID	Source Description	Release Points	Per Release Point								
					Rating	Control	Control ID	Control EU ID	CO (ton/yr)	NO <sub>x</sub> (ton/yr)	PM <sub>2.5</sub> (ton/yr)	PM <sub>10</sub> (ton/yr)	SO <sub>2</sub> (ton/yr)
CCD POX Thickening and Washing, and Neutralization													
--	74-TNK-320, 325, 330, 335, 365	125	Neutralization Tank (common exhaust)	1	--	GOP	--	--	--	--	--	--	--
Cyanide Destruction System													
15BRN100	15-BRN-100	21	SO2 Burner	1	2 MMBtu/hr	Clean Fuel / GOP	--	--	0.721	0.859	0.065	0.065	0.005 0.047
Carbon Elution, Electrowinning, Reactivation, and Gold Refining													
56BLR200	56-BLR-200	18	Carbon Elution Heater	1	16 MMBtu/hr		--	--	5.771	10.768	0.522	0.538	0.109 0.378
37STK110	37-EWN-100, 200, 300, 400, 56-TNK- 518, 512, 19- TNK-520	91-94	Electrowinning Circuit - EW Cells, Pregnant and Barren Solution Tanks (common exhaust)	1	211 gpm, total	Demister	37-DEM-XEW	95	--	--	0.825	0.825	-- --
						Carbon Filter	37-FIL-110	96					
56STK115	56-KLN-100	88	Carbon Regeneration Kiln	1	1.65 ton/hr	Off Gas Cooler Carbon Filter	56-CDO-300 56-FIL-205	89 90	3.849	0.077	1.925	1.925	-- 1.925
19STKXRE	19-VEZ-100	97	Mercury Retort	1	--	Condenser Carbon Filter	19-CDO-100 19-COL-100	98 99	--	--	0.133	0.133	-- --
19STK105	19-FUR-100	100	Induction Smelting Furnace	1	--	Dust Collector Carbon Filter	19-DCL-XFU 19-FIL-XFU	101 102	--	--	4.152	4.152	-- --
Power Generation													
ENGINE1	W1 to 12	1-12	Power Plant Generator Engine - Wärtsilä 18V50DF ULSD Mode	12	16,786 kWe	SCR Oxidation Catalyst	-- --	-- --	29.176	85.908	47.006	47.006	0.959 93.562
			Power Plant Generator Engine - Wärtsilä 18V50DF NG Mode	12	17,076 kWe	SCR Oxidation Catalyst	-- --	-- --	19.787	13.191	21.436	21.436	0.378 40.791
GENAIRP1	ADG1, 2	13-14	Airport Generator Engine	2	200 kWe	Clean Fuel / GOP	--	--	8.449	0.966	0.048	0.048	0.013 0.459
GENBLCK1	BEDG1, 2	29-30	Black Start Generator Engine	2	600 kWe	Clean Fuel / GOP	--	--	1.447	2.646	0.083	0.083	0.002 2.646
Emergency Equipment													
GENCAMP1	CEDG1 to 4	31-34	Emergency Generator Engine	4	1,500 kWe	Clean Fuel / GOP	--	--	3.617	6.614	0.207	0.207	0.006 6.614
FPTANK	FP1 to 3	35-37	Fire Pump Engine	3	252 hp	Clean Fuel / GOP	--	--	0.458	0.514	0.026	0.026	0.001 0.514

**Process, Power Generation, and Ancillary Source Specifications and Potential Emissions**

Model ID	Source ID	Permit EU ID	Source Description	Release Points	Per Release Point									
					Rating	Control	Control ID	Control EU ID	CO (ton/yr)	NO <sub>x</sub> (ton/yr)	PM <sub>2.5</sub> (ton/yr)	PM <sub>10</sub> (ton/yr)	SO <sub>2</sub> (ton/yr)	VOC (ton/yr)
Ancillary Sources														
PPHTR100	PP-HEU-100, 200	19-20	Power Plant Auxiliary Heater	2	16.5 MMBtu/hr	Low NOx Burner	--	--	5.95	11.10	0.54	0.56	0.11	0.39
15BRNAUX	1-15-BRN-100	22	Auxiliary SO2 Burner	1	2 MMBtu/hr	Clean Fuel / GOP	--	--	0.336	1.346	0.017	0.067	0.014	0.0229
BHEAT1	81-HEU-1 to 138	23	Building Heater	138	0.175 MMBtu/hr	Clean Fuel / GOP	--	--	0.030	0.071	0.006	0.006	0.0005	0.004
AIRH1	81-HVA-104 to 107, 109, 111 to 113, 126, 127, 201 to 207, 220, 230	24	Air Handler Heater	19	5 MMBtu/hr	Clean Fuel / GOP	--	--	1.804	2.147	0.163	0.163	0.013	0.118
AIRH9	81-HVA-108, 119, 231, 233, 234, 253, 257	25	Air Handler Heater	7	2.5 MMBtu/hr	Clean Fuel / GOP	--	--	0.902	1.074	0.082	0.082	0.006	0.059
PHEAT2	PBH1 to 20	26	Portable Building Heater	20	0.86 MMBtu/hr	Clean Fuel / GOP	--	--	0.145	0.579	0.007	0.029	0.006	0.010
54DCL710	61-COND	111	Water Treatment Plant Conditioning	1	--	Dust Collector	54-DCL-710	112	--	--	1.126	1.126	--	--
WINCIN	CWI	27	Camp Waste Incinerator	1	990 lb/hr	As needed to meet 40 CFR 60 Subpart CCCC	--	--	0.351	0.780	0.319	0.319	0.520	--
SINCIN	SSI	28	Sewage Sludge Incinerator	1	0.058 ton/day	As needed to meet 40 CFR 60 Subpart LLLL	--	--	0.010	0.064	0.009	0.009	0.011	--
24DCLXL1	24-LAB1	103-104	Sample Receiving and Preparation Laboratory	1	3,575 lb/day	Dust Collector	24-DCL-XL1	105	--	--	1.989	1.989	--	--
24DCLXL2	24-LAB2	106	Assay Laboratory	1	3,575 lb/day	Dust Collector	24-DCL-XL2	107	--	--	4.137	4.137	--	--
24DCLXL3	24-LAB3	108-109	Metallurgical Laboratory	1	3,575 lb/day	Dust Collector	24-DCL-XL3	110	--	--	1.989	1.989	--	--
--	36-TNK-870 to 881, 885 to 887	126-140	Tank Farm Tank	15	7,500,000 gal/yr	Submerged Fill	--	--	--	--	--	--	--	0.101
--	36-TNK-896, 897	141-142	Fuel Station Tank	2	19,035,000 gal/yr	Submerged Fill	--	--	--	--	--	--	--	0.020
--	ANFOTNK1	143	ANFO Mixing Plant Tank	1	1,106,184 gal/yr	Submerged Fill	--	--	--	--	--	--	--	0.002
--	FPTNK1 to 3	144-145, 153	Fire Pump Tank	3	6,776 gal/yr	Submerged Fill	--	--	--	--	--	--	--	0.00005
--	POXTNK	146	POX Boilers Tank	1	3,942,411 gal/yr	Submerged Fill	--	--	--	--	--	--	--	0.004
--	O2TNK	147	Oxygen Plant Boiler Tank	1	1,390,621 gal/yr	Submerged Fill	--	--	--	--	--	--	--	0.0020
--	CETNK	148	Carbon Elution Heater Tank	1	1,076,771 gal/yr	Submerged Fill	--	--	--	--	--	--	--	0.0016
--	AUXTNK	149	Auxiliary SO2 Burner Tank	1	134,596 gal/yr	Submerged Fill	--	--	--	--	--	--	--	0.0002
--	36-TNK-903, 904	150-151	Power Plant Tank	2	3,899,388 gal/yr	Submerged Fill	--	--	--	--	--	--	--	0.009
--	36-TNK-913	152	Camp Generator Tank	1	218,800 gal/yr	Submerged Fill	--	--	--	--	--	--	--	0.002
--	AJTNK1, 2	154-155	Jet Fuel Tank	2	55,000 gal/yr	Submerged Fill	--	--	--	--	--	--	--	0.080
--	AGTNK1	156	Aviation Gasoline Tank	1	10,000 gal/yr	Submerged Fill	--	--	--	--	--	--	--	0.087
--	ADTNK1	157	Airport Generator Tank	1	252,695 gal/yr	Submerged Fill	--	--	--	--	--	--	--	0.001

## Process, Power Generation, and Ancillary Source Source Parameters

Model ID	Source ID	Permit EU ID	Source Description	Release Points	Per Release Point					
					Release Height (m)	Exhaust Temperature (°K)	Exhaust Velocity (m/s)	Exhaust Diameter (m)	Exhaust Flow (m <sup>3</sup> /s)	Source Type
Ore Crushing, Grinding, Flotation, and Reagents										
OREDUMP	11-BIN-100	38	Gyratory Crusher Dump Pocket and Rock Breaker	1	6.93	N/A	N/A	N/A	N/A	VOLUME
81DCL100	11-CRU-100, 11-BIN-150, 11-FEE-150	41-43	Gyratory Crusher, Surge Pocket, Apron Feeder (common exhaust)	1	17.90	Ambient	12.42	1.10	11.81	POINTCAP
ORETRFER	11-CVB-100	44	Gyratory Crusher Discharge Conveyor	1	3.70	N/A	N/A	N/A	N/A	VOLUME
ORESTKP	14-CVB-200	45	Stockpile Feed Conveyor	1	22.40	N/A	N/A	N/A	N/A	VOLUME
81DCL200	14-FEE-200, 210, 220, 230	46, 48, 50, 52	Coarse Ore Reclaim Apron Feeder	4	2.00	Ambient	13.02	0.51	2.64	POINTCAP
SAGFEED	16-CVB-300	54	SAG Mill Feed Conveyor	1	18.30	N/A	N/A	N/A	N/A	VOLUME
81DCL600	16-CRU-200, 300	55-56	Pebble Crushers (common exhaust)	1	19.00	Ambient	14.91	1.10	14.17	POINTCAP
480TO300	16-CVB-480	58	Pebble Discharge Conveyor	1	2.30	N/A	N/A	N/A	N/A	VOLUME
15FIL535	15-HOP-535	59	Lime Hopper	1	7.00	Ambient	6.21	0.38	0.71	POINTCAP
15DCL700	15-BIN-800	61	Lime Silo	1	16.70	Ambient	6.21	0.38	0.71	POINTCAP
15SBW550	15-MIL-400	63	Lime Slaker	1	39.45	Ambient	2.60	0.38	0.30	POINTCAP
15DCLXFL	15-FLOC	65	Flocculant Handling and Mixing	1	7.00	Ambient	3.48	0.38	0.40	POINTCAP
15DCL100	15-NAOH	67	Caustic Soda Handling and Mixing	1	39.45	Ambient	5.48	0.38	0.63	POINTCAP
15DCL105	15-CUSO4	69	Copper Sulfate Handling and Mixing	1	39.45	Ambient	12.43	0.38	1.42	POINTCAP
15DCL110	15-PAX	71	Xanthate Handling and Mixing	1	39.45	Ambient	12.43	0.38	1.42	POINTCAP
15DCL520	15-SODA1	73	Soda Ash Handling	1	39.45	Ambient	8.28	0.38	0.94	POINTCAP
15DCL115	15-SODA2	75	Soda Ash Mixing	1	39.45	Ambient	12.43	0.38	1.42	POINTCAP
Acidulation and CCD Washing										
--	31-TNK-210, 215	124	Acidulation Tanks (common exhaust)	1	--	--	--	--	--	--
Autoclaving										
ACLAVE1	17-AUT-101, 201	77, 81	Autoclave	2	26.70	313.15	9.17	0.75	4.05	POINTCAP
17BLR301	17-BLR-301, 302	15, 16	POX Boiler	2	26.70	477.59	10.72	0.75	4.73	POINTCAP
33BLR001	33-BLR-001	17	Oxygen Plant Boiler	1	3.66	477.59	45.78	0.30	3.34	POINTCAP
17STKXHC	17-TNK-302, 303,	85-87	POX Hot Cure Tank (common exhaust)	1	16.69	373.15	8.21	0.10	0.06	POINTCAP

## Process, Power Generation, and Ancillary Source Source Parameters

Model ID	Source ID	Permit EU ID	Source Description	Release Points	Per Release Point					
					Release Height (m)	Exhaust Temperature (°K)	Exhaust Velocity (m/s)	Exhaust Diameter (m)	Exhaust Flow (m³/s)	Source Type
CCD POX Thickening and Washing, and Neutralization										
--	74-TNK-320, 325, 330, 335, 365	125	Neutralization Tank (common exhaust)	1	--	--	--	--	--	--
Cyanide Destruction System										
15BRN100	15-BRN-100		SO2 Burner	1	37.75	477.59	17.97	0.15	0.33	POINTCAP
Carbon Elution, Electrowinning, Reactivation, and Gold Refining										
56BLR200	56-BLR-200	18	Carbon Elution Heater	1	43.54	467.04	11.55	0.51	2.34	POINTCAP
37STK110	37-EWN-100, 200, 300, 400, 56-TNK- 518, 512, 19-TNK- 520	91-94	Electrowinning Circuit - EW Cells, Pregnant and Barren Solution Tanks (common exhaust)	1	39.45	356.15	9.58	0.80	4.82	POINTCAP
56STK115	56-KLN-100	88	Carbon Regeneration Kiln	1	39.45	312.15	10.09	0.40	1.27	POINTCAP
19STKXRE	19-VEZ-100	97	Mercury Retort	1	39.45	314.15	5.48	0.13	0.07	POINTCAP
19STK105	19-FUR-100	100	Induction Smelting Furnace	1	39.45	353.15	10.08	1.30	13.38	POINTCAP
Power Generation										
ENGINE1	W1 to 12	1-12	Power Plant Generator Engine - Wärtsilä 18V50DF ULSD Mode	12	49.00	458.15	21.95	1.60	44.14	POINT
			Power Plant Generator Engine - Wärtsilä 18V50DF NG Mode	12	49.00	458.15	17.94	1.60	36.06	POINT
GENAIRP1	ADG1, 2	13-14	Airport Generator Engine	2	3.66	764.15	10.74	0.30	0.76	POINTCAP
GENBLCK1	BEDG1, 2	29-30	Black Start Generator Engine	2	3.66	713.15	32.25	0.30	2.28	POINTCAP
Emergency Equipment										
GENCAMP1	CEDG1 to 4	31-34	Emergency Generator Engine	4	3.66	764.15	80.55	0.30	5.69	POINTCAP
FPTANK	FP1 to 3	35-37	Fire Pump Engine	3	3.66	718.15	9.02	0.3	0.64	POINTCAP

## Process, Power Generation, and Ancillary Source Source Parameters

Model IDSource IDPermit EU IDSource DescriptionRelease Points					Per Release Point					
					Release Height (m)	Exhaust Temperature (°K)	Exhaust Velocity (m/s)	Exhaust Diameter (m)	Exhaust Flow (m³/s)	Source Type
Ancillary Sources										
PPHTR100	PP-HEU-100, 200	19-20	Power Plant Auxiliary Heater	2	21.81	467.04	13.16	0.51	2.67	POINTCAP
15BRNAUX	1-15-BRN-100	22	Auxiliary SO2 Burner	1	37.75	477.59	17.48	0.15	0.32	POINTCAP
BHEAT1	81-HEU-1 to 138	23	Building Heater	138	34.90	673.15	6.29	0.08	0.03	POINTCAP
AIRH1	81-HVA-104 to 107, 109, 111 to 113, 126, 127, 201 to 207, 220, 230	24	Air Handler Heater	19	34.90	673.15	25.27	0.20	0.82	POINTCAP
AIRH9	81-HVA-108, 119, 231, 233, 234, 253, 257	25	Air Handler Heater	7	34.60	673.15	22.46	0.15	0.41	POINTCAP
PHEAT2	PBH1 to 20	26	Portable Building Heater	20	2.40	673.15	30.06	0.08	0.14	POINTCAP
54DCL710	61-COND	111	Water Treatment Plant Conditioning	1	18.10	Ambient	6.21	0.38	0.71	POINTCAP
WINCIN	CWI	27	Camp Waste Incinerator	1	5.66	773.15	12.56	0.30	0.92	POINTCAP
SINCIN	SSI	28	Sewage Sludge Incinerator	1	10.20	773.15	1.26	0.15	0.02	POINTCAP
24DCLXL1	24-LAB1	103-104	Sample Receiving and Preparation Laboratory	1	35.10	293.15	13.71	0.51	2.78	POINTCAP
24DCLXL2	24-LAB2	106	Assay Laboratory	1	35.10	313.15	14.61	1.10	13.89	POINTCAP
24DCLXL3	24-LAB3	108-109	Metallurgical Laboratory	1	35.10	293.15	13.71	0.51	2.78	POINTCAP
--	36-TNK-870 to 881, 885 to 887	126-140	Tank Farm Tank	15	--	--	--	--	--	--
--	36-TNK-896, 897	141-142	Fuel Station Tank	2	--	--	--	--	--	--
--	ANFOTNK1	143	ANFO Mixing Plant Tank	1	--	--	--	--	--	--
--	FPTNK1 to 3	144-145, 153	Fire Pump Tank	3	--	--	--	--	--	--
--	POXTNK	146	POX Boilers Tank	1	--	--	--	--	--	--
--	O2TNK	147	Oxygen Plant Boiler Tank	1	--	--	--	--	--	--
--	CETNK	148	Carbon Elution Heater Tank	1	--	--	--	--	--	--
--	AUXTNK	149	Auxiliary SO2 Burner Tank	1	--	--	--	--	--	--
--	36-TNK-903, 904	150-151	Power Plant Tank	2	--	--	--	--	--	--
--	36-TNK-913	152	Camp Generator Tank	1	--	--	--	--	--	--
--	AJTNK1, 2	154-155	Jet Fuel Tank	2	--	--	--	--	--	--
--	AGTNK1	156	Aviation Gasoline Tank	1	--	--	--	--	--	--
--	ADTNK1	157	Airport Generator Tank	1	--	--	--	--	--	--

## **Appendix B - Detailed Emission Calculations**

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AIR SCIENCES INC.

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## **Detailed Emission Calculations**

### **Donlin Gold Project, Alaska**

PREPARED FOR:  
DONLIN GOLD LLC

PROJECT NO. 281-21B-1  
OCTOBER 27, 2021

## Table of Contents

### **Emissions Summary (LOM Year 16)**

Facility-Wide Emissions Summary.....	5
Detailed Emissions Summary.....	6
Life-of-Mine Mining Activity, Machinery Tailpipes, Wind Erosion, and Access Roads Emissions Summary ...	8

### **Mining Activities (LOM Year 16)**

Mining Activity Emissions Summary.....	12
Drilling (EU ID: 113).....	13
Blasting (EU ID: 114).....	14
Material Handling (Loading and Unloading) (EU ID: 115-120).....	15
Material Hauling (EU ID: 160).....	17
Maintenance Equipment (EU ID: 121-123).....	19
Wind Erosion of Exposed Surfaces (EU ID: 161).....	21

### **Mobile Machinery Tailpipes (LOM Year 16)**

Mobile Machinery Tailpipes Emissions Summary .....	23
Machinery Specifications.....	24
Machinery Operation, Fuel, and Output.....	25
Machine-Specific Emissions.....	26

### **Power Generation**

Power Generation Emissions Summary .....	27
Power Plant (EU ID: 1-12).....	28
Airport Generators (EU ID: 13-14).....	30

### **Process and Refining**

Process and Refining Emissions Summary.....	31
ROM Ore Discharge and Crushing (EU ID: 38-44).....	32
Coarse Ore Transfer to Stockpile (EU ID: 45).....	33
Coarse Ore Stockpile Reclaim and Transfer to SAG Mill (EU ID: 46-54).....	34
Pebble Crushers and Recycle (EU ID: 55-58).....	36
Reagents (EU ID: 59-76).....	37
Autoclaves (EU ID: 77-84).....	41
Pressure Oxidation Hot Cure Tanks (EU ID: 85-87).....	42
Carbon Regeneration Kiln (EU ID: 88-90).....	43
Electrowinning Circuit (EU ID: 91-96).....	44
Mercury Retort (EU ID: 97-99).....	45
Induction Smelting Furnace (EU ID: 100-102).....	46
Laboratories (EU ID: 103-110).....	47
Water Treatment Plant (EU ID: 111-112).....	48

### **Boilers and Heaters**

Boilers and Heaters Emissions Summary .....	49
Pressure Oxidation Boilers (EU ID: 15-16).....	50
Oxygen Plant Boiler (EU ID: 17).....	52
Carbon Elution Heater (EU ID: 18).....	53
Power Plant Auxiliary Heaters (EU ID: 19-20).....	54
SO2 Burner (EU ID: 21).....	56
Auxiliary SO2 Burner (EU ID: 22).....	57
Building Heaters (EU ID: 23).....	58
Air Handler Heaters (EU ID: 24).....	59
Air Handler Heaters (EU ID: 25).....	60
Portable Heaters (EU ID: 26).....	61



<b>Incinerators</b>	
Incinerators Emissions Summary .....	62
Camp Waste Incinerator (EU ID: 27).....	63
Sewage Sludge Incinerator (EU ID: 28).....	65
<b>Emergency Equipment</b>	
Emergency Equipment Emissions Summary .....	67
Black Start Generators (EU ID: 29-30).....	68
Emergency Generators (EU ID: 31-34).....	69
Fire Pumps (EU ID: 35-37).....	70
<b>Tanks</b>	
Tanks Emissions Summary .....	73
Tanks Specifications and Emissions (EU ID: 126-157).....	74
<b>Access Roads</b>	
Access Road Emissions Summary .....	75
Camp to Mine Site (EU ID: 158).....	76
Airport to Camp (EU ID: 159).....	78
Jungjuk Port to Mine Site.....	80
MOVES Emission Factors .....	83
<b>Greenhouse Gas</b>	
Greenhouse Gas Emissions Summary .....	84
Heat Input Rates and Emission Factors for Greenhouse Gas Emissions.....	85
<b>Hazardous Air Pollutants</b>	
Hazardous Air Pollutants Emissions Summary .....	86
AP-42 Emission Factors for Engines and Boilers (NG and ULSD).....	87
Power Plant (EU ID: 1-12).....	89
Other Fuel-Burning Equipment.....	90
Process and Fugitive Dust .....	91
Process and Fugitive Hydrogen Cyanide .....	92
Incinerators.....	93
Fuel Storage Tanks.....	94
Hydrogen Cyanide Calculations.....	95
<b>Wind Erosion</b>	
Sample Wind Erosion Calculations .....	98
<b>TANKS 4.0.9d Summary Reports</b>	
Tank Farm Tanks (ULSD, 2.5 Million-Gallon Capacity) (EU ID: 126-140).....	107
Fuel Station Tanks (ULSD, 25,000-Gallon Capacity) (EU ID: 141-142).....	110
ANFO Mixing Plant Tank (ULSD, 10,000-Gallon Capacity) (EU ID: 143).....	112
Fire Pump Tanks (ULSD, 270-Gallon Capacity) (EU ID: 144-145, 153).....	114
POX Boilers Tank (ULSD, 5,000-Gallon Capacity) (EU ID: 146).....	116
Oxygen Plant Boiler Tank (ULSD, 5,000-Gallon Capacity) (EU ID: 147).....	118
Carbon Elution Heater Tank (ULSD, 5,000-Gallon Capacity) (EU ID: 148).....	120
Auxiliary SO2 Burner Tank (ULSD, 500-Gallon Capacity) (EU ID: 149).....	122
Power Plant Tanks (ULSD, 33,000-Gallon Capacity) (EU ID: 150-151).....	124
Camp Emergency Generators Tank (ULSD, 25,000-Gallon Capacity) (EU ID: 152).....	126
Airport Jet Fuel Tanks (9,900-Gallon Capacity) (EU ID: 154-155).....	128
Airport Aviation Gasoline Tank (5,000-Gallon Capacity) (EU ID: 156).....	130
Airport Generators Tank (ULSD, 9,900-Gallon Capacity) (EU ID: 157).....	132
<b>Mercury</b>	
Facility-Wide Mercury Emissions Summary.....	134
Fugitive Evaporative Mercury.....	135
Mining Fugitive Dust Mercury.....	138
Ore Processing and Analysis Dust Mercury Emissions.....	140
Ore Thermal Processing Mercury.....	141
Fuel Combustion and Incineration Mercury.....	142

**Emissions Summary (LOM Year 19)**

Facility-Wide Emissions Summary.....	143
Detailed Emissions Summary.....	144
Life-of-Mine Mining Activity, Machinery Tailpipes, Wind Erosion, and Access Roads Emissions Summary ...	146

**Mining Activities (LOM Year 19)**

Mining Activity Emissions Summary.....	150
Drilling (EU ID: 113).....	151
Blasting (EU ID: 114).....	152
Material Handling (Loading and Unloading) (EU ID: 115-120).....	153
Material Hauling (EU ID: 160).....	155
Maintenance Equipment (EU ID: 121-123).....	157
Wind Erosion of Exposed Surfaces (EU ID: 161).....	159

**Mobile Machinery Tailpipes (LOM Year 19)**

Mobile Machinery Tailpipes Emissions Summary .....	161
Machinery Specifications.....	162
Machinery Operation, Fuel, and Output.....	163
Machine-Specific Emissions.....	164

**Emissions Summary (LOM Year 20)**

Facility-Wide Emissions Summary.....	165
Detailed Emissions Summary.....	166
Life-of-Mine Mining Activity, Machinery Tailpipes, Wind Erosion, and Access Roads Emissions Summary ...	168

**Mining Activities (LOM Year 20)**

Mining Activity Emissions Summary.....	172
Drilling (EU ID: 113).....	173
Blasting (EU ID: 114).....	174
Material Handling (Loading and Unloading) (EU ID: 115-120).....	175
Material Hauling (EU ID: 160).....	177
Maintenance Equipment (EU ID: 121-123).....	179
Wind Erosion of Exposed Surfaces (EU ID: 161).....	181

**Mobile Machinery Tailpipes (LOM Year 20)**

Mobile Machinery Tailpipes Emissions Summary .....	183
Machinery Specifications.....	184
Machinery Operation, Fuel, and Output.....	185
Machine-Specific Emissions.....	186

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>		BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>		PAGE: <div>1</div>	OF: <div>7</div>	SHEET: <div>Summary</div>
	SUBJECT: <div>Emissions Summary</div>		DATE: <div>October 14, 2021</div>		

Calculations for LOM:16

Facility-Wide Emissions Summary (ton/yr)

Activity	CO	NOx	PM2.5	PM10	PM	SO2	VOC
Mining Activities	1,921.0	51.6	165.2	1,298.0	4,544.4	0.2	
Power Generation	367.0	1,032.8	564.2	564.2	564.2	11.5	1,123.7
Emergency Equipment	18.7	33.3	1.1	1.1	1.1	0.03	33.3
Mobile Machinery	2,042.4	1,977.8	22.9	22.9	22.9	3.9	110.9
Processing Operations	774.9	0.1	64.5	80.6	101.8	9.8	2.3
Boilers	94.9	158.1	8.9	9.5	20.9	1.4	6.5
Incinerators	0.4	0.8	0.3	0.3	0.3	0.53	--
Access Roads	4.5	2.3	4.3	43.2	174.2	0.01	0.2
Tanks							1.8
Process and Ancillary Source Subtotal	1,256	1,225	639	656	688	23	1,168
Mining Activity (including access roads) Subtotal	1,925	54	169	1,341	4,719	0	0
Mobile Machinery Subtotal	2,042	1,978	23	23	23	4	111
Facility Total	5,224	3,257	831	2,020	5,430	27	1,279

Assessable PTE11,058 ton/yr

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>					BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>					PAGE: <div>2</div>	OF: <div>7</div>	SHEET: <div>Summary</div>
	SUBJECT: <div>Emissions Summary</div>					DATE: <div>October 14, 2021</div>		

Calculations for LOM:16

Detailed Emissions Summary		(ton/yr)						
Activity	Rate	CO	NOx	PM2.5	PM10	PM	SO2	VOC
Mining Activities - Subtotal		1,921	52	165	1,298	4,544	0.17	0.00
Drilling (EU ID: 113)	141,512 holes/yr			2.76	47.83	91.98		
Blasting (EU ID: 114)	620 blasts/yr	1,921	51.61	5.41	93.81	180.41	0.17	
Material Handling (Loading and Unloading) (EU ID: 115-120)								
Ore Loading (In-Pit)	13,059,932 ton/yr			1.48	9.77	20.66		
Ore Unloading (Short-Term Stockpile)	5,876,969 ton/yr			0.67	4.40	9.30		
Ore Unloading (Long-Term Stockpile)	0 ton/yr			0.00	0.00	0.00		
Ore Reloading (Long-Term Stockpile)	7,948,468 ton/yr			0.90	5.95	12.58		
Waste (incl. OVB/PAG) Loading (In-Pit)	152,286,568 ton/yr			17.26	114.0	240.9		
Waste (incl. OVB/PAG) Un- & Re-loading	155,123,914 ton/yr			17.58	116.1	245.4		
Material Hauling (EU ID: 160)								
Ore Hauling	273,366 VMT/yr			4.49	44.87	184.5		
Waste Hauling	4,573,774 VMT/yr			75.07	750.7	3,087		
Maintenance Equipment (EU ID: 121-123)								
Dozer Use	75,495 hr/yr			34.07	58.14	324.5		
Grader Use	45,653 hr/yr			1.32	18.86	42.70		
Water Truck Use	13,986 hr/yr			1.78	17.83	73.29		
Wind Erosion of Exposed Surfaces (EU ID: 161)								
Tailings Beach (Dry)	798 acre			0.29	1.93	3.86		
Haul Roads	215 acre			0.13	0.90	1.79		
Access Roads	143 acre			0.09	0.60	1.19		
Waste Rock Facility	variable acre			1.74	11.62	23.23		
Short-term Stockpile	variable acre			0.02	0.15	0.30		
Long-term Stockpile West	variable acre			0.0285	0.1901	0.380		
Long-term Stockpile East (& PAG)	variable acre			0.0486	0.3242	0.648		
Overburden Stockpile South	variable acre			0.0153	0.1021	0.204		
Power Generation - Subtotal		367.0	1,033	564.2	564.2	564.2	11.54	1,124
Power Plant Generators (12)	204,912 kWVe	350.1	1,031	564.1	564.1	564.1	11.51	1,123
Airport Generators (2)	400 kWVe	16.90	1.93	0.097	0.097	0.097	0.026	0.92
Mobile Machinery - Subtotal		2,042	1,978	22.92	22.92	22.92	3.86	110.9
Hydraulic Shovel	9,961,449 hp-hr/yr	28.66	28.66	0.33	0.33	0.33	0.05	1.56
Front-End Loader	12,669,447 hp-hr/yr	36.45	36.45	0.42	0.42	0.42	0.07	1.98
Haul Truck	588,306,418 hp-hr/yr	1,693	1,693	19.34	19.34	19.34	3.20	91.88
Drill	32,268,357 hp-hr/yr	92.84	86.79	1.02	1.02	1.02	0.18	5.04
Track Dozer	27,401,903 hp-hr/yr	78.83	55.94	0.75	0.75	0.75	0.15	4.28
Wheel Dozer	11,963,331 hp-hr/yr	34.42	34.42	0.39	0.39	0.39	0.07	1.87
Grader	10,220,103 hp-hr/yr	29.40	3.36	0.17	0.17	0.17	0.06	1.60
Water Truck	6,870,588 hp-hr/yr	19.77	19.77	0.23	0.23	0.23	0.04	1.07
Hydraulic Excavator	4,297,026 hp-hr/yr	12.36	9.89	0.13	0.13	0.13	0.02	0.67
Fuel Truck	3,134,146 hp-hr/yr	9.02	9.02	0.10	0.10	0.10	0.02	0.49
Service Truck	171,440 hp-hr/yr	0.49	0.056	0.0028	0.0028	0.0028	0.0009	0.027
Mobile Crane	214,301 hp-hr/yr	0.62	0.070	0.0035	0.0035	0.0035	0.0012	0.033
Low Boy Truck	1,000,069 hp-hr/yr	2.88	0.33	0.016	0.016	0.016	0.0054	0.16
Tire Handler	1,428,671 hp-hr/yr	4.11	0.47	0.023	0.023	0.023	0.0078	0.22
Light Plant	3,428,810 hp-hr/yr	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<p style="text-align: center;"><b>Air Sciences Inc.</b></p> <p style="text-align: center;"><b>AIR EMISSION CALCULATIONS</b></p>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 3	OF: 7	SHEET: Summary
	SUBJECT: Emissions Summary		DATE: October 14, 2021		

Calculations for LOM:

16

**Detailed Emissions Summary (ton/yr) - continued**

Activity	Rate	CO	NOx	PM2.5	PM10	PM	SO2	VOC
<b>Emergency Equipment - Subtotal</b>		<b>18.74</b>	<b>33.29</b>	<b>1.07</b>	<b>1.07</b>	<b>1.07</b>	<b>0.03</b>	<b>33.29</b>
Black Start Generators (2)	1,200 <i>kWe</i>	2.89	5.29	0.17	0.17	0.17	0.0044	5.29
Emergency Generators (4)	6,000 <i>kWe</i>	14.47	26.46	0.83	0.83	0.83	0.022	26.46
Fire Pumps (3)	756 <i>hp</i>	1.38	1.54	0.079	0.079	0.079	0.00205	1.54
<b>Processing Operations - Subtotal</b>		<b>774.88</b>	<b>0.08</b>	<b>64.50</b>	<b>80.63</b>	<b>101.81</b>	<b>9.79</b>	<b>2.30</b>
ROM Ore Discharge and Crushing	5,100 <i>ton/hr</i>			10.92	19.456	30.67		
Coarse Ore Transfer	5,100 <i>ton/hr</i>			9.26	14.081	20.41		
Pebble Crushers and Recycle	660 <i>ton/hr</i>			11.76	14.529	18.16		
Reagents Handling and Mixing				12.61	12.613	12.61		
Refinery Sources		774.9	0.1	10.71	10.71	10.71	9.79	2.30
Laboratories				8.11	8.11	8.11		
Water Treatment Plant				1.13	1.13	1.13		
<b>Boilers - Subtotal</b>		<b>94.94</b>	<b>158.14</b>	<b>8.87</b>	<b>9.49</b>	<b>20.90</b>	<b>1.36</b>	<b>6.52</b>
POX Boilers (2)	58.58 <i>MMBtu/hr</i>	21.13	39.42	1.91	1.97	6.50	0.40	1.38
Oxygen Plant Boiler	20.66 <i>MMBtu/hr</i>	7.45	13.91	0.67	0.70	2.29	0.14	0.49
Carbon Elution Heater	16 <i>MMBtu/hr</i>	5.77	10.77	0.52	0.54	1.78	0.11	0.38
Power Plant Auxiliary Heaters (2)	33 <i>MMBtu/hr</i>	11.90	22.21	1.08	1.11	3.66	0.22	0.78
SO2 Burner	2 <i>MMBtu/hr</i>	0.72	0.86	0.07	0.07	0.07	0.01	0.05
Auxiliary SO2 Burner	2 <i>MMBtu/hr</i>	0.34	1.35	0.02	0.07	0.22	0.01	0.02
Building Heaters (138)	24.15 <i>MMBtu/hr</i>	4.15	9.75	0.79	0.79	0.79	0.06	0.57
Air Handlers (19)	95 <i>MMBtu/hr</i>	34.27	40.79	3.10	3.10	3.10	0.24	2.24
Air Handlers (7)	17.5 <i>MMBtu/hr</i>	6.31	7.51	0.57	0.57	0.57	0.05	0.41
Portable Heaters (20)	17.2 <i>MMBtu/hr</i>	2.89	11.58	0.14	0.58	1.91	0.12	0.20
<b>Incinerators - Subtotal</b>		<b>0.361</b>	<b>0.84</b>	<b>0.33</b>	<b>0.33</b>	<b>0.33</b>	<b>0.531</b>	
Camp Waste Incinerator (EU ID: 27)	0.50 <i>ton/hr</i>	0.351	0.78	0.32	0.32	0.32	0.5197	
Sewage Sludge Incinerator (EU ID: 28)	0.007 <i>ton/hr</i>	0.0096	0.064	0.0089	0.0089	0.0089	0.0110	
<b>Access Roads - Subtotal</b>		<b>4.47</b>	<b>2.29</b>	<b>4.30</b>	<b>43.18</b>	<b>174.15</b>	<b>0.0091</b>	<b>0.183</b>
Camp to Mine Site (EU ID: 158)		0.344	0.113	0.32	3.22	13.09	0.00069	0.0118
Airport to Camp (EU ID: 159)		0.297	0.049	0.186	1.88	7.55	0.00038	0.0113
Jungjuk Port to Mine Site		3.83	2.13	3.79	38.08	153.51	0.0080	0.160
<b>Tanks - Subtotal</b>								<b>1.840</b>
Mine Site Tanks								1.57
Power Plant Tanks								0.018
Camp Site Tanks								0.002
Airport Tanks								0.249

Numbers in *blue* are direct entries. *Green* text/numbers are lookup codes or results.

<p style="text-align: center;"><b>Air Sciences Inc.</b></p> <p style="text-align: center;"><b>AIR EMISSION CALCULATIONS</b></p>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 4	OF: 7	SHEET: Summary
	SUBJECT: Emissions Summary		DATE: October 14, 2021		

**Life-of-Mine Mining Activity, Machinery Tailpipes, Wind Erosion, and Access Roads Emissions Summary (ton/yr)**

LOM	CO	NOX	PM2.5	PM10	PM	SO2	VOC	Total
4	3,097.4	1,159.0	140.7	967.6	3,241.6	2.40	63.80	8,672
5	3,240.5	1,302.9	151.3	1,059.9	3,579.6	2.67	71.57	9,408
6	3,296.9	1,354.7	165.6	1,162.4	3,945.9	2.77	74.63	10,003
7	3,411.3	1,465.4	160.6	1,111.1	3,694.8	2.99	80.85	9,927
8	3,568.3	1,622.5	174.0	1,230.8	4,192.8	3.29	89.37	10,881
9	3,702.0	1,752.5	182.6	1,306.3	4,505.3	3.54	96.63	11,549
10	3,484.2	1,539.9	161.1	1,110.2	3,722.6	3.13	84.80	10,106
11	3,487.7	1,547.0	169.6	1,193.9	4,072.5	3.13	84.99	10,559
12	3,602.4	1,664.9	166.6	1,149.6	3,883.6	3.35	91.22	10,562
13	3,692.2	1,755.7	176.8	1,243.7	4,278.9	3.52	96.09	11,247
14	3,764.3	1,829.3	176.4	1,226.7	4,194.0	3.66	100.01	11,294
15	3,868.1	1,930.2	181.7	1,271.3	4,371.9	3.85	105.64	11,733
16	3,967.8	2,031.7	192.4	1,364.1	4,741.4	4.04	111.06	12,413
17	3,900.3	1,961.9	190.0	1,351.5	4,702.9	3.91	107.39	12,218
18	3,894.6	1,958.2	183.7	1,296.9	4,534.0	3.90	107.08	11,978
19	3,971.3	2,032.8	182.3	1,280.6	4,518.4	4.05	111.24	12,101
20	3,891.3	1,951.6	188.2	1,372.3	4,796.7	3.90	106.90	12,311
21	3,559.2	1,621.3	183.2	1,319.9	4,577.1	3.27	88.88	11,353
22	2,749.4	829.9	123.3	844.7	2,784.6	1.74	44.91	7,379
23	2,522.8	616.3	91.5	614.4	2,059.2	1.31	32.61	5,938
24	2,551.2	643.7	80.9	535.1	1,863.7	1.36	34.15	5,710
25	2,199.0	309.0	46.7	286.5	1,022.7	0.70	15.03	3,880
26	2,013.3	141.8	15.1	129.4	473.7	0.35	4.95	2,779
27	2,001.7	130.1	13.8	118.5	435.0	0.33	4.32	2,704

Red numbers represent the highest values

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

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<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 7	OF: 7	SHEET: Summary
	SUBJECT: Emissions Summary		DATE: October 14, 2021		

**Life-of-Mine Wind Erosion and Access Road Fugitive Emissions Summary (ton/yr)**

LOM	CO	NOX	PM2.5	PM10	PM	SO2	VOC
4	4.47	2.29	6.37	56.95	201.70	0.01	0.18
5	4.47	2.29	6.35	56.82	201.43	0.01	0.18
6	4.47	2.29	6.55	58.14	204.09	0.01	0.18
7	4.47	2.29	6.58	58.33	204.47	0.01	0.18
8	4.47	2.29	6.60	58.49	204.77	0.01	0.18
9	4.47	2.29	6.47	57.60	203.00	0.01	0.18
10	4.47	2.29	6.60	58.47	204.74	0.01	0.18
11	4.47	2.29	6.61	58.55	204.90	0.01	0.18
12	4.47	2.29	6.62	58.62	205.04	0.01	0.18
13	4.47	2.29	6.49	57.74	203.28	0.01	0.18
14	4.47	2.29	6.64	58.79	205.38	0.01	0.18
15	4.47	2.29	6.66	58.87	205.55	0.01	0.18
16	4.47	2.29	6.67	58.98	205.76	0.01	0.18
17	4.47	2.29	6.51	57.91	203.63	0.01	0.18
18	4.47	2.29	6.58	58.33	204.46	0.01	0.18
19	4.47	2.29	6.51	57.91	203.63	0.01	0.18
20	4.47	2.29	6.17	55.63	199.05	0.01	0.18
21	4.47	2.29	5.75	52.84	193.48	0.01	0.18
22	4.47	2.29	5.73	52.70	193.21	0.01	0.18
23	4.47	2.29	5.70	52.51	192.81	0.01	0.18
24	4.47	2.29	5.72	52.60	192.99	0.01	0.18
25	4.47	2.29	5.71	52.55	192.89	0.01	0.18
26	4.47	2.29	5.71	52.56	192.91	0.01	0.18
27	4.47	2.29	5.60	51.84	191.48	0.01	0.18

*Red numbers represent the highest values*

*Numbers in blue are direct entries. Green text/numbers are lookup codes or results.*

Air Sciences Inc.	PROJECT TITLE: Donlin Gold					BY: E. Memon		
	PROJECT NO: 281-1-2					PAGE: 1	OF: 11	SHEET: Mining
	SUBJECT: Mining Activity Emissions					DATE: October 14, 2021		
AIR EMISSION CALCULATIONS								

Calculations for LOM: 16Max Daily Ore: Yes

Mining Activity Emissions Summary

HgDustPM2.5HgDustPM10HgDust

Particulate Emissions								
Activity	Rate	PM2.5		PM2.5		PM10		PM
		(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(ton/yr)
Drilling (EU ID: 113)	141,512 holes/yr	0.63	15.12	2.76	10.92	262.09	47.83	92.0
Blasting (EU ID: 114)	620 blasts/yr	87.30	87.30	5.41	1,513.12	1,513.12	93.81	180.4
Material Handling (Loading and Unloading) (EU ID: 115-120)								
Ore Loading (In-Pit)	13,059,932 ton/yr	1.16	27.74	1.48	7.63	183.19	9.77	20.7
Ore Unloading (Short-Term Stockpile)	5,876,969 ton/yr	0.15	3.65	0.67	1.00	24.10	4.40	9.3
Ore Unloading (Long-Term Stockpile)	0 ton/yr	0.00	0.00	0.00	0.00	0.00	0.00	0.0
Ore Reloading (Long-Term Stockpile)	7,948,468 ton/yr	0.21	4.94	0.90	1.36	32.59	5.95	12.6
Waste (incl. OVB/PAG) Loading (In-Pit)	152,286,568 ton/yr	3.94	94.56	17.26	26.02	624.43	113.96	240.9
Waste (incl. OVB/PAG) Un- & Re-loading	155,123,914 ton/yr	4.01	96.32	17.58	26.50	636.07	116.08	245.4
Material Hauling (EU ID: 160)								
Ore Hauling	273,366 VMT/yr	1.02	24.59	4.49	10.24	245.86	44.87	184.5
Waste Hauling	4,573,774 VMT/yr	17.14	411.36	75.07	171.40	4,113.58	750.73	3,086.5
Maintenance Equipment (EU ID: 121-123)								
Dozer Use	75,495 hr/yr	7.78	186.68	34.07	13.28	318.60	58.14	324.5
Grader Use	45,653 hr/yr	0.30	7.25	1.32	4.31	103.34	18.86	42.7
Water Truck Use	13,986 hr/yr	0.41	9.77	1.78	4.07	97.68	17.83	73.3
Wind Erosion of Exposed Surfaces (EU ID: 161)								
Tailings Beach (Dry)	798.0 acre	0.07	1.59	0.29	0.44	10.58	1.93	3.86
Haul Roads	214.7 acre	0.03	0.74	0.13	0.20	4.91	0.90	1.79
Access Roads	143.0 acre	0.02	0.49	0.09	0.14	3.27	0.60	1.19
Waste Rock Facility	variable acre	0.40	9.55	1.74	2.65	63.65	11.62	23.23
Short-term Stockpile	variable acre	0.01	0.12	0.02	0.03	0.81	0.15	0.30
Long-term Stockpile West	variable acre	0.0065	0.16	0.029	0.043	1.04	0.19	0.38
Long-term Stockpile East (& PAG)	variable acre	0.0111	0.27	0.049	0.074	1.78	0.32	0.65
Overburden Stockpile South	variable acre	0.0035	0.08	0.015	0.023	0.56	0.10	0.20
Total		124.59	982.25	165.16	1,793.46	8,241.23	1,298.04	4,544.35

Other Emissions

Activity	CO			NOx			SO2		
	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
Blasting (EU ID: 114)	30,983.3	30,983.3	1,921.0	832.39	832.39	51.61	2.77	2.77	0.17

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.



<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>		PROJECT TITLE: Donlin Gold		BY: E. Memon		
		PROJECT NO: 281-1-2		PAGE: 3	OF: 11	SHEET: Mining
		SUBJECT: Mining Activity Emissions		DATE: October 14, 2021		

Calculations for LOM: 16

**Blasting (EU ID: 114)**

**Activity Information**

Total Material Mined 150,000,000 t/yr Donlin APP\_C4\_23

BVol 55,516,975 m<sup>3</sup>/yr Donlin

Con: Blasting Agent Use 60,000 t/yr Donlin (11/08/2016)

Excluding Water (13.3%) 52,020 t/yr Donlin

57,342 ton/yr

Blas No. of Blasts 620 blasts/yr Donlin

Bench Height 12 m Donlin

Operation 365 days/yr

24 hr/day

**Emission Factor(s)**

Emission Factor Equation TSP (lb/blast) = 0.000014 x A<sup>1.5</sup> AP-42, Tab. 11.9-1, 7/98 (blasting, overburden)

Where, A = Area per Blast 120,000 ft<sup>2</sup> Donlin (11/08/2016)

TSP 582.0 lb/blast

CO 67 lb/ton-ANFO AP-42, Tab. 13.3-1, 2/80 (ANFO)

NOx 0.9 kg/t-ANFO CSIRO

1.80 lb/ton-ANFO

SO2 0.006 lb/ton-ANFO Based on 15 ppm S in FO and a maximum of 10% FO in ANFO

**PM Scaling Factors (SF)**

PM2.5 0.03 AP-42, Tab. 11.9-1, 7/98 (blasting, overburden)

PM10 0.52 AP-42, Tab. 11.9-1, 7/98 (blasting, overburden)

Emissions	(lb/blast)	(lb/hr) <sup>(1)</sup>	(lb/day) <sup>(1)</sup>	(ton/yr)
PM2.5	17.46	87.30	87.30	5.41
PM10	302.62	1,513.12	1,513.12	93.81
PM	581.97	2,909.85	2,909.85	180.41
CO	6,196.65	30,983.27	30,983.27	1,920.96
NOx	166.48	832.39	832.39	51.61
SO2	0.55	2.77	2.77	0.17

<sup>(1)</sup> Based on: 5 blasts/day, occurring in 1 hour

**Sample Calculations**

**PM10**

93.8 ton/yr

(Activity)	(TSP EF)	(SF)	(Conversion)
620 <del>blast</del> yr	582.0 <del>lb</del> <del>blast</del>	0.52	ton 2,000 <del>lb</del>

**SO2 Emission Factor**

0.006 lb/ton-ANFO

0.000015 <del>lb-S</del> <del>lb-FO</del>	2 lb SO2 <del>lb-S</del>	10% <del>lb-FO</del> <del>lb ANFO</del>	2,000 <del>lb</del> ton
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Conversion(s):

2,000 lb/ton

1.1023 ton/t

2.2046 lb/kg

3.2808 ft/m

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

Air Sciences Inc.  AIR EMISSION CALCULATIONS		PROJECT TITLE: Donlin Gold		BY: E. Memon		
		PROJECT NO: 281-1-2		PAGE: 4	OF: 11	SHEET: Mining
		SUBJECT: Mining Activity Emissions		DATE: October 14, 2021		

Calculations for LOM: 16

Material Handling (Loading and Unloading) (EU ID: 115-120)

Activity Information

OreV

In-Pit Ore Removed

11,847,785 t/yr  
13,059,932 ton/yr  
122,400 ton/day (daily maximum ore processing rate)

Donlin

APP\_C4\_23

M2S1

Long-Term Ore Stockpiled

0 t/yr  
0 ton/yr

Donlin

S2S2

Short-Term Ore Stockpiled

5,331,503 t/yr  
5,876,969 ton/yr

Donlin

S2PT

Long-Term Stockpile Ore Processed (to Crusher)

7,210,737 t/yr  
7,948,468 ton/yr

Donlin

Wast

In-Pit Waste (including OVB and PAG) Removed

138,152,215 t/yr  
152,286,568 ton/yr

Donlin

W&C

Waste (including OVB) Deposited to Waste Dump

138,142,943 t/yr  
152,276,347 ton/yr

Donlin

OVB

OVB Stockpiled

0 t/yr  
0 ton/yr

Donlin

PAG

PAG Stockpiled

9,272 t/yr  
10,221 ton/yr

Donlin

OVB

Stockpiled OVB to Waste Dump Reclamation

1,287,000 t/yr  
1,418,673 ton/yr

Donlin

PAG

Stockpiled PAG to In-Pit Backfill

0 t/yr  
0 ton/yr

Donlin

W-BF

In-Pit Waste to In-Pit Backfill

0 t/yr  
0 ton/yr

Donlin

W-TI

Waste Deposited to Tails Dam

0 t/yr  
0 ton/yr

Donlin

Operation

365 days/yr  
24 hr/day

Emission Factor(s)

Emission Factor Equation E = 0.0032k(U/5)<sup>1.3</sup>/(M/2)<sup>1.4</sup> AP-42, Sec. 13.2.4, Eq. 1, 11/06

U = Mean wind speed 7.947 mph American Ridge 07/05 - 06-10

M = Material moisture content 2.5 % Donlin

PM2.5 PM10 PM

k = Particle size multiplier 0.053 0.35 0.74 AP-42, Sec. 13.2.4, Pg. 4, 11/06

E = Emission factor 0.000227 0.001497 0.003164 lb/ton

Ore Loading (In-Pit) (EU ID: 115)

Emissions	(lb/hr)*	(lb/day)*	(ton/yr)
PM2.5	1.2	27.7	1.5
PM10	7.6	183.2	9.8
PM	16.1	387.3	20.7

Note: For modeling, emissions from this activity are adjusted hourly based on wind speed and modeled using an hourly file.

\* Based on the daily maximum ore processing rate.

Ore Unloading (Long-Term Stockpile) (EU ID: 117)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.00	0.0	0.00
PM10	0.00	0.0	0.00
PM	0.00	0.0	0.00

Conversion(s):

2,000 lb/ton

1.1023 ton/t

2.2369 mph/mps

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>		BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>		PAGE: <div>5</div>	OF: <div>11</div>	SHEET: <div>Mining</div>
	SUBJECT: <div>Mining Activity Emissions</div>		DATE: <div>October 14, 2021</div>		

Calculations for LOM: 16

Material Handling (Loading and Unloading) (EU ID: 115-120) - continued

Ore Unloading (Short-Term Stockpile) <sup>(1)</sup> (EU ID: 116)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.2	3.6	0.7
PM10	1.0	24.1	4.4
PM	2.1	50.9	9.3

<sup>(1)</sup> See Mill emissions for ore unloading at crusher

Ore Reloading (Long-Term Stockpile) <sup>(1)</sup> (EU ID: 118)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.2	4.9	0.9
PM10	1.4	32.6	5.9
PM	2.9	68.9	12.6

<sup>(1)</sup> See Mill emissions for ore unloading at crusher

Waste (including OVB and PAG) Loading (In-Pit) (EU ID: 119)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	3.9	94.6	17.3
PM10	26.0	624.4	114.0
PM	55.0	1,320.2	240.9

Note: For modeling, emissions from this activity are adjusted hourly based on wind speed and modeled using an hourly file.

Waste (including OVB\*) Unloading (Waste Dump) (EU ID: 120)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	4.0	95.4	17.4
PM10	26.3	630.2	115.0
PM	55.5	1,332.4	243.2

Note: For modeling, emissions from this activity are adjusted hourly based on wind speed and modeled using an hourly file.

\* Includes stockpiled OVB for reclamation

OVB Unloading (OVB Stockpile)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.0	0.0	0.0
PM10	0.0	0.0	0.0
PM	0.0	0.0	0.0

OVB Reloading (OVB Stockpile)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.0	0.9	0.2
PM10	0.2	5.8	1.1
PM	0.5	12.3	2.2

PAG Unloading (PAG Stockpile)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.0	0.0	0.0
PM10	0.0	0.0	0.0
PM	0.0	0.1	0.0

PAG Reloading (PAG Stockpile)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.0	0.0	0.0
PM10	0.0	0.0	0.0
PM	0.0	0.0	0.0

Backfill (PAG and In-Pit Waste) Unloading (In-Pit)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.0	0.0	0.0
PM10	0.0	0.0	0.0
PM	0.0	0.0	0.0

Waste Unloading (Tails Dam)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.0	0.0	0.0
PM10	0.0	0.0	0.0
PM	0.0	0.0	0.0

Note: For modeling, emissions from this activity are adjusted hourly based on wind speed and modeled using an hourly file.

Sample Calculations

PM10 - Ore Loading

	(Activity)	(PM10 EF)	(Conversion)
9.8 ton/yr	13,059,932 <del>ton</del>	0.0015 <del>lb</del>	ton
	yr	<del>ton</del>	2,000 <del>lb</del>

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

Air Sciences Inc.  AIR EMISSION CALCULATIONS				PROJECT TITLE: Donlin Gold		BY: E. Memon		
				PROJECT NO: 281-1-2		PAGE: 6	OF: 11	SHEET: Mining
				SUBJECT: Mining Activity Emissions		DATE: October 14, 2021		
Calculations for LOM: 16								
Material Hauling (EU ID: 160)								
Activity Information								
Ore Hauled (from Pit and Stockpile)		19,058,522 t/yr	Donlin		OPSUM_P1			
		21,008,399 ton/yr						
Ore-VKT		439,939 VKT/yr	Donlin					
		273,366 VMT/yr						
Waste Hauled* (from Pit and Stockpile)		139,439,215 t/yr	Donlin					
* Includes OVB and PAG		153,705,241 ton/yr						
Waste-VKT		7,360,758 VKT/yr	Donlin					
		4,573,774 VMT/yr						
Operation		365 days/yr						
		24 hr/day						
Control Type		Water/Chemical Application						
Control Efficiency		90%			Based on AP-42, Figures 13.2.2-2 & 13.2.2-5, 11/06. See note below.			
Truck Hauling Fraction Calculation								
351-	Liebherr T282B	7,460,289 t-km	95.6%	Donlin	APP_C4_23			
131-	Caterpillar 785C	340,408 t-km	4.4%	Donlin				
Haul Truck Information								
Make and Model		Empty (ton)	Payload (ton)	Total (ton)				
Liebherr T282B		261	400	661	Liebherr, BK-RP LME 1100398-web-08.10			
Caterpillar 785C		116	159	275	Caterpillar, AEHQ5320-02 (4-02)			
Emission Factor(s)								
Emission Factor Equation		E = k(s/12) <sup>a</sup> (W/3) <sup>b</sup> [(365-P)/365]		AP-42, Sec. 13.2.2, Eqs. 1a and 2, 11/06				
s = Surface material silt content		3.8 %		(2)				
W = Mean vehicle weight		449.4 ton		Average of empty and full weights of fleet.				
P = Days/year with ≥0.01 in precip.		129		American Ridge, 2007-08, 2010-12				
(2) AP-42, Chapter 13.2-2, Related Information "r13s0202_dec03.xls" ( <a href="http://www.epa.gov/ttn/chieff/ap42/ch13/related/c13s02-2.html">http://www.epa.gov/ttn/chieff/ap42/ch13/related/c13s02-2.html</a> )								
		PM2.5	PM10	PM				
k = Size-specific empirical constant		0.15	1.5	4.9	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06			
a = Size-specific empirical constant		0.9	0.9	0.7	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06			
b = Size-specific empirical constant		0.45	0.45	0.45	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06			
E = Size-specific emission factor		0.33	3.28	13.50 lb/VMT				
Ore Hauling								
Emissions		(lb/hr)	(lb/day)	(ton/yr)				
PM2.5		1.0	24.6	4.5				
PM10		10.2	245.9	44.9				
PM		42.1	1,010.8	184.5				
Note:								
In section 13.2.2 of AP-42, Figures 13.2.2-2 and 13.2.2-5 provide estimated unpaved road control efficiencies for water application and chemical dust suppressants. These figures provide a range of up to 95 percent control for water application only and a range of up to 91 percent control for chemical application only. Donlin will apply a combination of water (or snow, as applicable) and chemical dust suppressant. In addition, see Section 2.18 of Appendix C and Section 3.7.1 of Appendix D								
Conversion(s):		2,000 lb/ton						
		1.1023 ton/t						
		1.609 km/mi						
Numbers in blue are direct entries. Green text/numbers are lookup codes or results.								

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 7	OF: 11	SHEET: Mining
	SUBJECT: Mining Activity Emissions		DATE: October 14, 2021		

Calculations for LOM: 16

Material Hauling (EU ID: 160) - continued

Waste Hauling

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	17.1	411.4	75.1
PM10	171.4	4,113.6	750.7
PM	704.7	16,912.4	3,086.5

Sample Calculations

PM10 - Waste Hauling

	(Activity)	(PM10 EF)	(Conversion)	(Control)
750.7 ton/yr	4,573,774 VMT	3.3 lb	ton	(1 - 0.9)
	yr	VMT	2,000 lb	

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.



<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 8	SHEET: 11 Mining
	SUBJECT: Mining Activity Emissions		DATE: October 14, 2021	

Calculations for LOM: 16

**Maintenance Equipment (EU ID: 121-123)**

**Activity Information**

DOZ Dozer Use 75,495 hr/yr Donlin APP\_C4\_23

GRA Grader Use 45,653 hr/yr Donlin

Eqp. Water Truck Use 13,986 hr/yr Donlin

HT\_ Water Truck Speed 18.74 kph Average haul truck speed HaulDist AirModel

162,861 VMT

Operation 365 days/yr

24 hr/day

**Control and Efficiency**

Dozer Use None 0%

Grader Use None 0%

Water Truck Use Water/Chemical Application 90% Based on AP-42, Figures 13.2.2-2 & 13.2.2-5, 11/06. See note below.

**Dozer Use**

**Emission Factor(s)**

Emission Factor Equation  $TSP (lb/hr) = 5.7 (s)^{1.2} / (M)^{1.3}$  AP-42, Tab. 11.9-1, 07/98, (bulldozing, overburden)

$PM_{15} (lb/hr) = 1 (s)^{1.5} / (M)^{1.4}$  AP-42, Tab. 11.9-1, 07/98, (bulldozing, overburden)

M = Material moisture content 2.5 % Donlin

s = Surface material silt content 3.8 % (2)

<sup>(2)</sup> AP-42, Chapter 13.2-2, Related Information "r13s0202\_dec03.xls" (<http://www.epa.gov/ttn/chieff/ap42/ch13/related/c13s02-2.html>)

**PM Scaling Factors (SF)**

PM2.5 0.105 AP-42, Tab. 11.9-1, 07/98, (applies to TSP EF, footnote e)

PM10 0.75 AP-42, Tab. 11.9-1, 07/98, (applies to PM15 EF, footnote d)

**Estimated Emission Factors**

PM2.5 0.9 lb/hr

PM10 1.54 lb/hr

PM 8.60 lb/hr

**Dozer Use (EU ID: 122)**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	7.78	186.7	34.1
PM10	13.28	318.6	58.1
PM	74.08	1,777.9	324.5

**Sample Calculations**

**PM10 - Dozer Use**

58.1 ton/yr	(Activity)	(PM10 EF)	(Conversion)	(Control)
	75,495 hr/yr	1.5 lb/hr	ton	(1 - 0)
			2,000 lb	

**Grader Use**

**Emission Factor(s)**

Emission Factor Equation  $TSP (lb/VMT) = 0.04 (S)^{2.5}$  AP-42, Tab. 11.9-1, 07/98, (grading)

$PM_{15} (lb/VMT) = 0.051 (S)^2$  AP-42, Tab. 11.9-1, 07/98, (grading)

S = Mean vehicle speed 3 mph Donlin

Note:

In section 13.2.2 of AP-42, Figures 13.2.2-2 and 13.2.2-5 provide estimated unpaved road control efficiencies for water application and chemical dust suppressants. These figures provide a range of up to 95 percent control for water application only and a range of up to 91 percent control for chemical application only. Donlin will apply a combination of water (or snow, as applicable) and chemical dust suppressant. In addition, see Section 2.18 of Appendix C and Section 3.7.1 of Appendix D

Conversion(s): 2,000 lb/ton

1.609 km/mi

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 9	SHEET: 11 Mining
	SUBJECT: Mining Activity Emissions		DATE: October 14, 2021	

Calculations for LOM: 16

**Maintenance Equipment (EU ID: 121-123) - continued**

**PM Scaling Factors (SF)**

PM2.5	0.031	AP-42, Tab. 11.9-1, 07/98, (applies to TSP EF, footnote e)
PM10	0.6	AP-42, Tab. 11.9-1, 07/98, (applies to PM15 EF, footnote d)

**Estimated Emission Factors**

PM2.5	0.02 lb/VMT
PM10	0.28 lb/VMT
PM	0.62 lb/VMT

**Grader Use (EU ID: 123)**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.30	7.3	1.3
PM10	4.31	103.3	18.9
PM	9.75	234.0	42.7

**Sample Calculations**

**PM10 - Grader Use**

	(Activity)	(PM10 EF)	(Speed)	(Conversion)	(Control)
18.9 ton/yr	45,653 <del>hr</del> yr	0.3 <del>lb</del> VMT	3 <del>VMT</del> hr	ton 2,000 <del>lb</del>	(1 - 0)

**Water Truck Use**

**Truck Specifications**

<b>Make and Model</b>	Empty (ton)	Payload (ton)	Total (ton)	
Caterpillar 785C	116	134	249	Caterpillar, AEHQ5320-02 (4-02)
		32,000 gal		

**Emission Factor(s)**

Emission Factor Equation E = k(s/12)<sup>a</sup> (W/3)<sup>b</sup> [(365-P)/365] AP-42, Sec. 13.2.2, Eqs. 1a and 2, 11/06

s = Surface material silt content 3.8 % (1)

<sup>(1)</sup> AP-42, Chapter 13.2-2, Related Information "r13s0202\_dec03.xls" (<http://www.epa.gov/ttn/chieff/ap42/ch13/related/c13s02-2.html>)

W = Mean vehicle weight 183 ton Average of empty and full weights

P = Days/year with ≥0.01 in precip. 129 American Ridge, 2007-08, 2010-12

	PM2.5	PM10	PM	
k = Size-specific empirical constant	0.15	1.5	4.9 lb/VMT	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06
a = Size-specific empirical constant	0.9	0.9	0.7	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06
b = Size-specific empirical constant	0.45	0.45	0.45	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06
E = Size-specific emission factor	0.22	2.19	9.00 lb/VMT	

**Water Truck Use (EU ID: 121)**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.4	9.8	1.8
PM10	4.1	97.7	17.8
PM	16.7	401.6	73.3

**Sample Calculations**

**PM10 - Water Truck Use**

	(Activity)	(PM10 EF)	(Conversion)	(Control)
17.8 ton/yr	162,861 <del>VMT</del> yr	2.2 <del>lb</del> VMT	ton 2,000 <del>lb</del>	(1 - 0.9)

Conversion(s): 2,000 lb/ton  
8.345 lb/gal water

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

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<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>		BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>		PAGE: <div>11</div>	OF: <div>11</div>	SHEET: <div>Mining</div>
	SUBJECT: <div>Mining Activity Emissions</div>		DATE: <div>October 14, 2021</div>		

Calculations for LOM:16

Wind Erosion of Exposed Surfaces (EU ID: 161) - continued

Exposed Stockpile/Waste Rock Facility

Emissions <sup>(1)</sup>	PM2.5			PM10			PM		
	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
WA Waste Rock Facility <sup>(2)</sup>	0.40	9.55	1.74	2.65	63.65	11.62	5.30	127.30	23.23
STF Short-term Stockpile	0.01	0.12	0.02	0.03	0.81	0.15	0.07	1.62	0.30
LTF Long-term Stockpile West	0.01	0.16	0.03	0.04	1.04	0.19	0.09	2.08	0.38
LTF Long-term Stockpile East (& PAG)	0.01	0.27	0.05	0.07	1.78	0.32	0.15	3.55	0.65
OV Overburden Stockpile South	0.003	0.08	0.02	0.02	0.56	0.10	0.05	1.12	0.20

<sup>(1)</sup> AP-42, Sec. 13.2.5, 11/06 (industrial wind erosion), hourly emission calculations provided in Wind\_Calcs

<sup>(2)</sup> Note: For modeling, emissions from this activity are adjusted hourly based on wind speed and modeled using an hourly file.

Sample emission calculations provided on page: 98

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>		BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>		PAGE: <div>1</div>	OF: <div>4</div>	SHEET: <div>Machines</div>
	SUBJECT: <div>Mobile Machinery Tailpipes</div>		DATE: <div>October 14, 2021</div>		

Calculations for LOM:16

Mobile Machinery Tailpipes Emissions Summary (ton/yr)

Machinery Type	Output (hp-hr/yr)	CO	NOx	PM	SO2	VOC
Hydraulic Shovel	9,961,449	28.66	28.66	0.33	0.05	1.56
Front-End Loader	12,669,447	36.45	36.45	0.42	0.07	1.98
Haul Truck	588,306,418	1,692.55	1,692.55	19.34	3.20	91.88
Drill	32,268,357	92.84	86.79	1.02	0.18	5.04
Track Dozer	27,401,903	78.83	55.94	0.75	0.15	4.28
Wheel Dozer	11,963,331	34.42	34.42	0.39	0.07	1.87
Grader	10,220,103	29.40	3.36	0.17	0.06	1.60
Water Truck	6,870,588	19.77	19.77	0.23	0.04	1.07
Hydraulic Excavator	4,297,026	12.36	9.89	0.13	0.02	0.67
Fuel Truck	3,134,146	9.02	9.02	0.10	0.02	0.49
Service Truck	171,440	0.49	0.06	0.003	0.001	0.03
Mobile Crane	214,301	0.62	0.07	0.004	0.001	0.03
Low Boy Truck	1,000,069	2.88	0.33	0.02	0.01	0.16
Tire Handler	1,428,671	4.11	0.47	0.02	0.01	0.22
Light Plant	3,428,810	0.00	0.00	0.00	0.00	0.00
Total		2,042.39	1,977.77	22.92	3.86	110.87

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<div style="text-align: center;"> <b>Air Sciences Inc.</b>   <b>AIR EMISSION CALCULATIONS</b> </div>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 2	OF: 4	SHEET: Machines
	SUBJECT: Mobile Machinery Tailpipes		DATE: October 14, 2021		

Calculations for LOM:

16

Mobile Machinery

Machinery Specifications

Make and Model <sup>(1)</sup>	Type	Engine	Rating (hp) <sup>(1)</sup>	Units <sup>(1)</sup>
Eqp Komatsu PC8000	Hydraulic Shovel	2 X Komatsu SDA16V160	4,020	1
Eqp LeTourneau L2350	Front-End Loader	MTU/DD 16V4000	2,300	2
Eqp Caterpillar 994F	Front-End Loader	Cat 3516B	1,577	1
Eqp Liebherr T282C	Haul Truck	MTU/DD 20V4000	3,755	69
Eqp Caterpillar 785C	Haul Truck	Cat 3512B	1,450	8
Eqp Atlas Copco PV 275	Drill	Cat C32 ACERT	950	7
Eqp Atlas Copco DML	Drill	Cat C27 ACERT	800	14
Eqp Atlas Copco L8	Drill		540	5
Eqp Caterpillar D11T	Track Dozer	Cat C27 ACERT	850	6
Eqp Caterpillar D10T	Track Dozer	Cat C32 ACERT	646	4
Eqp Caterpillar 854G	Wheel Dozer	Cat C32 ACERT	904	6
Eqp Caterpillar 24H	Grader	Cat C13 ACERT	533	3
Eqp Caterpillar 16H	Grader	Cat C18 ACERT	297	7
Eqp Caterpillar 785C	Water Truck	Cat 3512B	1,450	4
Eqp Caterpillar 390DL	Hydraulic Excavator	Cat C18 ATAAC	523	1
Eqp Komatsu PC2000	Hydraulic Excavator		976	2
Eqp Caterpillar 777F	Fuel Truck	Cat C32 ACERT	1,016	3
Eqp QTE Body on Peterbilt Chassis	Service Truck		300	1
Eqp Grove GMK6350 (200T)	Mobile Crane	Benz OM906LA	563	1
Eqp QTE Body on Peterbilt Chassis	Low Boy Truck		300	1
Eqp Caterpillar 988	Tire Handler		501	2
Eqp Terex LT7000	Light Plant		25	20

<sup>(1)</sup> Donlin

Operation

365 day/yr

24 hr/day

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

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<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>		BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>		PAGE: <div>4</div>	OF: <div>4</div>	SHEET: <div>Machines</div>
	SUBJECT: <div>Mobile Machinery Tailpipes</div>		DATE: <div>October 14, 2021</div>		

Calculations for LOM:16

Machine-Specific Emissions

(ton/yr)

Make and Model	PM	NOx	NMHC	CO	SO2 <sup>(1)</sup>
Komatsu PC8000	0.33	28.66	1.56	28.66	0.05
LeTourneau L2350	0.37	32.50	1.76	32.50	0.06
Caterpillar 994F	0.05	3.95	0.21	3.95	0.01
Liebherr T282C	18.98	1,661.04	90.17	1,661.04	3.14
Caterpillar 785C	0.36	31.51	1.71	31.51	0.06
Atlas Copco PV 275	0.41	36.00	1.95	36.00	0.07
Atlas Copco DML	0.57	50.01	2.71	50.01	0.09
Atlas Copco L8	0.04	0.78	0.37	6.83	0.01
Caterpillar D11T	0.61	52.99	2.88	52.99	0.10
Caterpillar D10T	0.15	2.95	1.40	25.85	0.05
Caterpillar 854G	0.39	34.42	1.87	34.42	0.07
Caterpillar 24H	0.06	1.23	0.59	10.78	0.02
Caterpillar 16H	0.11	2.13	1.01	18.63	0.04
Caterpillar 785C	0.23	19.77	1.07	19.77	0.04
Caterpillar 390DL	0.02	0.32	0.15	2.79	0.01
Komatsu PC2000	0.11	9.57	0.52	9.57	0.02
Caterpillar 777F	0.10	9.02	0.49	9.02	0.02
QTE Body on Peterbilt Chassis	0.003	0.06	0.03	0.49	0.001
Grove GMK6350 (200T)	0.004	0.07	0.03	0.62	0.001
QTE Body on Peterbilt Chassis	0.02	0.33	0.16	2.88	0.01
Caterpillar 988	0.02	0.47	0.22	4.11	0.01
Terex LT7000					Set to zero per ADEC 3/16/2015
Total Emissions	22.92	1,977.77	110.87	2,042.39	3.86

<sup>(1)</sup> Based on15 ppm S content and diesel density of6.74 lb/galMSDS - Ultra Low Sulfur Diesel No. 1

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.



<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 1	OF: 4	SHEET: Power
	SUBJECT: Power Generation Emissions		DATE: October 14, 2021		

**Power Generation Emissions Summary** (ton/yr)

Source	Output	CO	NOx	PM	SO2	VOC
Power Plant Generators (12)	204,912 <i>kWe</i>	350.11	1,030.89	564.07	11.51	1,122.74
Airport Generators (2)	400 <i>kWe</i>	16.90	1.93	0.10	0.03	0.92
<b>Power Generation Total</b>		<b>367.01</b>	<b>1,032.82</b>	<b>564.17</b>	<b>11.54</b>	<b>1,123.66</b>

Numbers in *blue* are direct entries. *Green* text/numbers are lookup codes or results.

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## AIR EMISSION CALCULATIONS

Donlin Gold

E. Memon

281-1-2

<b>SHEET:</b>
---------------

3

4

Power

## Power Generation Emissions

October 14, 2021

(Single Engine)

(12 Engines)

	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
CO	6.66	159.87	29.18	79.93	1,918.43	350.11
NOx	19.61	470.73	85.91	235.36	5,648.72	1,030.89
PM2.5/PM10/PM	10.73	257.57	47.01	128.78	3,090.81	564.07
VOC (C3H8)	21.36	512.67	93.56	256.33	6,152.01	1,122.74
SO2	0.22	5.26	0.96	2.63	63.09	11.51
NH3 <sup>(1)</sup>	1.33	31.85	5.81	15.93	382.25	69.76

<sup>(1)</sup> Based on mass exhaust rate of 24.5 Nm<sup>3</sup>/s, dry @ 0 °C  
and NH<sub>3</sub> molecular weight of 17 g/g-mol

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*Wärtsilä*

### NOx Emissions - Diesel Operation Mode

19.61 $lb/hr$	0.53 $\frac{g}{kWt}$	16,786 $\frac{kWt}{hr}$	$lb$
	$kWt$	$hr$	453.6 $\frac{g}{lb}$

Conversion(s):      0.022415  $Nm^3/g\text{-mol}$   
                              453.592  $g/lb$   
                              2,000  $lb/ton$   
                              3,785.41  $cc/gal$   
                              2.205  $lb/kg$

Numbers in **blue** are direct entries. **Green** text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 4	OF: 4
	SHEET: Power			
SUBJECT: Power Generation Emissions		DATE: October 14, 2021		

**Power Generation - Airport Generators (EU ID: 13-14) ADG1-2**  
 Engine Make and Model      Unknown  
 Engine Output (gross)      200 kWe      Donlin  
 Heat Input Rate      9,387 Btu/kWhe      Based on      7,000 Btu/hp-hr      AP-42 Default  
                                  1.9 MMBtu/hr  
 Units      2  
 Fuel Type      Diesel  
 Fuel Consumption      14.4 gal/hr      (1)  
                                  126,347 gal/yr

(1) Based on      130,167 Btu/gal      Donlin  
  
 Operation      365 days/yr  
                          24 hr/day  
 Control      None

Emission Factor(s)			
CO	4.38 g/kWhe	§ 60.4204(b), § 60.4201(a), and 1039.101, Table 1 (1.25x per § 60.4204(d), § 60.4212(b), § 1039.101 (e)(2)&(3))	
NOx	0.50 g/kWhe	§ 60.4204(b), § 60.4201(a), and 1039.101, Table 1 (1.25x per § 60.4204(d), § 60.4212(b), § 1039.101 (e)(2)&(3))	
PM2.5/PM10/PM	0.03 g/kWhe	§ 60.4204(b), § 60.4201(a), and 1039.101, Table 1 (1.25x per § 60.4204(d), § 60.4212(b), § 1039.101 (e)(2)&(3))	
VOC	0.24 g/kWhe	§ 60.4204(b), § 60.4201(a), and 1039.101, Table 1 (1.25x per § 60.4204(d), § 60.4212(b), § 1039.101 (e)(2)&(3))	
SO2	0.00661 g/kWhe	(1)	

(1) Based on      15 ppm S content and diesel density of      6.74 lb/gal      MSDS - Ultra Low Sulfur Diesel No. 1

Emissions	(Single Engine)			(2 Engines)		
	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
CO	1.9	46.3	8.4	3.9	92.6	16.9
NOx	0.2	5.3	1.0	0.4	10.6	1.9
PM2.5/PM10/PM	0.01	0.265	0.05	0.02	0.5	0.1
VOC	0.1	2.5	0.5	0.2	5.0	0.9
SO2	0.003	0.1	0.01	0.01	0.1	0.03

**Sample Calculations**  
**SO2 Emission Factor**  

0.00661 g/kWhe

15 lb-S	14.4 gal-Fuel	6.74 lb-Fuel	hr	2 lb-SO2	453.6 g
1.00E+06 lb-Fuel	hr	gal-Fuel	200 kWhe	lb-S	lb

**NOx Emissions**  

0.2 lb/hr

0.50 g	200 kWhe	lb
kWhe	hr	453.6 g

Conversion(s):  
 453.6 g/lb  
 2,000 lb/ton  
 1.34 hp/kW

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

Air Sciences Inc.  AIR EMISSION CALCULATIONS	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 1	OF: 18	SHEET: Mill
	SUBJECT: Processing Emissions		DATE: October 14, 2021		

Process and Refining Emissions Summary

Particulate Emissions

Source/Activity		PM2.5			PM10		PM	
		(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	
ROM Ore Discharge and Crushing	5,100 ton/hr	2.49	59.81	10.92	4.44	106.61	19.46	30.67
Coarse Ore Transfer	5,100 ton/hr	2.11	50.73	9.26	3.21	77.15	14.08	20.41
Pebble Crushers and Recycle	660 ton/hr	2.69	64.45	11.76	3.32	79.61	14.53	18.16
Reagents Handling and Mixing		2.88	69.11	12.61	2.88	69.11	12.61	12.61
Refinery Sources		2.45	58.71	10.71	2.45	58.71	10.71	10.71
Laboratories		1.85	44.46	8.11	1.85	44.46	8.11	8.11
Water Treatment Plant		0.26	6.17	1.13	0.26	6.17	1.13	1.13
Total		14.73	353.44	64.50	18.41	441.83	80.63	101.81

Other Emissions

Source/Activity	CO	NOx	SO2	VOC	H2S
	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)
Autoclaves	771		9.8	0.4	2.8
Carbon Regeneration Kiln	3.8	0.1		1.9	
EW Circuit					
Mercury Retort					
Induction Smelting Furnace					
Assay Furnaces					
Total	774.88	0.08	9.79	2.30	2.78

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 2	OF: 18
	SUBJECT: Processing Emissions		SHEET: Mill	
DATE: October 14, 2021				

**ROM Ore Discharge and Crushing (EU ID: 38-44)**  
**Activity Information**  
Gyratory Crusher (GC) Design Throughput

5,100 ton/hr

122,400 ton/day

44,676,000 ton/yr

Donlin

Operation

365 days/yr

24 hr/day

Emission Sources	EU ID	Control Equipment	EU ID
GC Dump Pocket 11-BIN-100	38	Enclosure	
GC Circuit	39	81-DCL-100      Dust Collector	40
GC 11-CRU-100, Surge Pocket 11-BIN-150, Apron Feeder 11-FEE-150	41, 42, 43		
GC Discharge Conveyor 11-CVB-100	44	Enclosure	

**Material Transfer - Run-of-Mine Ore Discharge to GC Dump Pocket and GC Discharge Conveyor**  
**Emission Factor(s)**  
Emission Factor Equation       $E = 0.0032k(U/5)^{1.3} / (M/2)^{1.4}$       AP-42, Sec. 13.2.4, Eq. 1, 11/06  
U = Mean wind speed      1.3 mph      Minimum applicable wind speed to account for enclosure  
M = Material moisture content      1.8 %      Donlin  
  
k = Particle size multiplier      PM2.5      PM10      PM      AP-42, Sec. 13.2.4, Pg. 4, 11/06  
E = Emission factor      0.000034      0.00023      0.00048 lb/ton

**GC Dump Pocket 11-BIN-100**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.17	4.2	0.8
PM10	1.15	27.6	5.0
PM	2.43	58.3	10.6

  
**GC Discharge Conveyor 11-CVB-100**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.17	4.2	0.8
PM10	1.15	27.6	5.0
PM	2.43	58.3	10.6

  
**GC Circuit**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5/PM10/PM	2.14	51.5	9.4

  
Based on:      0.01 gr/ACF      Vendor performance guarantee  
25,015 ACFM      42,500 Am<sup>3</sup>/hr      Man. Spec. Sheet

**Sample Calculation**  
**GC Circuit (exhaust through 81-DCL-100)**  

<b>PM2.5/PM10/PM</b>	(Dust Collector performance)	(Rated flow)	(Conversion)	(Conversion)
2.1 lb/hr	0.01 gr/ACF	25,015 ACF/min	60 min/hr	lb
				7,000 gr

  
Conversion(s):      3.2808 ft/m  
2,000 lb/ton  
1.1023 ton/t  
7,000 gr/lb

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<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 3	OF: 18	SHEET: Mill
	SUBJECT: Processing Emissions		DATE: October 14, 2021		

Coarse Ore Transfer to Stockpile (EU ID: 45)

Activity Information

Coarse Ore Throughput	5,100 ton/hr 122,400 ton/day 44,676,000 ton/yr	Gyratory crusher design rate Gyratory crusher throughput Gyratory crusher throughput Donlin Donlin
Stockpile Total Capacity	192,000 ton	Donlin
Stockpile Live Capacity	42,000 ton	Donlin
Operation	365 days/yr 24 hr/day	

Emission Sources	EU ID	Control Equipment
Stockpile Feed Conveyor 14-CVB-200	45	Enclosure

Emission Factor(s)

Emission Factor Equation	$E = 0.0032k(U/5)^{1.3} / (M/2)^{1.4}$			AP-42, Sec. 13.2.4, Eq. 1, 11/06
U = Mean wind speed	1.3 mph			Minimum applicable wind speed to account for cover
M = Material moisture content	1.8 %			Donlin
	PM2.5	PM10	PM	
k = Particle size multiplier	0.053	0.35	0.74	AP-42, Sec. 13.2.4, Pg. 4, 11/06
E = Emission factor	0.000034	0.00023	0.00048 lb/ton	

Stockpile Feed Conveyor 14-CVB-200			
Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.17	4.2	0.8
PM10	1.15	27.6	5.0
PM	2.43	58.3	10.6

Sample Calculation

Stockpile Feed Conveyor 14-CVB-200

PM10

1.15 lb/hr	0.00023 lb	5,100 <del>ton</del>	
	<del>ton</del>	hr	
27.6 lb/day	0.00023 lb	122,400 <del>ton</del>	
	<del>ton</del>	day	
5.0 ton/yr	0.00023 <del>lb</del>	44,676,000 <del>ton</del>	ton
	<del>ton</del>	yr	2000 <del>lb</del>

Conversion(s):

2,000 lb/ton

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE:		BY:	
	Donlin Gold		E. Memon	
	PROJECT NO:	PAGE:	OF:	SHEET:
	281-1-2	4	18	Mill
	SUBJECT:		DATE:	
	Processing Emissions		October 14, 2021	





<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 6	OF: 18
	SHEET: Mill			
SUBJECT: Processing Emissions		DATE: October 14, 2021		

**Pebble Crushers and Recycle (EU ID: 55-58)**

**Activity Information**

SAG Mill Throughput	3,303 ton/hr	Donlin
Pebble Crusher Design Throughput	660 ton/hr	Donlin

Operation	365 days/yr
	24 hr/day

Emission Sources	EU ID	Control Equipment	EU ID
Pebble Crushers 16-CRU-200, 300	55, 56	81-DCL-600      Dust Collector	57
Pebble Discharge Conveyor 16-CVB-480	58	Enclosure	

**Pebble Crushers 16-CRU-200, 300**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5/PM10/PM	2.6	61.8	11.3

Based on:      0.01 gr/ACF      30,017 ACFM      51,000 Am<sup>3</sup>/hr

Vendor performance guarantee  
Man. Spec. Sheet

**Pebble Discharge Conveyor 16-CVB-480**

**Emission Factor(s)**

Emission Factor Equation	$E = 0.0032k(U/5)^{1.3} / (M/2)^{1.4}$	AP-42, Sec. 13.2.4, Eq. 1, 11/06
U = Mean wind speed	1.3 mph	Minimum applicable wind speed to account for enclosure
M = Material moisture content	1.8 %	Donlin

	PM2.5	PM10	PM
k = Particle size multiplier	0.053	0.35	0.74 AP-42, Sec. 13.2.4, Pg. 4, 11/06
E = Emission factor	0.000034	0.00023	0.00048 lb/ton

**Pebble Discharge Conveyor 16-CVB-480**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.02	0.5	0.1
PM10	0.15	3.6	0.7
PM	0.31	7.5	1.4

**Sample Calculation**

**Pebble Crushers 16-CRU-200, 300 (exhaust through 81-DCL-600)**

PM2.5/PM10/PM	(Dust Collector performance)	(Rated flow)	(Conversion)	(Conversion)
2.6 lb/hr	0.01 <del>gr</del> ACF	30,017 ACF <del>min</del>	60 <del>min</del> hr	lb 7,000 gr

Conversion(s):      3.2808 ft/m  
2,000 lb/ton  
7,000 gr/lb

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 7	OF: 18	SHEET: Mill
	SUBJECT: Processing Emissions		DATE: October 14, 2021		

**Reagents (EU ID: 59-76)**

**Lime**

Lime Consumption	28,386 t/yr	Donlin
	31,290 ton/yr	

Lime Equipment Design Rating

Lime Hopper 15-HOP-535	110 t	Donlin
Lime Silo 15-BIN-800	122 t	Man. Spec. Sheet
Lime Slaker 15-MIL-400		

Operation

	365 days/yr
	24 hr/day

Emission Sources	EU ID	Control Equipment	EU ID
Lime Hopper 15-HOP-535	59	Lime Hopper 15-HOP-535	60
Lime Silo 15-BIN-800	61	Lime Silo 15-BIN-800	62
Lime Slaker 15-MIL-400	63	Lime Slaker 15-MIL-400	64

**Lime Hopper 15-HOP-535**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5/PM10/PM	0.26	6.17	1.13

Based on: 0.02 gr/ACF      Vendor performance guarantee  
1,500 ACFM      Estimate

**Lime Silo 15-BIN-800**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5/PM10/PM	0.26	6.17	1.13

Based on: 0.02 gr/ACF      Vendor performance guarantee  
1,500 ACFM      Proposal Document

**Lime Slaker 15-MIL-400**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5/PM10/PM	0.11	2.58	0.47

Based on: 0.02 gr/ACF      Vendor performance guarantee  
628 ACFM      1,067 Am<sup>3</sup>/hr      Proposal Document

**Sample Calculation**

**Lime Hopper 15-HOP-535 (exhaust through 15-FIL-535)**

PM2.5/PM10/PM	(Dust Collector performance)	(Rated flow)	(Conversion)	(Conversion)
0.26 lb/hr	0.02 <del>gr</del>	1,500 <del>ACF</del>	60 <del>min</del>	lb
	<del>ACF</del>	<del>min</del>	hr	7,000 <del>gr</del>

Conversion(s):

	2,000 lb/ton
	1.1023 ton/t
	7,000 gr/lb
	3.2808 ft/m

*Numbers in blue are direct entries. Green text/numbers are lookup codes or results.*

Reagents (EU ID: 59-76) - continued

Flocculants

Flocculant 1 Consumption

1,269 t/yr

Donlin

1,399 ton/yr

Flocculant 2 Consumption

920 t/yr

Donlin

1,014 ton/yr

Flocculant 3 Consumption

1,133 t/yr

Donlin

1,249 ton/yr

Total Flocculant Consumption

3,662 ton/yr

Operation

365 days/yr

24 hr/day

Emission Sources	EU ID	Control Equipment	EU ID
Flocculant Handling and Mixing 15-FLOC	65	15-DCL-XFLDust Collector	66

Flocculant Handling and Mixing 15-FLOC

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5/PM10/PM	0.14	3.46	0.63

Based on:

0.02 gr/ACF

Vendor performance guarantee

840 ACFM

Donlin

Sample Calculation

Flocculant Handling and Mixing (exhaust through 15-DCL-XFL)

PM2.5/PM10/PM

(Dust Collector performance)

(Rated flow)

(Conversion)

(Conversion)

0.14 lb/hr

0.02 gr

840 ACF

60 min

lb

ACFM

min

hr

gr

Conversion(s):

2,000 lb/ton

1.1023 ton/t

7,000 gr/lb

Numbers in blue are direct entries.

Green text/numbers are lookup codes or results.

Reagents (EU ID: 59-76) - continued

Caustic Soda (NaOH)

NaOH Consumption

276 t/yr  
304 ton/yr

Donlin

Operation

365 days/yr  
24 hr/day

Emission Sources	EU ID	Control Equipment	EU ID
Caustic Soda Handling and Mixing 15-NAOH	67	15-DCL-100Dust Collector	68

Caustic Soda Handling and Mixing 15-NAOH

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5/PM10/PM	0.23	5.45	0.99

Based on:

0.02 gr/ACF  
1,324 ACFM

2,250 Am<sup>3</sup>/hr

Vendor performance guarantee  
Donlin

Sample Calculation

Caustic Soda Handling and Mixing (exhaust through 15-DCL-100)

PM2.5/PM10/PM	(Dust Collector performance)	(Rated flow)	(Conversion)	(Conversion)
0.23 lb/hr	0.02 g# ACF	1,324 ACF min	60 min hr	lb 7,000 g#

Copper Sulfate

Copper Sulfate Consumption

Flotation  
CN Destruction  
Total

1,953 t/yr  
257 t/yr  
2,210 t/yr  
2,436 ton/yr

Donlin  
Donlin

Operation

365 days/yr  
24 hr/day

Emission Sources	EU ID	Control Equipment	EU ID
Copper Sulfate Handling and Mixing 15-CUSO4	69	15-DCL-105Dust Collector	70

Copper Sulfate Handling and Mixing 15-CUSO4

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5/PM10/PM	0.51	12.35	2.25

Based on:

0.02 gr/ACF  
3,002 ACFM

5,100 Am<sup>3</sup>/hr

Vendor performance guarantee  
Donlin

Sample Calculation

Copper Sulfate Handling and Mixing (exhaust through 15-DCL-105)

PM2.5/PM10/PM	(Dust Collector performance)	(Rated flow)	(Conversion)	(Conversion)
0.51 lb/hr	0.02 g# ACF	3,002 ACF min	60 min hr	lb 7,000 g#

Conversion(s):

2,000 lb/ton  
1.1023 ton/t  
7,000 gr/lb  
3.2808 ft/m

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 10	OF: 18
	SUBJECT: Processing Emissions		SHEET: Mill	
		DATE: October 14, 2021		

**Reagents (EU ID: 59-76) - continued**

**Xanthate (PAX)**

PAX Consumption	3,906 t/yr	Donlin
	4,306 ton/yr	
Operation	365 days/yr	
	24 hr/day	

Emission Sources	EU ID	Control Equipment	EU ID
PAX Handling and Mixing 15-PAX	71	15-DCL-110 Dust Collector	72

**PAX Handling and Mixing 15-PAX**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5/PM10/PM	0.51	12.35	2.25

Based on: 0.02 gr/ACF      Vendor performance guarantee  
3,002 ACFM      5,100 Am<sup>3</sup>/hr      Donlin

**Sample Calculation**

**PAX Handling and Mixing (exhaust through 15-DCL-110)**

PM2.5/PM10/PM	(Dust Collector performance)	(Rated flow)	(Conversion)	(Conversion)
0.51 lb/hr	0.02 <del>gr</del>	3,002 <del>ACF</del>	60 <del>min</del>	lb
	<del>ACF</del>	<del>min</del>	hr	7,000 <del>gr</del>

**Soda Ash**

Soda Ash Consumption	976 t/yr	Donlin
	1,076 ton/yr	
Operation	365 days/yr	
	24 hr/day	

Emission Sources	EU ID	Control Equipment	EU ID
Soda Ash Handling 15-SODA1	73	15-DCL-520 Dust Collector	74
Soda Ash Mixing 15-SODA2	75	15-DCL-115 Dust Collector	76

**Soda Ash Handling 15-SODA1**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5/PM10/PM	0.34	8.23	1.50

Based on: 0.02 gr/ACF      Vendor performance guarantee  
2,000 ACFM      Estimate

**Soda Ash Mixing 15-SODA2**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5/PM10/PM	0.51	12.35	2.25

Based on: 0.02 gr/ACF      Vendor performance guarantee  
3,002 ACFM      5,100 Am<sup>3</sup>/hr      Donlin

**Sample Calculation**

**Soda Ash Mixing (exhaust through 15-DCL-115)**

PM2.5/PM10/PM	(Dust Collector performance)	(Rated flow)	(Conversion)	(Conversion)
0.51 lb/hr	0.02 <del>gr</del>	3,002 <del>ACF</del>	60 <del>min</del>	lb
	<del>ACF</del>	<del>min</del>	hr	7,000 <del>gr</del>

Conversion(s): 3.2808 ft/m  
2,000 lb/ton  
1.1023 ton/t  
7,000 gr/lb

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.







<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 13	OF: 18
	SHEET: Mill			
SUBJECT: Processing Emissions		DATE: October 14, 2021		

**Carbon Regeneration Kiln (EU ID: 88-90) (Electric)**

**Activity Information**

Kiln Design Throughput      1.5 t/hr      Donlin  
    1.65 ton/hr

Operation      365 days/yr  
                          24 hr/day

Emission Sources	EU ID	Control Equipment	EU ID
Carbon Regeneration Kiln 56-KLN-100	88	56-CDO-300 Off Gas Cooler	89
		56-FIL-205 Carbon Filter	90

**Carbon Regeneration Kiln 56-KLN-100**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5/PM10/PM	0.44	10.5	1.9
CO	0.88	21.1	3.8
NOx	0.018	0.42	0.08
VOC	0.44	10.5	1.9

Based on:	0.0218 gr/dscf	50,000 µg/Nm <sup>3</sup>	PM	Based on Barrick Goldstrike 2006-2012 test data (Method 29, 5/202, Kiln 2)
	0.0437 gr/dscf	100,000 µg/Nm <sup>3</sup>	CO	Based on Barrick Goldstrike 2006-2011 test data (Method 10, Kiln 2)
	0.0009 gr/dscf	2,000 µg/Nm <sup>3</sup>	NOx	Based on Barrick Goldstrike 2006-2007 test data (Method 7E, Kiln 2)
	0.0218 gr/dscf	50,000 µg/Nm <sup>3</sup>	VOC	Based on Barrick Goldstrike 2006-2011 test data (Method 25A, Kiln 2)

	39 C, stack temperature	Hatch, Hg Emissions Controls Summary, 5/27/2014
2,346 SCFM,dry	3.7% moisture	Hatch, Hg Emissions Controls Summary, 5/27/2014
2,437 SCFM,wet	4,563 Am <sup>3</sup> /hr	Hatch, Hg Emissions Controls Summary, 5/27/2014
	2,686 ACFM	

**Sample Calculation**

**Carbon Regeneration Kiln 56-KLN-100 (exhaust through 56-FIL-205)**

PM2.5/PM10/PM	(Pollutant concentration)	(Rated flow)	(Conversion)	(Conversion)
0.44 lb/hr	0.0218 <del>gr</del>	2,346 <del>SCF</del>	60 <del>min</del>	lb
	<del>SCF</del>	<del>min</del>	hr	7,000 <del>gr</del>

Conversion(s):      20 C, standard temperature      14.696 psia, standard pressure

                         64,799 µg/gr      14.2 psia, actual pressure

                         35.315 ft<sup>3</sup>/m<sup>3</sup>

                         2,000 lb/ton

                         1.1023 ton/t

                         7,000 gr/lb

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.





<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 16	OF: 18	SHEET: Mill
	SUBJECT: Processing Emissions		DATE: October 14, 2021		

**Induction Smelting Furnace (EU ID: 100-102) (Electric)**  
**Activity Information**  
 Operation 365 days/yr  
24 hr/day

Emission Sources	EU ID	Control Equipment	EU ID
Induction Smelting Furnace 19-FUR-1 100		19-DCL-XFU      Dust Collector	101
		19-FIL-XFU      Carbon Filter	102

**Induction Smelting Furnace 19-FUR-100**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5/PM10/PM	0.95	22.8	4.2

<p>Based on:      0.00503 gr/dscf      <span style="color: blue;">11,500</span> µg/Nm<sup>3</sup>      PM</p> <p style="text-align: center; margin-left: 150px;"><span style="color: blue;">80</span> C, stack temperature</p> <p style="margin-left: 50px;">22,006 SCFM,dry      <span style="color: blue;">3.2%</span> moisture</p> <p style="margin-left: 50px;">22,744 SCFM,wet      <span style="color: blue;">48,177</span> Am<sup>3</sup>/hr</p> <p style="margin-left: 100px;"><span style="color: blue;">28,356</span> ACFM</p>	<p>Based on Barrick Goldstrike 2004-2012 test data (Methods 29, 5/202, Furnace)</p> <p>Hatch, Hg Emissions Controls Summary, 5/27/2014</p> <p>Hatch, Hg Emissions Controls Summary, 5/27/2014</p> <p>Hatch, Hg Emissions Controls Summary, 5/27/2014</p>
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**Sample Calculation**  
**Induction Smelting Furnace (exhaust through 19-FIL-XFU)**

<b>PM2.5/PM10/PM</b>	(Pollutant concentration)	(Rated flow)	(Conversion)	(Conversion)
0.95 lb/hr	0.0050 <del>gr</del>	22,006 <del>SCF</del>	60 <del>min</del>	lb
	<del>SCF</del>	<del>min</del>	hr	7,000 <del>gr</del>

Conversion(s):      20 C, standard temperature      14.696 psia, standard pressure  
64,799 µg/gr      14.2 psia, actual pressure  
35.315 ft<sup>3</sup>/m<sup>3</sup>  
2,000 lb/ton  
1.1023 ton/t  
7,000 gr/lb

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<p style="text-align: center;"><b>Air Sciences Inc.</b></p> <p style="text-align: center;">AIR EMISSION CALCULATIONS</p>	PROJECT TITLE:		BY:	
	Donlin Gold		E. Memon	
	PROJECT NO:	PAGE:	OF:	SHEET:
	281-1-2	17	18	Mill
	SUBJECT:	DATE:		
	Processing Emissions	October 14, 2021		

**Laboratories (EU ID: 103-110)**

### Activity Information

Sample Preparation	11 lb/sample	325 sample/day	Nonlinear
Operation	365 days/yr	24 hr/day	

Emission Sources	EU ID	Control Equipment	EU ID
24-LAB1 - Sample Receiving and Preparation Drying Ovens (2 Grieve 350 Dryers)	103	Electric	--
24-LAB1 - Sample Receiving and Preparation (Crushers, Pulverizers, Splitters, Screens)	104	24-DCL-XL1 Dust Collector	105
24-LAB2 - Assay Furnaces	106	24-DCL-XL2 Dust Collector	107
24-LAB3 - Metallurgical Drying Oven (Grieve 350 Dryer)	108	Electric	--
24-LAB3 - Metallurgical Material Testing (Grinding Rollers, Screens)	109	24-DCL-XL3 Dust Collector	110

## Sample Receiving and Preparation Laboratory 24-LAB1

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5/PM10/PM	0.45	10.9	2.0

Based on:	0.009 gr/SCF	20,000 $\mu\text{g}/\text{Nm}^3$	PM
		20 C, stack temperature	
	5,886 SCFM	10,000 $\text{Am}^3/\text{hr}$	
		5,886 ACFM	

Based on Barrick Goldstrike 2011 test data (Method 5/202, Met. Sample Prep.)  
Estimate

Based on Barrick Goldstrike 2011 test data (Method 5/202, Met. Sample Prep.)

## Assay Laboratory 24-LAB2

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5/PM10/PM	0.94	22.7	4.1

Based on:	0.004 gr/SCF	9,200 $\mu\text{g}/\text{Nm}^3$	PM
		40 C, stack temperature	
27,550 SCFM		50,000 $\text{Am}^3/\text{hr}$	
		29,429 ACFM	

*Based on Barrick Goldstrike 2008-2012 test data (Method 29, Fire Assay)*

Estimate

*Based on Barrick Goldstrike 2008-2012 test data (Method 29, Fire Assay)*

## Metallurgical Laboratory 24-LAB3

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5/PM10/PM	0.45	10.9	2.0

Based on:	0.009 gr/SCF	20,000 $\mu\text{g}/\text{Nm}^3$	PM
		20 C,	stack temperature
	5,886 SCFM	10,000 $\text{Am}^3/\text{hr}$	
		5,886 ACFM	

*Based on Barrick Goldstrike 2011 test data (Method 5/202, Met. Sample Prep.)*

*Estimate*

*Based on Barrick Goldstrike 2011 test data (Method 5/202, Met. Sample Prep.)*

Conversion(s):                20 C, standard temperature  
64,799 μg/gr  
35.315 ft<sup>3</sup>/m<sup>3</sup>  
2,000 lb/ton  
1.1023 ton/t  
7,000 gr/lb

Numbers in **blue** are direct entries. **Green** text/numbers are lookup codes or results.

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 18	OF: 18	SHEET: Mill
	SUBJECT: Processing Emissions		DATE: October 14, 2021		

**Water Treatment Plant (EU ID: 111-112) (WTP)**

## Water Conditioning

Conditioner Consumption Unknown t/yr

Emissions are not based on throughput rate. Instead, emissions are conservatively based on the maximum control system exhaust fan flow rate and the maximum estimated particulate concentration in the exhaust.

Operation 365 days/yr  
24 hr/day

Emission Sources	EU ID	Control Equipment	EU ID
WTP Water Coconditioning (61-COND)	111	54-DCL-710 Dust Collector	112

WTP Water Coinditioning (61-COND)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5/PM10/PM	0.26	6.17	1.13

Based on: 0.02 gr/scf  
1,500 SCFM

*Vendor performance guarantee*  
*Estimate*

### Sample Calculation

### WTP Water Coconditioning (61-COND)

PM2.5/PM10/PM	(Dust Collector performance)	(Rated flow)	(Conversion)	(Conversion)
0.26 lb/hr	0.02 $\frac{scf}{sec}$	1,500 $\frac{scf}{min}$	60 $\frac{min}{hr}$	lb
	$\frac{scf}{sec}$	$\frac{min}{min}$	$\frac{hr}{hr}$	7,000 $\frac{scf}{hr}$

Conversion(s):            2,000 lb/ton  
                                 1.1023 ton/t  
                                 7,000 gr/lb

Numbers in **blue** are direct entries. **Green** text/numbers are lookup codes or results.

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<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 2	OF: 13
	SUBJECT: Boiler/Heater Emissions		DATE: October 14, 2021	

**Pressure Oxidation Boilers (EU ID: 15-16)**  
**POX Boiler No. 1 - 17-BLR-301**

Make and Model                      Clayton Industries, E704  
Rating                                      29.29 MMBtu/hr                      Man. Spec. Sheet

Fuel                                        NG or ULSD

Operation                                365 days/yr  
   24 hr/day  
   NG <sup>(1)</sup>                                      ULSD <sup>(2)</sup>

Fuel Consumption                      28,716 Scf/hr                                      225.0 gal/hr  
   252 MMScf/yr                                      1,971,205 gal/yr

<sup>(1)</sup> Based on                      1,020 Btu/Scf                      footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98  
<sup>(2)</sup> Based on                      130,167 Btu/gal                      Donlin

Emission Factor(s)	NG	ULSD	NG	ULSD
CO <sup>(2), (5)</sup>	84 lb/MMScf	0.005 lb/gal	0.0824	0.0384 lb/MMBtu <sup>(1)</sup>
NOx <sup>(2), (5)</sup>	100 lb/MMScf	0.020 lb/gal	0.0980	0.1536 lb/MMBtu <sup>(1)</sup>
PM2.5 <sup>(3), (4), (6)</sup>	7.6 lb/MMScf	0.00025 lb/gal	0.0075	0.00192 lb/MMBtu <sup>(1)</sup>
PM10 <sup>(3), (4), (6)</sup>	7.6 lb/MMScf	0.001 lb/gal	0.0075	0.0077 lb/MMBtu <sup>(1)</sup>
PM <sup>(3), (4), (7)</sup>	7.6 lb/MMScf	0.003 lb/gal	0.0075	0.0254 lb/MMBtu <sup>(1)</sup>
SO2 <sup>(3), (8)</sup>	0.6 lb/MMScf		0.0006	0.0016 lb/MMBtu <sup>(1)</sup>
VOC <sup>(3), (9)</sup>	5.5 lb/MMScf	0.0002 lb/gal	0.0054	0.00154 lb/MMBtu <sup>(1)</sup>

<sup>(1)</sup> NG based on                      1,020 Btu/Scf                      footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98                      No. 1                      130,167 Btu/gal  
<sup>(2)</sup> AP-42, Tab. 1.4-1, 07/98 (boilers < 100 MMBtu/hr)  
<sup>(3)</sup> AP-42, Tab. 1.4-2, 07/98  
<sup>(4)</sup> Assumed PM2.5 = PM10 = PM  
<sup>(5)</sup> AP-42, Tab. 1.3-1, 05/10 (distillate oil, < 100 MMBtu/hr)  
<sup>(6)</sup> AP-42, Tab. 1.3-6, 05/10 (distillate oil, industrial boilers)  
<sup>(7)</sup> AP-42, Tabs. 1.3-1 (filterable, distillate oil, < 100 MMBtu/hr) & 1.3-2 (condensable, No. 2 oil), 05/10  
<sup>(8)</sup> Based on                      15 ppm S content and diesel density of                      6.74 lb/gal                      MSDS - Ultra Low Sulfur Diesel No. 1  
<sup>(9)</sup> AP-42, Tab. 1.3-3, 05/10 (distillate oil, industrial boilers)

**POX Boiler No. 1 - 17-BLR-301**

Emissions	NG			ULSD			Maximum		
	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
CO	2.41	57.9	10.6	1.13	27.00	4.93	2.41	57.89	10.57
NOx	2.87	68.9	12.6	4.50	108.01	19.71	4.50	108.01	19.71
PM2.5	0.22	5.24	0.96	0.056	1.35	0.246	0.22	5.24	0.96
PM10	0.22	5.24	0.96	0.225	5.40	0.99	0.23	5.40	0.99
PM	0.22	5.24	0.96	0.74	17.82	3.25	0.74	17.82	3.25
SO2	0.02	0.41	0.08	0.05	1.09	0.20	0.05	1.09	0.20
VOC	0.16	3.79	0.69	0.045	1.08	0.197	0.16	3.79	0.69

**Sample Calculation - POX Boiler No. 1 - 17-BLR-301**  
**CO (NG Combustion)**

2.41 lb/hr	0.0824 lb	29 MMBtu	hr
	MMBtu		

**NOx (NG Combustion)**

2.87 lb/hr	0.0980 lb	29 MMBtu	hr
	MMBtu		

Conversion(s):                      2,000 lb/ton

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.



<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	<b>PROJECT TITLE:</b> Donlin Gold		<b>BY:</b> E. Memon		
	<b>PROJECT NO:</b> 281-1-2		<b>PAGE:</b> 3	<b>OF:</b> 13	<b>SHEET:</b> Boilers
	<b>SUBJECT:</b> Boiler/Heater Emissions		<b>DATE:</b> October 14, 2021		

**Pressure Oxidation Boilers (EU ID: 15-16) - continued**  
**POX Boiler No. 2 - 17-BLR-302**

Make and Model                      Clayton Industries, E704  
Rating                                      29.29 MMBtu/hr                      Man. Spec. Sheet

Fuel    NG or ULSD

Operation                                      365 days/yr  
    24 hr/day  
    NG <sup>(1)</sup>                                      ULSD <sup>(2)</sup>

Fuel Consumption                      28,716 Scf/hr                      225.0 gal/hr  
    252 MMScf/yr                      1,971,205 gal/yr

<sup>(1)</sup> Based on                      1,020 Btu/Scf                      footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98  
<sup>(2)</sup> Based on                      130,167 Btu/gal                      Donlin

Emission Factor(s)	NG	ULSD	NG	ULSD
CO                      (2), (5)	84 lb/MMScf	0.005 lb/gal	0.0824	0.0384 lb/MMBtu <sup>(1)</sup>
NOx                      (2), (5)	100 lb/MMScf	0.020 lb/gal	0.0980	0.1536 lb/MMBtu <sup>(1)</sup>
PM2.5                      (3), (4), (6)	7.6 lb/MMScf	0.00025 lb/gal	0.0075	0.00192 lb/MMBtu <sup>(1)</sup>
PM10                      (3), (4), (6)	7.6 lb/MMScf	0.001 lb/gal	0.0075	0.0077 lb/MMBtu <sup>(1)</sup>
PM                      (3), (4), (7)	7.6 lb/MMScf	0.003 lb/gal	0.0075	0.0254 lb/MMBtu <sup>(1)</sup>
SO2                      (3), (8)	0.6 lb/MMScf	0.0006 lb/gal	0.0006	0.0016 lb/MMBtu <sup>(1)</sup>
VOC                      (3), (9)	5.5 lb/MMScf	0.0002 lb/gal	0.0054	0.00154 lb/MMBtu <sup>(1)</sup>

<sup>(1)</sup> NG based on                      1,020 Btu/Scf                      footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98                      No. 1                      130,167 Btu/gal  
<sup>(2)</sup> AP-42, Tab. 1.4-1, 07/98 (boilers < 100 MMBtu/hr)  
<sup>(3)</sup> AP-42, Tab. 1.4-2, 07/98  
<sup>(4)</sup> Assumed PM2.5 = PM10 = PM  
<sup>(5)</sup> AP-42, Tab. 1.3-1, 05/10 (distillate oil, < 100 MMBtu/hr)  
<sup>(6)</sup> AP-42, Tab. 1.3-6, 05/10 (distillate oil, industrial boilers)  
<sup>(7)</sup> AP-42, Tabs. 1.3-1 (filterable, distillate oil, < 100 MMBtu/hr) & 1.3-2 (condensable, No. 2 oil), 05/10  
<sup>(8)</sup> Based on                      15 ppm S content and diesel density of                      6.74 lb/gal                      MSDS - Ultra Low Sulfur Diesel No. 1  
<sup>(9)</sup> AP-42, Tab. 1.3-3, 05/10 (distillate oil, industrial boilers)

**POX Boiler No. 2 - 17-BLR-302**

Emissions	NG			ULSD			Maximum		
	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
CO	2.41	57.9	10.6	1.13	27.00	4.93	2.41	57.89	10.57
NOx	2.87	68.9	12.6	4.50	108.01	19.71	4.50	108.01	19.71
PM2.5	0.22	5.24	0.96	0.056	1.35	0.246	0.22	5.24	0.96
PM10	0.22	5.24	0.96	0.225	5.40	0.99	0.23	5.40	0.99
PM	0.22	5.24	0.96	0.74	17.82	3.25	0.74	17.82	3.25
SO2	0.02	0.41	0.08	0.05	1.09	0.20	0.05	1.09	0.20
VOC	0.16	3.79	0.69	0.045	1.08	0.197	0.16	3.79	0.69

**Sample Calculation**

**CO**

2.41 lb/hr	0.0824 lb	29 MMBtu
	MMBtu	hr

**NOx**

2.87 lb/hr	0.0980 lb	29 MMBtu
	MMBtu	hr

Conversion(s):                      2,000 lb/ton

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 4	OF: 13
	SUBJECT: Boiler/Heater Emissions		DATE: October 14, 2021	

**Oxygen Plant Boiler (EU ID: 17)**  
**Oxygen Plant Boiler - 33-BLR-001**  
 Make and Model                      Clayton Industries, E504  
 Rating                                      20.66 MMBtu/hr                      Man. Spec. Sheet

Fuel    NG or ULSD

Operation                                      365 days/yr  
    24 hr/day  
    NG <sup>(1)</sup>                                      ULSD <sup>(2)</sup>

Fuel Consumption                      20,258 Scf/hr                      158.7 gal/hr  
    177 MMScf/yr                      1,390,621 gal/yr

<sup>(1)</sup> Based on                      1,020 Btu/Scf                      footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98

<sup>(2)</sup> Based on                      130,167 Btu/gal                      Donlin

Emission Factor(s)		NG	ULSD	NG	ULSD
CO	(2), (5)	84 lb/MMScf	0.005 lb/gal	0.0824	0.0384 lb/MMBtu <sup>(1)</sup>
NOx	(2), (5)	100 lb/MMScf	0.020 lb/gal	0.0980	0.1536 lb/MMBtu <sup>(1)</sup>
PM2.5	(3), (4), (6)	7.6 lb/MMScf	0.00025 lb/gal	0.0075	0.00192 lb/MMBtu <sup>(1)</sup>
PM10	(3), (4), (6)	7.6 lb/MMScf	0.001 lb/gal	0.0075	0.0077 lb/MMBtu <sup>(1)</sup>
PM	(3), (4), (7)	7.6 lb/MMScf	0.003 lb/gal	0.0075	0.0254 lb/MMBtu <sup>(1)</sup>
SO2	(3), (8)	0.6 lb/MMScf		0.0006	0.0016 lb/MMBtu <sup>(1)</sup>
VOC	(3), (9)	5.5 lb/MMScf	0.0002 lb/gal	0.0054	0.00154 lb/MMBtu <sup>(1)</sup>

<sup>(1)</sup> NG based on                      1,020 Btu/Scf                      footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98                      No. 1                      130,167 Btu/gal

<sup>(2)</sup> AP-42, Tab. 1.4-1, 07/98 (boilers < 100 MMBtu/hr)

<sup>(3)</sup> AP-42, Tab. 1.4-2, 07/98

<sup>(4)</sup> Assumed PM2.5 = PM10 = PM

<sup>(5)</sup> AP-42, Tab. 1.3-1, 05/10 (distillate oil, < 100 MMBtu/hr)

<sup>(6)</sup> AP-42, Tab. 1.3-6, 05/10 (distillate oil, industrial boilers)

<sup>(7)</sup> AP-42, Tabs. 1.3-1 (filterable, distillate oil, < 100 MMBtu/hr) & 1.3-2 (condensable, No. 2 oil), 05/10

<sup>(8)</sup> Based on                      15 ppm S content and diesel density of                      6.74 lb/gal                      MSDS - Ultra Low Sulfur Diesel No. 1

<sup>(9)</sup> AP-42, Tab. 1.3-3, 05/10 (distillate oil, industrial boilers)

**Oxygen Plant Boiler - 33-BLR-001**

Emissions	NG			ULSD			Maximum		
	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
CO	1.70	40.8	7.5	0.79	19.05	3.48	1.70	40.84	7.45
NOx	2.03	48.6	8.9	3.17	76.20	13.91	3.17	76.20	13.91
PM2.5	0.15	3.70	0.67	0.040	0.95	0.174	0.15	3.70	0.67
PM10	0.15	3.70	0.67	0.159	3.81	0.70	0.16	3.81	0.70
PM	0.15	3.70	0.67	0.52	12.57	2.29	0.52	12.57	2.29
SO2	0.01	0.29	0.05	0.03	0.77	0.14	0.03	0.77	0.14
VOC	0.11	2.67	0.49	0.032	0.76	0.139	0.11	2.67	0.49

**Sample Calculation**

**CO**

1.70 lb/hr	0.0824 lb	21 MMBtu
	MMBtu	hr

**NOx**

2.03 lb/hr	0.0980 lb	21 MMBtu
	MMBtu	hr

Conversion(s):                      2,000 lb/ton

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 5	OF: 13	SHEET: Boilers
	SUBJECT: Boiler/Heater Emissions		DATE: October 14, 2021		

**Carbon Elution Heater (EU ID: 18)**  
**Carbon Elution Heater - 56-BLR-200**  
 Make and Model                      Sigma Thermal, BBC-18  
 Rating                                      16 MMBtu/hr  
  
 Fuel                                        NG or ULSD  
  
 Operation                                365 days/yr  
     24 hr/day  
     NG <sup>(1)</sup>                                      ULSD <sup>(2)</sup>  
 Fuel Consumption                      15,686 Scf/hr                              122.9 gal/hr  
     137 MMScf/yr                              1,076,771 gal/yr

(1) Based on                      1,020 Btu/Scf                      footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98  
 (2) Based on                      130,167 Btu/gal                      Donlin

Emission Factor(s)	NG	ULSD	NG	ULSD
CO <sup>(2), (5)</sup>	84 lb/MMScf	0.005 lb/gal	0.0824	0.0384 lb/MMBtu <sup>(1)</sup>
NOx <sup>(2), (5)</sup>	100 lb/MMScf	0.020 lb/gal	0.0980	0.1536 lb/MMBtu <sup>(1)</sup>
PM2.5 <sup>(3), (4), (6)</sup>	7.6 lb/MMScf	0.00025 lb/gal	0.0075	0.00192 lb/MMBtu <sup>(1)</sup>
PM10 <sup>(3), (4), (6)</sup>	7.6 lb/MMScf	0.001 lb/gal	0.0075	0.0077 lb/MMBtu <sup>(1)</sup>
PM <sup>(3), (4), (7)</sup>	7.6 lb/MMScf	0.003 lb/gal	0.0075	0.0254 lb/MMBtu <sup>(1)</sup>
SO2 <sup>(3), (8)</sup>	0.6 lb/MMScf		0.0006	0.0016 lb/MMBtu <sup>(1)</sup>
VOC <sup>(3), (9)</sup>	5.5 lb/MMScf	0.0002 lb/gal	0.0054	0.00154 lb/MMBtu <sup>(1)</sup>

(1) NG based on                      1,020 Btu/Scf                      footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98                      No. 1                      130,167 Btu/gal  
 (2) AP-42, Tab. 1.4-1, 07/98 (boilers < 100 MMBtu/hr)  
 (3) AP-42, Tab. 1.4-2, 07/98  
 (4) Assumed PM2.5 = PM10 = PM  
 (5) AP-42, Tab. 1.3-1, 05/10 (distillate oil, < 100 MMBtu/hr)  
 (6) AP-42, Tab. 1.3-6, 05/10 (distillate oil, industrial boilers)  
 (7) AP-42, Tabs. 1.3-1 (filterable, distillate oil, < 100 MMBtu/hr) & 1.3-2 (condensable, No. 2 oil), 05/10  
 (8) Based on                      15 ppm S content and diesel density of                      6.74 lb/gal                      MSDS - Ultra Low Sulfur Diesel No. 1  
 (9) AP-42, Tab. 1.3-3, 05/10 (distillate oil, industrial boilers)

**Carbon Elution Heater - 56-BLR-200**

Emissions	NG			ULSD			Maximum		
	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
CO	1.32	31.6	5.8	0.61	14.75	2.69	1.32	31.62	5.77
NOx	1.57	37.6	6.9	2.46	59.00	10.77	2.46	59.00	10.77
PM2.5	0.12	2.86	0.52	0.0307	0.74	0.135	0.12	2.86	0.52
PM10	0.12	2.86	0.52	0.123	2.95	0.54	0.12	2.95	0.54
PM	0.12	2.86	0.52	0.41	9.74	1.78	0.41	9.74	1.78
SO2	0.01	0.23	0.04	0.02	0.60	0.11	0.02	0.60	0.11
VOC	0.09	2.07	0.38	0.0246	0.59	0.108	0.09	2.07	0.38

**Sample Calculation**  
**CO**

1.32 lb/hr	<div style="border-bottom: 1px solid black; display: inline-block; width: 100%;">0.0824 lb</div> <div style="text-align: center; font-size: small;">MMBtu</div>	<div style="border-bottom: 1px solid black; display: inline-block; width: 100%;">16 MMBtu</div> <div style="text-align: center; font-size: small;">hr</div>
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**NOx**

1.57 lb/hr	<div style="border-bottom: 1px solid black; display: inline-block; width: 100%;">0.0980 lb</div> <div style="text-align: center; font-size: small;">MMBtu</div>	<div style="border-bottom: 1px solid black; display: inline-block; width: 100%;">16 MMBtu</div> <div style="text-align: center; font-size: small;">hr</div>
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 Conversion(s):                      2,000 lb/ton

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	<b>PROJECT TITLE:</b> Donlin Gold		<b>BY:</b> E. Memon		
	<b>PROJECT NO:</b> 281-1-2		<b>PAGE:</b> 6	<b>OF:</b> 13	<b>SHEET:</b> Boilers
	<b>SUBJECT:</b> Boiler/Heater Emissions		<b>DATE:</b> October 14, 2021		

**Power Plant Auxiliary Heaters (EU ID: 19-20)**  
**Power Plant Auxiliary Heaters No. 1 - PP-HEU-100**  
 Make and Model                      Unknown  
 Rating                                      16.5 MMBtu/hr                      Wäertsilä  
  
 Fuel    NG or ULSD  
  
 Operation                                      365 days/yr  
     24 hr/day  
     NG <sup>(1)</sup>                                      ULSD <sup>(2)</sup>  
 Fuel Consumption                      16,176 Scf/hr                      126.8 gal/hr  
     142 MMScf/yr                      1,110,420 gal/yr

(1) Based on                      1,020 Btu/Scf                      footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98  
 (2) Based on                      130,167 Btu/gal                      Donlin

Emission Factor(s)	NG	ULSD	NG	ULSD
CO                      (2), (5)	84 lb/MMScf	0.005 lb/gal	0.0824	0.0384 lb/MMBtu <sup>(1)</sup>
NOx                      (2), (5)	50 lb/MMScf	0.020 lb/gal	0.0490	0.1536 lb/MMBtu <sup>(1)</sup>
PM2.5                      (3), (4), (6)	7.6 lb/MMScf	0.00025 lb/gal	0.0075	0.00192 lb/MMBtu <sup>(1)</sup>
PM10                      (3), (4), (6)	7.6 lb/MMScf	0.001 lb/gal	0.0075	0.0077 lb/MMBtu <sup>(1)</sup>
PM                      (3), (4), (7)	7.6 lb/MMScf	0.003 lb/gal	0.0075	0.0254 lb/MMBtu <sup>(1)</sup>
SO2                      (3), (8)	0.6 lb/MMScf		0.0006	0.0016 lb/MMBtu <sup>(1)</sup>
VOC                      (3), (9)	5.5 lb/MMScf	0.0002 lb/gal	0.0054	0.00154 lb/MMBtu <sup>(1)</sup>

(1) NG based on                      1,020 Btu/Scf                      footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98                      No. 1                      130,167 Btu/gal  
 (2) AP-42, Tab. 1.4-1, 07/98, (boilers < 100 MMBtu/hr, Low-NOx)  
 (3) AP-42, Tab. 1.4-2, 07/98  
 (4) Assumed PM2.5 = PM10 = PM  
 (5) AP-42, Tab. 1.3-1, 05/10 (distillate oil, < 100 MMBtu/hr)  
 (6) AP-42, Tab. 1.3-6, 05/10 (distillate oil, industrial boilers)  
 (7) AP-42, Tabs. 1.3-1 (filterable, distillate oil, < 100 MMBtu/hr) & 1.3-2 (condensable, No. 2 oil), 05/10  
 (8) Based on                      15 ppm S content and diesel density of                      6.74 lb/gal                      MSDS - Ultra Low Sulfur Diesel No. 1  
 (9) AP-42, Tab. 1.3-3, 05/10 (distillate oil, industrial boilers)

**Power Plant Auxiliary Heaters No. 1 - PP-HEU-100**

Emissions	NG			ULSD			Maximum		
	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
CO	1.36	32.6	6.0	0.63	15.21	2.78	1.36	32.61	5.95
NOx	0.81	19.4	3.5	2.54	60.84	11.10	2.54	60.84	11.10
PM2.5	0.12	2.95	0.54	0.0317	0.76	0.139	0.12	2.95	0.54
PM10	0.12	2.95	0.54	0.127	3.04	0.56	0.13	3.04	0.56
PM	0.12	2.95	0.54	0.42	10.04	1.83	0.42	10.04	1.83
SO2	0.01	0.23	0.04	0.03	0.62	0.11	0.03	0.62	0.11
VOC	0.09	2.14	0.39	0.0254	0.61	0.111	0.09	2.14	0.39

**Sample Calculation - NG**  
**CO**

1.36 lb/hr	<div style="border-bottom: 1px solid black; display: inline-block; width: 100%;">0.0824 lb</div> <div style="text-align: center; font-size: small;">MMBtu</div>	<div style="border-bottom: 1px solid black; display: inline-block; width: 100%;">16.5 MMBtu</div> <div style="text-align: center; font-size: small;">hr</div>
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**NOx**

0.81 lb/hr	<div style="border-bottom: 1px solid black; display: inline-block; width: 100%;">0.0490 lb</div> <div style="text-align: center; font-size: small;">MMBtu</div>	<div style="border-bottom: 1px solid black; display: inline-block; width: 100%;">16.5 MMBtu</div> <div style="text-align: center; font-size: small;">hr</div>
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 Conversion(s):                      2,000 lb/ton

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

Air Sciences Inc.

AIR EMISSION CALCULATIONS

PROJECT TITLE:  
Donlin Gold

PROJECT NO:  
281-1-2

SUBJECT:  
Boiler/Heater Emissions

BY:  
E. Memon

PAGE:  
7

OF:  
13

SHEET:  
Boilers

DATE:  
October 14, 2021

**Power Plant Auxiliary Heaters (EU ID: 19-20) - continued**  
**Power Plant Auxiliary Heater No. 2 - PP-HEU-200**

Make and Model                      Unknown

Rating                                      16.5 MMBtu/hr                      Wärtsilä

Fuel    NG or ULSD

Operation                                      365 days/yr  
    24 hr/day  
    NG <sup>(1)</sup>                                      ULSD <sup>(2)</sup>

Fuel Consumption                      16,176 Scf/hr                      126.8 gal/hr  
    142 MMScf/yr                      1,110,420 gal/yr

<sup>(1)</sup> Based on                      1,020 Btu/Scf                      footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98

<sup>(2)</sup> Based on                      130,167 Btu/gal                      Donlin

Emission Factor(s)	NG	ULSD	NG	ULSD
CO <sup>(2), (5)</sup>	84 lb/MMScf	0.005 lb/gal	0.0824	0.0384 lb/MMBtu <sup>(1)</sup>
NOx <sup>(2), (5)</sup>	50 lb/MMScf	0.020 lb/gal	0.0490	0.1536 lb/MMBtu <sup>(1)</sup>
PM2.5 <sup>(3), (4), (6)</sup>	7.6 lb/MMScf	0.00025 lb/gal	0.0075	0.00192 lb/MMBtu <sup>(1)</sup>
PM10 <sup>(3), (4), (6)</sup>	7.6 lb/MMScf	0.001 lb/gal	0.0075	0.0077 lb/MMBtu <sup>(1)</sup>
PM <sup>(3), (4), (7)</sup>	7.6 lb/MMScf	0.003 lb/gal	0.0075	0.0254 lb/MMBtu <sup>(1)</sup>
SO2 <sup>(3), (8)</sup>	0.6 lb/MMScf		0.0006	0.0016 lb/MMBtu <sup>(1)</sup>
VOC <sup>(3), (9)</sup>	5.5 lb/MMScf	0.0002 lb/gal	0.0054	0.00154 lb/MMBtu <sup>(1)</sup>

<sup>(1)</sup> NG based on                      1,020 Btu/Scf                      footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98                      No. 1                      130,167 Btu/gal

<sup>(2)</sup> AP-42, Tab. 1.4-1, 07/98, (boilers < 100 MMBtu/hr, Low-NOx)

<sup>(3)</sup> AP-42, Tab. 1.4-2, 07/98

<sup>(4)</sup> Assumed PM2.5 = PM10 = PM

<sup>(5)</sup> AP-42, Tab. 1.3-1, 05/10 (distillate oil, < 100 MMBtu/hr)

<sup>(6)</sup> AP-42, Tab. 1.3-6, 05/10 (distillate oil, industrial boilers)

<sup>(7)</sup> AP-42, Tabs. 1.3-1 (filterable, distillate oil, < 100 MMBtu/hr) & 1.3-2 (condensable, No. 2 oil), 05/10

<sup>(8)</sup> Based on                      15 ppm S content and diesel density of                      6.74 lb/gal                      MSDS - Ultra Low Sulfur Diesel No. 1

<sup>(9)</sup> AP-42, Tab. 1.3-3, 05/10 (distillate oil, industrial boilers)

**Power Plant Auxiliary Heater No. 2 - PP-HEU-200**

Emissions	NG			ULSD			Maximum		
	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
CO	1.36	32.6	6.0	0.63	15.21	2.78	1.36	32.61	5.95
NOx	0.81	19.4	3.5	2.54	60.84	11.10	2.54	60.84	11.10
PM2.5	0.12	2.95	0.54	0.0317	0.76	0.139	0.12	2.95	0.54
PM10	0.12	2.95	0.54	0.127	3.04	0.56	0.13	3.04	0.56
PM	0.12	2.95	0.54	0.42	10.04	1.83	0.42	10.04	1.83
SO2	0.01	0.23	0.04	0.03	0.62	0.11	0.03	0.62	0.11
VOC	0.09	2.14	0.39	0.0254	0.61	0.111	0.09	2.14	0.39

**Sample Calculation**

CO

1.36 lb/hr	0.0824 lb	16.5 MMBtu
	MMBtu	hr

NOx

0.81 lb/hr	0.0490 lb	16.5 MMBtu
	MMBtu	hr

Conversion(s):                      2,000 lb/ton

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 8	OF: 13
	SUBJECT: Boiler/Heater Emissions		DATE: October 14, 2021	

**SO2 Burner (EU ID: 21)**  
**SO2 Burner - 15-BRN-100**  
 Make and Model                      A. H. Lundberg Associates, Inc., Item No. 11, Auxiliary Natural Gas Burner  
 Rating                                      2 MMBtu/hr                      Man. Spec. Sheet

Fuel    NG

Operation                                      365 days/yr  
     24 hr/day

Fuel Consumption                      1,961 Scf/hr                      Based on 1,020 Btu/Scf  
     17.2 MMScf/yr                      footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98

Emission Factor(s)	(lb/MMScf)	(lb/MMBtu) <sup>(1)</sup>	
CO	84.0	0.0824	AP-42 <sup>(2)</sup>
NOx	100.0	0.0980	AP-42 <sup>(2)</sup>
PM2.5/PM10/PM (Total)	7.6	0.0075	AP-42 <sup>(3)</sup>
SO2	0.6	0.0006	AP-42 <sup>(3)</sup>
VOC	5.5	0.0054	AP-42 <sup>(3)</sup>

<sup>(1)</sup> Based on 1,020 Btu/Scf                      footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98  
<sup>(2)</sup> AP-42, Tab. 1.4-1, 07/98 (boilers < 100 MMBtu/hr)  
<sup>(3)</sup> AP-42, Tab. 1.4-2, 07/98

**SO2 Burner - 15-BRN-100**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
CO	0.16	4.0	0.72
NOx	0.20	4.7	0.86
PM2.5/PM10/PM (Total)	0.01	0.4	0.07
SO2	0.001	0.03	0.01
VOC	0.01	0.3	0.05

**Sample Calculation**

**CO**

0.16 lb/hr	<div style="border-bottom: 1px solid black; display: inline-block; padding: 0 10px;">0.0824 lb</div>	<div style="border-bottom: 1px solid black; display: inline-block; padding: 0 10px;">2 MMBtu</div>
	MMBtu	hr

**NOx**

0.20 lb/hr	<div style="border-bottom: 1px solid black; display: inline-block; padding: 0 10px;">0.0980 lb</div>	<div style="border-bottom: 1px solid black; display: inline-block; padding: 0 10px;">2 MMBtu</div>
	MMBtu	hr

Conversion(s):                      2,000 lb/ton

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 9	OF: 13
	SUBJECT: Boiler/Heater Emissions		DATE: October 14, 2021	

**Auxiliary SO2 Burner (EU ID: 22)    1-15-BRN-100**

Make and Model                      Unknown

Rating                                      2 MMBtu/hr                      Donlin

Fuel    ULSD

Operation                                      365 days/yr  
   24 hr/day

Fuel Consumption                      15.4 gal/hr                      Based on                      130,167 Btu/gal                      Donlin  
   134,596 gal/yr

Emission Factor(s)	(lb/gal)	(lb/MMBtu) <sup>(1)</sup>	
CO	0.005	0.0384	AP-42 <sup>(2)</sup>
NOx	0.020	0.1536	AP-42 <sup>(2)</sup>
PM2.5	0.00025	0.0019	AP-42 <sup>(3)</sup>
PM10	0.00100	0.0077	AP-42 <sup>(3)</sup>
PM	0.003	0.0254	AP-42 <sup>(4)</sup>
SO2		0.0016	<sup>(5)</sup>
VOC	0.00034	0.0026	AP-42 <sup>(6)</sup>

<sup>(1)</sup> Based on                      130,167 Btu/gal

<sup>(2)</sup> AP-42, Tab. 1.3-1, 05/10 (distillate oil, < 100 MMBtu/hr)

<sup>(3)</sup> AP-42, Tab. 1.3-6, 05/10 (distillate oil, industrial boilers)

<sup>(4)</sup> AP-42, Tabs. 1.3-1 (filterable, distillate oil, < 100 MMBtu/hr) & 1.3-2 (condensable, No. 2 oil), 05/10

<sup>(5)</sup> Based on                      15 ppm S content and diesel density of                      6.74 lb/gal                      MSDS - Ultra Low Sulfur Diesel No. 1

<sup>(6)</sup> AP-42, Tab. 1.3-3, 05/10 (distillate oil, industrial boilers)

**Auxiliary SO2 Burner (EU ID: 22) - 1-15-BRN-100**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
CO	0.08	1.8	0.34
NOx	0.31	7.4	1.35
PM2.5	0.004	0.1	0.02
PM10	0.02	0.4	0.07
PM	0.05	1.2	0.22
SO2	0.003	0.07	0.01
VOC	0.005	0.1	0.02

**Sample Calculation**

**CO**

0.08 lb/hr	0.0384 lb	2.0 <del>MMBtu</del>	hr
	<del>MMBtu</del>		

**NOx**

0.31 lb/hr	0.1536 lb	2.0 <del>MMBtu</del>	hr
	<del>MMBtu</del>		

Conversion(s):                      2,000 lb/ton

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 10	OF: 13
	SUBJECT: Boiler/Heater Emissions		SHEET: Boilers	
		DATE: October 14, 2021		

**Building Heaters (EU ID: 23)**  
**Building Heaters - 81-HEU-1 to 138**  
 Make and Model      TRANE, GAND017AEG  
 Units      138      *Proposal Document*  
 Rating      0.175 MMBtu/hr      *Proposal Document*  
 Fuel      NG  
  
 Operation      365 days/yr  
                          24 hr/day  
  
 Fuel Consumption      172 Scf/hr      *Based on*      1,020 Btu/Scf  
                          1.5 MMScf/yr      *footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98*

Emission Factor(s)	(lb/MMScf)	(lb/MMBtu) <sup>(1)</sup>	
CO	40.0	0.0392	AP-42 <sup>(2)</sup>
NOx	94.0	0.0922	AP-42 <sup>(2)</sup>
PM2.5/PM10/PM (Total)	7.6	0.0075	AP-42 <sup>(3)</sup>
SO2	0.6	0.0006	AP-42 <sup>(3)</sup>
VOC	5.5	0.0054	AP-42 <sup>(3)</sup>

<sup>(1)</sup> Based on 1,020 Btu/Scf      footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98  
<sup>(2)</sup> AP-42, Tab. 1.4-1, 07/98 (residential furnaces, < 0.3 MMBtu/hr)  
<sup>(3)</sup> AP-42, Tab. 1.4-2, 07/98

**Building Heaters - 81-HEU-1 to 138**

Emissions	(Single Unit)			(138 Units)		
	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
CO	0.01	0.2	0.03	0.95	22.73	4.15
NOx	0.02	0.4	0.07	2.23	53.41	9.75
PM2.5/PM10/PM (Total)	0.001	0.03	0.006	0.18	4.32	0.79
SO2	0.0001	0.002	0.0005	0.01	0.34	0.06
VOC	0.001	0.02	0.004	0.13	3.13	0.57

**Sample Calculation**  
**CO**

0.01 lb/hr	<div>0.0392 lb</div> <div>MMBtu</div>	<div>0.175 MMBtu</div> <div>hr</div>
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**NOx**

0.02 lb/hr	<div>0.0922 lb</div> <div>MMBtu</div>	<div>0.175 MMBtu</div> <div>hr</div>
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Conversion(s):      2,000 lb/ton

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.



<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 11	OF: 13
	SUBJECT: Boiler/Heater Emissions		SHEET: Boilers	
		DATE: October 14, 2021		

**Air Handler Heaters (EU ID: 24)**  
**Air Handler Heaters - 81-HVA-104 to 107, 109, 111 to 113, 126, 127, 201 to 207, 220, 230**

Make and Model                      Bousquet, HDG(H)-400

Units                                      19                                      Proposal Document

Rating                                      5 MMBtu/hr

Fuel    NG

Operation                                  365 days/yr  
    24 hr/day

Fuel Consumption                      4,902 Scf/hr                      Based on                      1,020 Btu/Scf  
    43 MMBtu/yr                      footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98

Emission Factor(s)	(lb/MMScf)	(lb/MMBtu) <sup>(1)</sup>	
CO	84.0	0.0824	AP-42 <sup>(2)</sup>
NOx	100.0	0.0980	AP-42 <sup>(2)</sup>
PM2.5/PM10/PM (Total)	7.6	0.0075	AP-42 <sup>(3)</sup>
SO2	0.6	0.0006	AP-42 <sup>(3)</sup>
VOC	5.5	0.0054	AP-42 <sup>(3)</sup>

<sup>(1)</sup> Based on                      1,020 Btu/Scf                      footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98

<sup>(2)</sup> AP-42, Tab. 1.4-1, 07/98 (boilers < 100 MMBtu/hr)

<sup>(3)</sup> AP-42, Tab. 1.4-2, 07/98

**Air Handler Heaters (5 MMBtu/hr)**

Emissions	(Single Unit)			(19 Units)		
	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
CO	0.41	9.9	1.8	7.82	187.76	34.27
NOx	0.49	11.8	2.1	9.31	223.53	40.79
PM2.5/PM10/PM (Total)	0.04	0.9	0.2	0.71	16.99	3.10
SO2	0.00	0.1	0.0	0.06	1.34	0.24
VOC	0.03	0.6	0.1	0.51	12.29	2.24

**Sample Calculation**

**CO**

0.41 lb/hr	0.0824 lb	5 MMBtu
	MMBtu	hr

**NOx**

0.49 lb/hr	0.0980 lb	5 MMBtu
	MMBtu	hr

Conversion(s):                      2,000 lb/ton

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 12	OF: 13
	SUBJECT: Boiler/Heater Emissions		DATE: October 14, 2021	

**Air Handler Heaters (EU ID: 25)**  
**Air Handler Heaters - 81-HVA-108, 119, 231, 233, 234, 253, 257**

Make and Model                      Bousquet, HDG(H)-200

Units                                      7                                      Proposal Document

Rating                                    2.5 MMBtu/hr

Fuel                                        NG

Operation                                365 days/yr  
    24 hr/day

Fuel Consumption                      2,451 Scf/hr                      Based on                      1,020 Btu/Scf  
    21 MMScf/yr                      footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98

Emission Factor(s)	(lb/MMScf)	(lb/MMBtu) <sup>(1)</sup>	
CO	84.0	0.0824	AP-42 <sup>(2)</sup>
NOx	100.0	0.0980	AP-42 <sup>(2)</sup>
PM2.5/PM10/PM (Total)	7.6	0.0075	AP-42 <sup>(3)</sup>
SO2	0.6	0.0006	AP-42 <sup>(3)</sup>
VOC	5.5	0.0054	AP-42 <sup>(3)</sup>

<sup>(1)</sup> Based on                      1,020 Btu/Scf                      footnote to AP-42, Tab. 1.4-1 and 1.4-2, 07/98

<sup>(2)</sup> AP-42, Tab. 1.4-1, 07/98 (boilers < 100 MMBtu/hr)

<sup>(3)</sup> AP-42, Tab. 1.4-2, 07/98

**Air Handler Heaters - 81-HVA-108, 119, 231, 233, 234, 253, 257**

Emissions	(Single Unit)			(7 Units)		
	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
CO	0.21	4.9	0.90	1.44	34.59	6.31
NOx	0.25	5.9	1.07	1.72	41.18	7.51
PM2.5/PM10/PM (Total)	0.02	0.4	0.08	0.13	3.13	0.57
SO2	0.001	0.04	0.01	0.01	0.25	0.05
VOC	0.01	0.3	0.06	0.09	2.26	0.41

**Sample Calculation**

**CO**

0.21 lb/hr	<div style="display: flex; justify-content: space-between;"> <span>0.0824 lb</span> <span>2.5 MMBtu</span> </div> <div style="display: flex; justify-content: space-between;"> <span>MMBtu</span> <span>hr</span> </div>
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**NOx**

0.25 lb/hr	<div style="display: flex; justify-content: space-between;"> <span>0.0980 lb</span> <span>2.5 MMBtu</span> </div> <div style="display: flex; justify-content: space-between;"> <span>MMBtu</span> <span>hr</span> </div>
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Conversion(s):                      2,000 lb/ton

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 13	OF: 13
	SUBJECT: Boiler/Heater Emissions		DATE: October 14, 2021	

**Portable Heaters (EU ID: 26)**  
**Portable Heaters PBH1-20**  
 Make and Model Wacker Neuson Pureheat  
 Units 20 Donlin  
 Rating 0.86 MMBtu/hr Man. Spec. Sheet  
 Fuel ULSD  
 Fuel Consumption 6.6 gal/hr (1)  
    57,876 gal/yr

(1) Based on 130,167 Btu/gal Donlin  
  
 Operation 365 days/yr  
                                  24 hr/day  
                                  8,760 hr/yr

Emission Factor(s)	(lb/gal)	(lb/MMBtu) <sup>(1)</sup>	
CO	0.005	0.0384	AP-42 <sup>(2)</sup>
NOx	0.020	0.1536	AP-42 <sup>(2)</sup>
PM2.5	0.00025	0.0019	AP-42 <sup>(3)</sup>
PM10	0.00100	0.0077	AP-42 <sup>(3)</sup>
PM	0.003	0.0254	AP-42 <sup>(4)</sup>
SO2		0.0016	<sup>(5)</sup>
VOC	0.00034	0.0026	AP-42 <sup>(6)</sup>

(1) Based on 130,167 Btu/gal AP-42, Tab. 1.3-2, footnote d, 05/10  
 (2) AP-42, Tab. 1.3-1, 05/10 (distillate oil, < 100 MMBtu/hr)  
 (3) AP-42, Tab. 1.3-6, 05/10 (distillate oil, industrial boilers)  
 (4) AP-42, Tabs. 1.3-1 (filterable, distillate oil, < 100 MMBtu/hr) & 1.3-2 (condensable, No. 2 oil), 05/10  
 (5) Based on 15 ppm S content and diesel density of 6.74 lb/gal MSDS - Ultra Low Sulfur Diesel No. 1  
 (6) AP-42, Tab. 1.3-3, 05/10 (distillate oil)

Emissions	(Single Unit)			(20 Units)		
	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
CO	0.03	0.8	0.145	0.66	15.86	2.89
NOx	0.13	3.2	0.579	2.64	63.43	11.58
PM2.5	0.002	0.04	0.0072	0.03	0.79	0.14
PM10	0.01	0.2	0.029	0.13	3.17	0.58
PM	0.02	0.5	0.095	0.44	10.47	1.91
SO2	0.001	0.03	0.0059	0.03	0.64	0.12
VOC	0.002	0.1	0.010	0.04	1.08	0.20

**Sample Calculation**  
**CO**  

0.03 lb/hr

0.0384 lb	0.9 MMBtu
MMBtu	hr

  
**NOx**  

0.13 lb/hr

0.1536 lb	0.9 MMBtu
MMBtu	hr

Conversion(s): 2,000 lb/ton

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 1	OF: 5	SHEET: Incinerator
	SUBJECT: Incinerator Emissions		DATE: October 14, 2021		

**Incinerators Emissions Summary (ton/yr)**

Source	Throughput	CO	NOx	PM	SO2
Camp Waste Incinerator (EU ID: 27)	0.495 ton/hr	0.351	0.780	0.319	0.5197
Sewage Sludge Incinerator (EU ID: 28)	0.007 ton/hr	0.010	0.064	0.009	0.0110
<b>Incinerators Total</b>		<b>0.361</b>	<b>0.844</b>	<b>0.328</b>	<b>0.531</b>

Numbers in *blue* are direct entries. *Green* text/numbers are lookup codes or results.

Air Sciences Inc.		PROJECT TITLE:		BY:		
		Donlin Gold		E. Memon		
		PROJECT NO:		PAGE:	OF:	SHEET:
AIR EMISSION CALCULATIONS		281-1-2		2	5	Incinerator
		SUBJECT:		DATE:		
		Incinerator Emissions		October 14, 2021		
Camp Waste Incinerator (EU ID: 27) CWI						
Population	600 people	Donlin				
Waste Generation	5 lb of waste per person per day	Donlin				
	11.88 ton/day	0.495 ton/hr	Based on maximum capacity		990 lb/hr	
	106.92 MMBtu/day	4.455 MMBtu/hr				
	112,796 MJ/day	4,700 MJ/hr				
Operation	365 days/yr					
	24 hr/day					
Controls	As needed to meet 40 CFR 60 Subpart CCCC					
Emission Factor(s) <sup>(1)</sup>						
CO	17 ppmvd @ 7% O2	28.01 g/mol	7.74E-03 g/MJ			
NOx	23 ppmvd @ 7% O2	46.005 g/mol	1.72E-02 g/MJ			
PM (filterable)	18 mg/Nm <sup>3</sup> @ 7% O2, dry		7.04E-03 g/MJ			
SO2	11 ppmvd @ 7% O2	64.063 g/mol	1.15E-02 g/MJ			
Cd	0.0023 mg/Nm <sup>3</sup> @ 7% O2, dry		8.99E-07 g/MJ			
Dioxins/furans (total mass)	1 nano-g/Nm <sup>3</sup> @ 7% O2, dry		2.27E-10 g/MJ			
Dioxins/furans (toxic equi. basis)	0.13 nano-g/Nm <sup>3</sup> @ 7% O2, dry		5.08E-11 g/MJ			
HCl <sup>(2)</sup>	0.091 ppmvd @ 7% O2	36.461 g/mol	5.39E-05 g/MJ			
Pb	0.015 mg/Nm <sup>3</sup> @ 7% O2, dry		5.86E-06 g/MJ			
Hg	0.00084 mg/Nm <sup>3</sup> @ 7% O2, dry		3.28E-07 g/MJ			
<sup>(1)</sup> Vendor performance guarantee to meet or exceed 40 CFR 60 Subpart CCCC, Table 5 [84 FR 15853, Apr. 16, 2019]						
<sup>(2)</sup> Emission test results for identical incinerator, 10/09; average of the three test runs plus 2.2 × safety factor.						
Sample Calculation						
Cd	8.99E-07 g/MJ	0.0023 <del>mg</del> Nm <sup>3</sup>	0.26 <del>Nm<sup>3</sup></del> MJ	(20.9% - 0.0%) (20.9% - 7.0%)	g 1,000 <del>mg</del>	
CO	7.74E-03 g/MJ	17 <del>Nm<sup>3</sup></del> 1.00E+06 <del>Nm<sup>3</sup></del>	0.26 <del>Nm<sup>3</sup></del> MJ	(20.9% - 0.0%) (20.9% - 7.0%)	<del>mol</del> 0.02406 <del>Nm<sup>3</sup></del>	28.01 g <del>mol</del>
Dioxins/furans (total mass)	2.27E-10 g/MJ	1 <del>nano-g</del> Nm <sup>3</sup>	0.26 <del>Nm<sup>3</sup></del> MJ	(20.9% - 0.0%) (20.9% - 7.0%)	g 1.0E+09 <del>nano-g</del>	
(Average test result @ 11% O2)						
HCl @ 7% O2	11.7 ppmvd	12.63 <del>mg</del> Nm <sup>3</sup>	(20.9% - 7.0%) (20.9% - 11.0%)	g 1,000 <del>mg</del>	<del>mol</del> 36.461 g	0.024057 Nm <sup>3</sup> <del>mol</del>
Conversion(s):	9,570 dscf/MMBtu @ 0% O2	0.26 Nm <sup>3</sup> /MJ @ 0% O2	AP-42, Tabs. 2.1-1 & -2, 10-96			
	4,500 Btu/lb solid waste	10,466 l/g	AP-42, Tab. 2.1-2, 10-96			
	0.022415 Nm <sup>3</sup> /mol (0C)					
	0.0240571 Nm <sup>3</sup> /mol (20C)					
	1.0E+09 nano-g/g					
	1,000 mg/g					
	453.592 g/lb					
	2,000 lb/ton					
	1,055 l/Btu					
Numbers in blue are direct entries. Green text/numbers are lookup codes or results.						

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 3	OF: 5	SHEET: Incinerator
	SUBJECT: Incinerator Emissions		DATE: October 14, 2021		

#### Camp Waste Incinerator

Emissions	(lb/hr)	(lb/day)	(ton/yr)
CO	0.080	1.924	0.351
NOx	0.178	4.276	0.78
PM (filterable)	0.073	1.750	0.32
SO2	0.119	2.848	0.5197
Cd	9.32E-06	2.24E-04	4.08E-05
Dioxins/furans (total mass)	2.35E-09	5.64E-08	1.03E-08
Dioxins/furans (toxic equi. basis)	5.27E-10	1.26E-08	2.31E-09
HCl	5.59E-04	1.34E-02	2.45E-03
Pb	6.08E-05	1.46E-03	2.66E-04
Hg	3.40E-06	8.17E-05	1.49E-05

#### Sample Calculation

CO	(NSPS CCCC)	(Heat Input)	(Conversion)
0.080 lb/hr	7.74E-03 $\frac{g}{Mj}$	4,700 $\frac{MJ}{hr}$	$\frac{lb}{g}$
			453.592 $\frac{g}{lb}$

Conversion(s):      453.592 g/lb  
                              2,000 lb/ton

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 4	OF: 5	SHEET: Incinerator
	SUBJECT: Incinerator Emissions		DATE: October 14, 2021		

**Sewage Sludge Incinerator (EU ID: 28)**

**SSI**

70.5 lb/year/person, dry sludge (1.5x) EPA-822-R-96-003 p. 1-1, Donlin

600 people Donlin

0.058 ton/day 0.0072 ton/hr Maximum hourly base on: 8 hr/day

0.89 MMBtu/day 0.112 MMBtu/hr

941.5 MJ/day 117.7 MJ/hr

Operation

365 days/yr

24 hr/day

Controls

As needed to meet 40 CFR 60 Subpart LLLL

Emission Factor(s) <sup>(1)</sup>			
CO	52 ppmvd @ 7% O <sub>2</sub>	28.01 g/mol	2.54E-02 g/MJ
NOX	210 ppmvd @ 7% O <sub>2</sub>	46.005 g/mol	1.68E-01 g/MJ
PM (filterable)	60 mg/Nm <sup>3</sup> @ 7% O <sub>2</sub> , dry		2.35E-02 g/MJ
SO <sub>2</sub>	26 ppmvd @ 7% O <sub>2</sub>	64.063 g/mol	2.91E-02 g/MJ
Cd	0.0024 mg/Nm <sup>3</sup> @ 7% O <sub>2</sub> , dry		9.38E-07 g/MJ
Dioxins/furans (total mass)	0.045 nano-g/Nm <sup>3</sup> @ 7% O <sub>2</sub> , dry		1.76E-11 g/MJ
Dioxins/furans (toxic equi. basis)	0.0022 nano-g/Nm <sup>3</sup> @ 7% O <sub>2</sub> , dry		8.60E-13 g/MJ
HCl	1.2 ppmvd @ 7% O <sub>2</sub>	36.461 g/mol	7.63E-04 g/MJ
Pb	0.0035 mg/Nm <sup>3</sup> @ 7% O <sub>2</sub> , dry		1.37E-06 g/MJ
Hg	0.15 mg/Nm <sup>3</sup> @ 7% O <sub>2</sub> , dry		5.86E-05 g/MJ

<sup>(1)</sup> Vendor performance guarantee to meet or exceed 40 CFR 60 Subpart LLLL, Table 2

**Sample Calculation**

Cd	9.38E-07 g/MJ	0.0024 <del>mg</del> Nm <sup>3</sup>	0.26 Nm <sup>3</sup> MJ	( 20.9% - 0.0% ) ( 20.9% - 7.0% )	g 1.00E+03 <del>mg</del>
CO	2.54E-02 g/MJ	52 <del>Nm<sup>3</sup>/mol</del> 1.00E+06 Nm <sup>3</sup>	0.26 Nm <sup>3</sup> MJ	( 20.9% - 0.0% ) ( 20.9% - 7.0% )	mol 0.022415 Nm <sup>3</sup> mol
Dioxins/furans (total mass)	1.76E-11 g/MJ	0.045 <del>nano-g</del> Nm <sup>3</sup>	0.26 Nm <sup>3</sup> MJ	( 20.9% - 0.0% ) ( 20.9% - 7.0% )	g 1.0E+09 <del>nano-g</del>

Conversion(s):

9,570 dscf/MMBtu @ 0% O<sub>2</sub> 0.26 Nm<sup>3</sup>/MJ @ 0% O<sub>2</sub> AP-42, Tabs. 2.1-1 & -2, 10-96

7,700 Btu/lb dry sludge EPA-625/4-78-012

0.022415 Nm<sup>3</sup>/mol (0C)

0.0240571 Nm<sup>3</sup>/mol (20C)

1.0E+09 nano-g/g

1,000 mg/g

453.592 g/lb

2,000 lb/ton

1,055 J/Btu

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 5	OF: 5	SHEET: Incinerator
	SUBJECT: Incinerator Emissions		DATE: October 14, 2021		

#### Sewage Sludge Incinerator

Emissions	(lb/hr)	(lb/day)	(ton/yr)
CO	6.59E-03	5.27E-02	0.0096
NOx	4.37E-02	3.50E-01	0.064
PM (filterable)	6.09E-03	4.87E-02	0.0089
SO2	7.54E-03	6.03E-02	0.0110
Cd	2.43E-07	1.95E-06	3.55E-07
Dioxins/furans (total mass)	4.56E-12	3.65E-11	6.66E-12
Dioxins/furans (toxic equi. basis)	2.23E-13	1.79E-12	3.26E-13
HCl	1.980E-04	1.58E-03	2.89E-04
Pb	3.550E-07	2.84E-06	5.18E-07
Hg	1.522E-05	1.22E-04	2.22E-05

#### Sample Calculation

CO	(NSPS LLLL)	(Heat Input)	(Conversion)
6.59E-03 lb/hr	2.54E-02 $\frac{g}{Mj}$	118 $\frac{MJ}{hr}$	$\frac{lb}{g}$
	$\frac{MJ}{hr}$		453.592 $\frac{g}{lb}$

Conversion(s):      453.592 g/lb  
                              2,000 lb/ton

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.





<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 2	SHEET: 6 Emergency
	SUBJECT: Emergency Eqpt. Emissions		DATE: October 14, 2021	

**Black Start Generators (EU ID: 29-30) BEDG1-2**

Make and Model Cummins, DQCA (Engine Model QSK23-G7 NR2)

Output (gross) 600 kW<sub>e</sub> *Man. Spec. Sheet*

Heat Input Rate 9,387 Btu/kW<sub>h</sub> *Based on 7,000 Btu/hp-hr AP-42 Default*

5.6 MMBtu/hr

Units 2

Fuel Type Ultra Low Sulfur Diesel (ULSD)

Fuel Consumption 43.3 gal/hr (1)

21,635 gal/yr

(1) Based on 130,167 Btu/gal Donlin

Operation 24 hr/day (2)

500 hr/yr

(2) Seitz, J. S., Director OAQPS, Calculating Potential to Emit (PTE) for Emergency Generators, 09/06/95

Control None

Emission Factor(s)		
CO	4.38 g/kW <sub>h</sub>	§ 60.4205(b), § 60.4202(a)(2), and § 89.112, Table 1 (1.25x per § 60.4205(e), § 60.4212(c))
NO <sub>x</sub>	8.00 g/kW <sub>h</sub>	§ 60.4205(b), § 60.4202(a)(2), and § 89.112, Table 1 (1.25x per § 60.4205(e), § 60.4212(c))
PM2.5/PM10/PM	0.25 g/kW <sub>h</sub>	§ 60.4205(b), § 60.4202(a)(2), and § 89.112, Table 1 (1.25x per § 60.4205(e), § 60.4212(c))
VOC	8.00 g/kW <sub>h</sub>	§ 60.4205(b), § 60.4202(a)(2), and § 89.112, Table 1 (1.25x per § 60.4205(e), § 60.4212(c))
SO <sub>2</sub>	0.00661 g/kW <sub>h</sub>	(1)

(1) Based on 15 ppm S content and diesel density of 6.74 lb/gal MSDS - Ultra Low Sulfur Diesel No. 1

Emissions	(Single Engine)			(2 Engines)		
	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
CO	5.79	138.89	1.45	11.57	277.78	2.89
NO <sub>x</sub>	10.58	253.97	2.65	21.16	507.95	5.29
PM2.5/PM10/PM	0.33	7.94	0.08	0.66	15.87	0.17
VOC	10.58	253.97	2.65	21.16	507.95	5.29
SO <sub>2</sub>	0.01	0.21	0.002	0.02	0.42	0.004

**Sample Calculations**

**SO<sub>2</sub> Emission Factor**

0.00661 g/kW<sub>h</sub>

**NO<sub>x</sub> Emissions**

10.6 lb/hr

15 lb-S	43.3 gal-Fuel	6.74 lb-Fuel	hr	2 lb-SO <sub>2</sub>	453.6 g
1.00E+06 lb-Fuel	hr	gal-Fuel	600 kW <sub>h</sub>	lb-S	lb

8.00 g	600 kW <sub>h</sub>	lb
kW <sub>h</sub>	hr	453.6 g

Conversion(s):

453.6 g/lb

2,000 lb/ton

1.34 hp/kW

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 3	OF: 6
	SUBJECT: Emergency Eqpt. Emissions		DATE: October 14, 2021	

**Emergency Generators (EU ID: 31-34)**    **Camp Site - CEDG1-4**

Make and Model                      Cummins, DQGAB (Engine Model QSK50-G4 NR2)

Output (gross)                        1,500 kW<sub>e</sub>                      *Man. Spec. Sheet*

Heat Input Rate                        9,494 Btu/kW<sub>h</sub>e                      *Based on*                      130,167 Btu/gal                      Donlin

14.2 MMBtu/hr

Units                                      4

Fuel Type                                ULSD

Fuel Consumption                        109.4 gal/hr                      *Man. Spec. Sheet*

54,700 gal/yr

Operation                                24 hr/day

500 hr/yr                      <sup>(1)</sup>

<sup>(1)</sup> Seitz, J. S., Director OAQPS, Calculating Potential to Emit (PTE) for Emergency Generators, 09/06/95

Control	None
---------	------

Emission Factor(s)		
CO	4.38 g/kW <sub>h</sub> e	§ 60.4205(b), § 60.4202(a)(2), and § 89.112, Table 1 (1.25x per § 60.4205(e), § 60.4212(c))
NO <sub>x</sub>	8.00 g/kW <sub>h</sub> e	§ 60.4205(b), § 60.4202(a)(2), and § 89.112, Table 1 (1.25x per § 60.4205(e), § 60.4212(c))
PM2.5/PM10/PM	0.25 g/kW <sub>h</sub> e	§ 60.4205(b), § 60.4202(a)(2), and § 89.112, Table 1 (1.25x per § 60.4205(e), § 60.4212(c))
VOC	8.00 g/kW <sub>h</sub> e	§ 60.4205(b), § 60.4202(a)(2), and § 89.112, Table 1 (1.25x per § 60.4205(e), § 60.4212(c))
SO <sub>2</sub>	0.00669 g/kW <sub>h</sub> e	<sup>(1)</sup>

<sup>(1)</sup> Based on                      15 ppm S content and diesel density of                      6.74 lb/gal                      MSDS - Ultra Low Sulfur Diesel No. 1

Emissions	(Single Engine)			(4 Engines)		
	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
CO	14.47	347.23	3.62	57.87	1388.91	14.47
NO <sub>x</sub>	26.46	634.93	6.61	105.82	2539.73	26.46
PM2.5/PM10/PM	0.83	19.84	0.21	3.31	79.37	0.83
VOC	26.46	634.93	6.61	105.82	2539.73	26.46
SO <sub>2</sub>	0.022	0.53	0.006	0.09	2.12	0.02

**Sample Calculations**

**SO<sub>2</sub> Emission Factor**

0.00669 g/kW <sub>h</sub>	15 lb-S	109.4 gal-Fuel	6.74 lb-Fuel	hr	2 lb-SO <sub>2</sub>	453.6 g
	1.00E+06 lb-Fuel	hr	gal-Fuel	1,500 kW <sub>h</sub>	lb-S	lb

**NO<sub>x</sub> Emissions**

26.5 lb/hr	8.00 g	1,500 kW <sub>h</sub>	lb
	kW <sub>h</sub>	hr	453.6 g

Conversion(s):                      453.6 g/lb

2,000 lb/ton

1.34 hp/kW

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

[illegible]

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 5	OF: 6
	SHEET: Emergency			
SUBJECT: Emergency Eqpt. Emissions		DATE: October 14, 2021		

**Fire Pumps (EU ID: 35-37) - continued**

Make and Model      Aurora Model 6-481-18C (Engine Model Clarke JW6H-UF38)

Output (gross)              252 hp      *Man. Spec. Sheet*

Heat Input Rate              7,000 Btu/hph      *AP-42 Default*

1.8 MMBtu/hr

Units                              1

Fuel Type                        ULSD

Fuel Consumption              13.6 gal/hr      <sup>(1)</sup>

6,776 gal/yr

<sup>(1)</sup> Based on      130,167 Btu/gal      Donlin

Operation                        24 hr/day

500 hr/yr      <sup>(2)</sup>

<sup>(2)</sup> Seitz, J. S., Director OAQPS, Calculating Potential to Emit (PTE) for Emergency Generators, 09/06/95

Control                              None

Emission Factor(s)			
CO	4.375 g/kWhe	3.30 g/lhp-hr	\$ 60.4205(c), Table 4 (1.25x per \$ 60.4205(e), \$ 60.4212(d))
NOx	5 g/kWhe	3.70 g/lhp-hr	\$ 60.4205(c), Table 4 (1.25x per \$ 60.4205(e), \$ 60.4212(d))
PM2.5/PM10/PM	0.25 g/kWhe	0.19 g/lhp-hr	\$ 60.4205(c), Table 4 (1.25x per \$ 60.4205(e), \$ 60.4212(d))
VOC	5 g/kWhe	3.70 g/lhp-hr	\$ 60.4205(c), Table 4 (1.25x per \$ 60.4205(e), \$ 60.4212(d))
SO2		0.00493 g/lhp-hr	<sup>(1)</sup>

<sup>(1)</sup> Based on      15 ppm S content and diesel density of      6.74 lb/gal      MSDS - Ultra Low Sulfur Diesel No. 1

Emissions	(lb/hr)	(lb/day)	(ton/yr)
CO	1.8	44.0	0.5
NOx	2.1	49.3	0.5
PM2.5/PM10/PM	0.1	2.5	0.03
VOC	2.1	49.3	0.5
SO2	0.003	0.1	0.001

**Sample Calculations**

**SO2 Emission Factor**

0.00493 g/kWhe

15 lb-S	13.6 gal-Fuel	6.74 lb-Fuel	hr	2 lb-SO2	453.6 g
1.00E+06 lb-Fuel	hr	gal-Fuel	252 kWhe	lb-S	lb

**NOx Emissions**

2.1 lb/hr

3.70 g	252 hp-hr	lb
hp-hr	hr	453.6 g

Conversion(s):

453.6 g/lb

2,000 lb/ton

1.34 hp/kW

*Numbers in blue are direct entries. Green text/numbers are lookup codes or results.*

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 6	OF: 6
	SHEET: Emergency			
SUBJECT: Emergency Eqpt. Emissions		DATE: October 14, 2021		

**Fire Pumps (EU ID: 35-37) - continued**

Make and Model: Aurora Model 6-481-18C (Engine Model Clarke JW6H-UF38)

Output (gross): 252 hp *Man. Spec. Sheet*

Heat Input Rate: 7,000 Btu/hph *AP-42 Default*

1.8 MMBtu/hr

Units: 1

Fuel Type: ULSD

Fuel Consumption: 13.6 gal/hr (1)

6,776 gal/yr

**Camp Site Fire Pump - FP3**

(1) Based on 130,167 Btu/gal Donlin

Operation: 24 hr/day

500 hr/yr (2)

(2) Seitz, J. S., Director OAQPS, Calculating Potential to Emit (PTE) for Emergency Generators, 09/06/95

Control: None

Emission Factor(s)			
CO	4.375 g/kWhe	3.30 g/hp-hr	§ 60.4205(c), Table 4 (1.25x per § 60.4205(e), § 60.4212(d))
NOx	5 g/kWhe	3.70 g/hp-hr	§ 60.4205(c), Table 4 (1.25x per § 60.4205(e), § 60.4212(d))
PM2.5/PM10/PM	0.25 g/kWhe	0.19 g/hp-hr	§ 60.4205(c), Table 4 (1.25x per § 60.4205(e), § 60.4212(d))
VOC	5 g/kWhe	3.70 g/hp-hr	§ 60.4205(c), Table 4 (1.25x per § 60.4205(e), § 60.4212(d))
SO2		0.00493 g/hp-hr	(1)

(1) Based on 15 ppm S content and diesel density of 6.74 lb/gal *MSDS - Ultra Low Sulfur Diesel No. 1*

Emissions	(lb/hr)	(lb/day)	(ton/yr)
CO	1.8	44.0	0.5
NOx	2.1	49.3	0.5
PM2.5/PM10/PM	0.1	2.5	0.03
VOC	2.1	49.3	0.5
SO2	0.003	0.1	0.001

**Sample Calculations**

**SO2 Emission Factor**

0.00493 g/kWhe

15 lb-S	13.6 gal-Fuel	6.74 lb-Fuel	hr	2 lb-SO2	453.6 g
1.00E+06 lb-Fuel	hr	gal-Fuel	252 kWh	lb-S	lb

**NOx Emissions**

2.1 lb/hr

3.70 g	252 hp-hr	lb
hp-hr	hr	453.6 g

Conversion(s):

453.6 g/lb

2,000 lb/ton

1.34 hp/kW

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-1		PAGE: 1	OF: 2	SHEET: Tanks
	SUBJECT: Tanks Emissions		DATE: October 14, 2021		

**Tanks Emissions Summary** (ton/yr)

Source	VOC
Mine Site Tanks	1.572
Power Plant Tanks	0.018
Camp Site Tanks	0.002
Airport Tanks	0.249
<b>Tanks Total</b>	<b>1.840</b>

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

Air Sciences Inc.					PROJECT TITLE: Donlin Gold			BY: E. Memon		
					PROJECT NO: 281-1-1			PAGE: 2	OF: 2	SHEET: Tanks
					SUBJECT: Tanks Emissions			DATE: October 14, 2021		
AIR EMISSION CALCULATIONS										
Tanks Specifications and Emissions (EU ID: 126-157)										
Total ULSD Consumption		42,300,000 gal/yr	Donlin Maximum annual fuel use plus Wärtsilä usage of 500 hr/yr							
Tank ID	Description	Capacity (gal)	Throughput (gal/yr)	Type	Dia. (m)	H/L Content (m)	Turns	VOC (lb/yr)	EU ID	
Mine Site										
36-TNK-870	Tank Farm Tank 1	2,500,000	7,500,000	Vertical	42.7	7.8 ULSD	3	202.97	126	
36-TNK-871	Tank Farm Tank 2	2,500,000	7,500,000	Vertical	42.7	7.8 ULSD	3	202.97	127	
36-TNK-872	Tank Farm Tank 3	2,500,000	7,500,000	Vertical	42.7	7.8 ULSD	3	202.97	128	
36-TNK-873	Tank Farm Tank 4	2,500,000	7,500,000	Vertical	42.7	7.8 ULSD	3	202.97	129	
36-TNK-874	Tank Farm Tank 5	2,500,000	7,500,000	Vertical	42.7	7.8 ULSD	3	202.97	130	
36-TNK-875	Tank Farm Tank 6	2,500,000	7,500,000	Vertical	42.7	7.8 ULSD	3	202.97	131	
36-TNK-876	Tank Farm Tank 7	2,500,000	7,500,000	Vertical	42.7	7.8 ULSD	3	202.97	132	
36-TNK-877	Tank Farm Tank 8	2,500,000	7,500,000	Vertical	42.7	7.8 ULSD	3	202.97	133	
36-TNK-878	Tank Farm Tank 9	2,500,000	7,500,000	Vertical	42.7	7.8 ULSD	3	202.97	134	
36-TNK-879	Tank Farm Tank 10	2,500,000	7,500,000	Vertical	42.7	7.8 ULSD	3	202.97	135	
36-TNK-880	Tank Farm Tank 11	2,500,000	7,500,000	Vertical	42.7	7.8 ULSD	3	202.97	136	
36-TNK-881	Tank Farm Tank 12	2,500,000	7,500,000	Vertical	42.7	7.8 ULSD	3	202.97	137	
36-TNK-885	Tank Farm Tank 13	2,500,000	7,500,000	Vertical	42.7	7.8 ULSD	3	202.97	138	
36-TNK-886	Tank Farm Tank 14	2,500,000	7,500,000	Vertical	42.7	7.8 ULSD	3	202.97	139	
36-TNK-887	Tank Farm Tank 15	2,500,000	7,500,000	Vertical	42.7	7.8 ULSD	3	202.97	140	
36-TNK-896	Fuel Station 1 Tank	25,000	19,035,000	Horizontal	3.0	13.0 ULSD	761	39.06	141	
36-TNK-897	Fuel Station 2 Tank	25,000	19,035,000	Horizontal	3.0	13.0 ULSD	761	39.06	142	
ANFOTNK1	ANFO Mixing Plant Tank	10,000	1,106,184	Horizontal	2.4	8.2 ULSD	111	4.72	143	
FPTNK2	Mill Fire Pump Tank	270	6,776	Horizontal	1.0	1.8 ULSD	25	0.09	144	
FPTNK1	Tank Farm Fire Pump Tank	270	6,776	Horizontal	1.0	1.8 ULSD	25	0.09	145	
POXTNK	POX Boilers Tank	5,000	3,942,411	Horizontal	1.8	7.2 ULSD	788	8.03	146	
O2TNK	Oxygen Plant Boiler Tank	5,000	1,390,621	Horizontal	1.8	7.2 ULSD	278	3.95	147	
CETNK	Carbon Elution Heater Tank	5,000	1,076,771	Horizontal	1.8	7.2 ULSD	215	3.12	148	
AUXTNK	Auxiliary SO2 Burner Tank	500	134,596	Horizontal	1.2	1.8 ULSD	269	0.39	149	
Power Plant										
36-TNK-903	Power Plant A Tank	33,000	3,899,388	Horizontal	3.7	14.4 ULSD	118	17.52	150	
36-TNK-904	Power Plant B Tank	33,000	3,899,388	Horizontal	3.7	14.4 ULSD	118	17.52	151	
Camp Site										
36-TNK-913	Camp Emergency Generators Tank	25,000	218,800	Horizontal	3.0	13.0 ULSD	9	3.52	152	
FPTNK3	Camp Fire Pump Tank	270	6,776	Horizontal	1.0	1.8 ULSD	25	0.09	153	
Airport										
AJTNK1	Jet Fuel Tank 1	9,900	55,000	Horizontal	2.4	8.2 Jet A	6	160.41	154	
AJTNK2	Jet Fuel Tank 2	9,900	55,000	Horizontal	2.4	8.2 Jet A	6	160.41	155	
AGTNK1	Aviation Gasoline Tank	5,000	10,000	Horizontal	2.4	4.9 100 LL	2	174.59	156	
ADTNK1	Airport Generators Tank	9,900	252,695	Horizontal	2.4	8.2 ULSD	26	2.99	157	
Tanks Total								3,680		
ULSD Consumption										
Mine		42,300,000 gal/yr								
Wärtsilä engines		6,613,287 gal/yr	Based on:	500 hr/yr						
ANFO Tank Throughput		1,106,184 gal/yr	Based on:	6.50% ULSD in emulsion and ULSD density of:	6.74 lb/gal	Donlin				
Conversion(s):		3.2808 ft/m								
		264.1720 gal/m³								
Numbers in blue are direct entries. Green text/numbers are lookup codes or results.										



<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-1		PAGE: 1	OF: 9	SHEET: Access Rds
	SUBJECT: Access Roads Emissions		DATE: October 14, 2021		

Calculations for LOM: 16

**Access Road Emissions Summary (ton/yr)**

Route	Length (km)	CO	NOx	PM2.5	PM10	PM	SO2	VOC
Camp to Mine Site (EU ID: 158)	6.7	0.34	0.11	0.322	3.218	13.09	0.0007	0.012
Airport to Camp (EU ID: 159)	10.1	0.30	0.05	0.186	1.879	7.55	0.0004	0.011
Jungjuk Port to Mine Site	47.4	3.83	2.13	3.794	38.078	153.51	0.008	0.16
<b>Access Road Total</b>		<b>4.47</b>	<b>2.29</b>	<b>4.30</b>	<b>43.18</b>	<b>174.15</b>	<b>0.009</b>	<b>0.18</b>

Numbers in *blue* are direct entries. *Green* text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-1		PAGE: 2	OF: 9
	SUBJECT: Access Roads Emissions		SHEET: Access Rds	
DATE: October 14, 2021				

Calculations for LOM: 16

**Camp to Mine Site (EU ID: 158)**

Route Length 6.7 km Donlin  
 Road Width 9 m Donlin

Operation 365 day/yr  
24 hr/day

**Traffic** Donlin

Vehicle Type	Make and Model	Rating (hp)	Roundtrips (daily)	Speed (mph)	VMT (annual)	GVW (ton)
Bus	Blue Bird GSA	300	12	30	36,702	18.1
Light Vehicle	Ford F-150	411	20	30	61,170	5.6
Water Truck	Caterpillar T660	550	1	15	3,058	41.4 <sup>(1)</sup>
Grader	Caterpillar 16H	297	1/week	3	437	N/A

<sup>(1)</sup> Includes vehicle weight of 12.2 ton loaded with 7,000 gallon water tank

**Grader Use**

**Emission Factor(s)**

Emission Factor Equation TSP (lb/VMT) = 0.04 (S)<sup>2.5</sup> AP-42, Tab. 11.9-1, 07/98, (grading)  
PM15 (lb/VMT) = 0.051 (S)<sup>2</sup> AP-42, Tab. 11.9-1, 07/98, (grading)

S = Mean vehicle speed 3 mph Donlin

**PM Scaling Factors (SF)**

PM2.5 0.031 AP-42, Tab. 11.9-1, 07/98, (applies to TSP EF, footnote e)  
 PM10 0.6 AP-42, Tab. 11.9-1, 07/98, (applies to PM15 EF, footnote d)

**Estimated Emission Factors**

PM2.5 0.02 lb/VMT  
 PM10 0.28 lb/VMT  
 PM 0.62 lb/VMT

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.001	0.02	0.004
PM10	0.01	0.3	0.06
PM	0.03	0.7	0.14

Equip: Fuel Use 37 L/hr Donlin  
9.8 gal/hr  
3.9 gal/day Based on 1.2 mi/day

**Tailpipe Emissions <sup>(1)</sup>**

	(g/kW-hr)	(lb/hr)	(lb/day)	(ton/yr)
CO <sup>(2)</sup>	3.5	0.0174	0.417	0.0762
NOx <sup>(2)</sup>	0.4	0.0020	0.048	0.0087
PM <sup>(2)</sup>	0.02	0.0001	0.002	0.0004
SO2 <sup>(3)</sup>	0.004	0.00002	0.0005	0.0001
VOC <sup>(2)</sup>	0.19	0.0009	0.023	0.0041

<sup>(1)</sup> Based on: Fuel heating value of: 130,167 Btu/gal Donlin  
 Diesel engine efficiency of: 7,000 Btu/hp-hr AP-42 Default

<sup>(2)</sup> 40 CFR 1039, Table 1 of § 1039.101, current as of 03/07/13

<sup>(3)</sup> Based on 15 ppm S content and diesel density of 6.74 lb/gal MSDS - Ultra Low Sulfur Diesel No. 1

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-1		PAGE: 3	OF: 9
	SUBJECT: Access Roads Emissions		SHEET: Access Rds	
DATE: October 14, 2021				

**Bus, Light Vehicle, and Water Truck**  
**Emission Factor(s)**  
Emission Factor Equation       $E = k(s/12)^a (W/3)^b [(365-P)/365]$       AP-42, Sec. 13.2.2, Eqs. 1a and 2, 11/06  
s = Surface material silt content      3.8 %      AP-42, Chapter 13.2-2, Related Information "r13s0202\_dec03.xls"  
http://www.epa.gov/ttn/chieffap42/ch13/related/c13s02-2.html  
W = Mean vehicle weight      11.2 ton      Mean fleet weight  
P = Days/year with ≥0.01 in precip.      129      American Ridge, 2007-08, 2010-12  
  

	PM2.5	PM10	PM	
k = Size-specific empirical constant	0.15	1.5	4.9	lb/VMT      AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06
a = Size-specific empirical constant	0.9	0.9	0.7	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06
b = Size-specific empirical constant	0.45	0.45	0.45	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06
E = Size-specific emission factor	0.06	0.62	2.57	lb/VMT

  
Control Type      Water/Chemical Application  
Control Efficiency      90%      Based on AP-42, Figures 13.2.2-2 & 13.2.2-5, 11/06.

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.07	1.7	0.31
PM10	0.72	17.3	3.15
PM	2.96	71.0	12.95

  
**Tailpipe Emissions**  

Bus	(g/mi) <sup>(1)</sup>	(lb/hr)	(lb/day)	(ton/yr)
CO	1.1048375	0.01021	0.24492	0.04470
NOx	2.367584	0.02187	0.52485	0.09579
PM2.5	0.0445051	0.00041	0.00987	0.00180
PM10	0.1342863	0.00124	0.02977	0.00543
SO2	0.0111821	0.00010	0.00248	0.00045
VOC	0.0346486	0.00032	0.00768	0.00140

Light Vehicle	(g/mi) <sup>(1)</sup>	(lb/hr)	(lb/day)	(ton/yr)
CO	3.215	0.04949	1.18773	0.21676
NOx	0.020959	0.00032	0.00774	0.00141
PM2.5	0.0068926	0.00011	0.00255	0.00046
PM10	0.0338767	0.00052	0.01252	0.00228
SO2	0.0018013	0.00003	0.00067	0.00012
VOC	0.0905307	0.00139	0.03345	0.00610

Water Truck	(g/mi) <sup>(1)</sup>	(lb/hr)	(lb/day)	(ton/yr)
CO	1.853	0.00143	0.03423	0.00625
NOx	2.109	0.00162	0.03895	0.00711
PM2.5	0.026	0.00002	0.00049	0.00009
PM10	0.101	0.00008	0.00187	0.00034
SO2	0.010	0.00001	0.00018	0.00003
VOC	0.042	0.00003	0.00078	0.00014

  
<sup>(1)</sup> Calculated from MOVES

Conversion(s):      2.000 lb/ton  
1.609 km/mi  
8.345 lb/gal water  
3.78541 L/gal  
1.34102 hp/kW  
453.592 g/lb

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-1		PAGE: 4	OF: 9
	SUBJECT: Access Roads Emissions		SHEET: Access Rds	
DATE: October 14, 2021				

Calculations for LOM: 16

**Airport to Camp (EU ID: 159)**

Route Length 10.1 km Donlin

Road Width 9 m Donlin

Operation 365 day/yr  
24 hr/day

Donlin

Traffic		Rating	Roundtrips	Speed	VMT	GVW
Vehicle Type Make and Model		(hp)	(daily)	(mph)	(annual)	(ton)
Bus	Blue Bird GSA	300	2	30	9,157	18.1
Light Vehicle	Ford F-150	411	10	30	45,784	5.6
Water Truck	Caterpillar T660	550	1	15	4,578	41.4 <sup>(1)</sup>
<sup>(1)</sup> Grader	Caterpillar 16H	297	1/week	3	654	N/A

*Includes vehicle weight of 12.2 ton, and 7,000 gallon water tank*

**Grader Use**

**Emission Factor(s)**

Emission Factor Equation TSP (lb/VMT) = 0.04 (S)<sup>2.5</sup> AP-42, Tab. 11.9-1, 07/98, (grading)

PM15 (lb/VMT) = 0.051 (S)<sup>2</sup> AP-42, Tab. 11.9-1, 07/98, (grading)

S = Mean vehicle speed 3 mph Donlin

**PM Scaling Factors (SF)**

PM2.5 0.031 AP-42, Tab. 11.9-1, 07/98, (applies to TSP EF, footnote e)

PM10 0.6 AP-42, Tab. 11.9-1, 07/98, (applies to PM15 EF, footnote d)

**Estimated Emission Factors**

PM2.5 0.02 lb/VMT

PM10 0.28 lb/VMT

PM 0.62 lb/VMT

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.001	0.03	0.006
PM10	0.02	0.5	0.09
PM	0.05	1.1	0.20

Equip: Fuel Use 37 L/hr Donlin

9.8 gal/hr

5.8 gal/day Based on 1.8 mi/day

APP\_C4\_23

Tailpipe Emissions <sup>(1)</sup>	(g/kW-hr)	(lb/hr)	(lb/day)	(ton/yr)
CO <sup>(2)</sup>	3.5	0.0260	0.625	0.1140
NOX <sup>(2)</sup>	0.4	0.0030	0.071	0.0130
PM <sup>(2)</sup>	0.02	0.0001	0.004	0.0007
SO2 <sup>(3)</sup>	0.004	0.00003	0.001	0.0001
VOC <sup>(2)</sup>	0.19	0.0014	0.034	0.0062

<sup>(1)</sup> Based on: Fuel heating value of: 130,167 Btu/gal Donlin

Diesel engine efficiency of: 7,000 Btu/hp-hr AP-42 Default

<sup>(2)</sup> 40 CFR 1039, Table 1 of § 1039.101, current as of 03/07/13

<sup>(3)</sup> Based on 15 ppm S content and diesel density of 6.74 lb/gal MSDS - Ultra Low Sulfur Diesel No. 1

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-1		PAGE: 5	OF: 9
	SUBJECT: Access Roads Emissions		SHEET: Access Rds	
DATE: October 14, 2021				

**Bus, Light Vehicle, and Water Truck**

**Emission Factor(s)**

Emission Factor Equation       $E = k(s/12)^a (W/3)^b [(365-P)/365]$       AP-42, Sec. 13.2.2, Eqs. 1a and 2, 11/06

s = Surface material silt content      3.8 %      AP-42, Chapter 13.2-2, Related Information "r13s0202\_dec03.xls"  
<http://www.epa.gov/ttn/chieffap42/ch13/related/c13s02-2.html>

W = Mean vehicle weight      10.3 ton      Mean fleet weight

P = Days/year with ≥0.01 in precip.      129      American Ridge, 2007-08, 2010-12

	PM2.5	PM10	PM	
k = Size-specific empirical constant	<span style="color: blue;">0.15</span>	<span style="color: blue;">1.5</span>	<span style="color: blue;">4.9</span> lb/VMT	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06
a = Size-specific empirical constant	<span style="color: blue;">0.9</span>	<span style="color: blue;">0.9</span>	<span style="color: blue;">0.7</span>	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06
b = Size-specific empirical constant	<span style="color: blue;">0.45</span>	<span style="color: blue;">0.45</span>	<span style="color: blue;">0.45</span>	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06
E = Size-specific emission factor	0.06	0.60	2.47 lb/VMT	

Control Type      Water/Chemical Application

Control Efficiency      90%      Based on AP-42, Figures 13.2.2-2 & 13.2.2-5, 11/06.

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.04	1.0	0.18
PM10	0.41	9.8	1.78
PM	1.68	40.2	7.34

**Tailpipe Emissions**

Bus	(g/mi) <sup>(1)</sup>	(lb/hr)	(lb/day)	(ton/yr)
CO	1.1048375	0.00255	0.06111	0.01115
NOx	2.367584	0.00546	0.13095	0.02390
PM2.5	0.0445051	0.00010	0.00246	0.00045
PM10	0.1342863	0.00031	0.00743	0.00136
SO2	0.0111821	0.00003	0.00062	0.00011
VOC	0.0346486	0.00008	0.00192	0.00035

Light Vehicle	(g/mi) <sup>(1)</sup>	(lb/hr)	(lb/day)	(ton/yr)
CO	3.215	0.03704	0.88898	0.16224
NOx	0.021	0.00024	0.00580	0.00106
PM2.5	0.007	0.00008	0.00191	0.00035
PM10	0.034	0.00039	0.00937	0.00171
SO2	0.002	0.00002	0.00050	0.00009
VOC	0.091	0.00104	0.02504	0.00457

Water Truck	(g/mi) <sup>(1)</sup>	(lb/hr)	(lb/day)	(ton/yr)
CO	1.853	0.00214	0.05124	0.00935
NOx	2.109	0.00243	0.05831	0.01064
PM2.5	0.026	0.00003	0.00073	0.00013
PM10	0.101	0.00012	0.00280	0.00051
SO2	0.010	0.00001	0.00026	0.00005
VOC	0.042	0.00005	0.00117	0.00021

<sup>(1)</sup> Calculated from MOVES

Conversion(s):      2,000 lb/ton  
1.609 km/mi  
8.345 lb/gal water  
3.78541 L/gal  
1.34102 hp/kW  
453.592 g/lb

*Numbers in blue are direct entries. Green text/numbers are lookup codes or results.*

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-1		PAGE: 6	OF: 9
	SUBJECT: Access Roads Emissions		SHEET: Access Rds	
DATE: October 14, 2021				

Calculations for LOM: 16

**Jungjuk Port to Mine Site**

Route Length 47.4 km Donlin

Road Width 9 m Donlin

Operation 365 day/yr  
24 hr/day  
120 day/yr Tanker/Container Trucks  
12 hr/day Tanker/Container Trucks

**Traffic** Donlin

Vehicle Type	Make and Model	Rating (hp)	Roundtrips (daily)	Speed (mph)	VMT (annual)	GVW (ton)
Tanker Truck	Caterpillar T660	550	27	30	191,025	57.7 <sup>(1)</sup>
Container Truck	Caterpillar T660	550	27	30	191,025	70.3 <sup>(2)</sup>
Light Vehicle	Ford F-150	411	10	30	215,198	5.6
Water Truck	Caterpillar T660	550	2	15	43,040	41.4 <sup>(3)</sup>
Grader	Caterpillar 16H	297	1/2-day	3	10,760	N/A

<sup>(1)</sup> Includes vehicle weight of 12.2 ton, and 13,500 gallon diesel tank

<sup>(2)</sup> Includes vehicle weight of 12.2 ton, and 58.1 ton cargo

<sup>(3)</sup> Includes vehicle weight of 12.2 ton, and 7,000 gallon water tank

**Grader Use**

**Emission Factor(s)**

Emission Factor Equation TSP (lb/VMT) = 0.04 (S)<sup>2.5</sup> AP-42, Tab. 11.9-1, 07/98, (grading)  
PM15 (lb/VMT) = 0.051 (S)<sup>2</sup> AP-42, Tab. 11.9-1, 07/98, (grading)

S = Mean vehicle speed 3 mph Donlin

**PM Scaling Factors (SF)**

PM2.5 0.031 AP-42, Tab. 11.9-1, 07/98, (applies to TSP EF, footnote e)

PM10 0.6 AP-42, Tab. 11.9-1, 07/98, (applies to PM15 EF, footnote d)

**Estimated Emission Factors**

PM2.5 0.02 lb/VMT

PM10 0.28 lb/VMT

PM 0.62 lb/VMT

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.02	0.6	0.10
PM10	0.34	8.1	1.48
PM	0.77	18.4	3.35

**Fuel Use** 37 L/hr Donlin

9.8 gal/hr

96.0 gal/day Based on 29.5 mi/day

Tailpipe Emissions <sup>(1)</sup>	(g/kW-hr)	(lb/hr)	(lb/day)	(ton/yr)
CO <sup>(2)</sup>	3.5	0.4282	10.277	1.8755
NOx <sup>(2)</sup>	0.4	0.0489	1.174	0.2143
PM <sup>(2)</sup>	0.02	0.0024	0.059	0.0107
SO2 <sup>(3)</sup>	0.004	0.0005	0.012	0.0022
VOC <sup>(2)</sup>	0.19	0.0232	0.558	0.1018

<sup>(1)</sup> Based on: Fuel heating value of: 130,167 Btu/gal Donlin

Diesel engine efficiency of: 7,000 Btu/hp-hr AP-42 Default

<sup>(2)</sup> 40 CFR 1039, Table 1 of § 1039.101, current as of 03/07/13

<sup>(3)</sup> Based on 15 ppm S content and diesel density of 6.74 lb/gal MSDS - Ultra Low Sulfur Diesel No. 1

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

APP\_C4\_23

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-1		PAGE: 7	OF: 9	SHEET: Access Rds
	SUBJECT: Access Roads Emissions		DATE: October 14, 2021		

PROJECT TITLE: Donlin Gold	BY: E. Memon		
PROJECT NO: 281-1-1	PAGE: 7	OF: 9	SHEET: Access Rds
SUBJECT: Access Roads Emissions	DATE: October 14, 2021		

### Light Vehicle and Truck Emission Factor(s)

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-1		PAGE: 8	OF: 9	SHEET: Access Rds
	SUBJECT: Access Roads Emissions		DATE: October 14, 2021		

Light Vehicle	(g/mi) <sup>(1)</sup>	(lb/hr)	(lb/day)	(ton/yr)
CO	3.215	0.17410	4.17847	0.76257
NOx	0.021	0.00114	0.02724	0.00497
PM2.5	0.007	0.00037	0.00896	0.00164
PM10	0.034	0.00183	0.04403	0.00804
SO2	0.002	0.00010	0.00234	0.00043
VOC	0.091	0.00490	0.11767	0.02148

Water Truck	(g/mi) <sup>(1)</sup>	(lb/hr)	(lb/day)	(ton/yr)
CO	1.853	0.02007	0.48173	0.08792
NOx	2.109	0.02284	0.54814	0.10004
PM2.5	0.026	0.00028	0.00684	0.00125
PM10	0.101	0.00110	0.02633	0.00481
SO2	0.010	0.00010	0.00247	0.00045
VOC	0.042	0.00046	0.01095	0.00200

<sup>(1)</sup> Calculated from MOVES

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.



<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-1		PAGE: 9	OF: 9	SHEET: Access Rds
	SUBJECT: Access Roads Emissions		DATE: October 14, 2021		

**MOVES Emission Factors** <sup>(1)</sup>

Vehicle Type	MOVES Vehicle Category	RunID	Emission Factors (g/mi)					
			CO	NOx	PM2.5	PM10	SO2	VOC
Tanker Truck	Single Unit Long-Haul truck	353	1.853	2.109	0.026	0.101	0.010	0.042
Container Truck	Combination Unit Long-Haul truck	362	3.376	6.469	0.098	0.250	0.014	0.124
Light Vehicle	Passenger truck	331	3.215	0.021	0.007	0.034	0.002	0.091
Water Truck	Single Unit Short-Haul truck (range < 200 miles)	552	1.853	2.109	0.026	0.101	0.010	0.042
Bus	Bus	343	1.105	2.368	0.045	0.134	0.011	0.035

<sup>(1)</sup> EPA MOVES3. Run 10/14/2021.

Numbers in *blue* are direct entries. *Green* text/numbers are lookup codes or results.

Air Sciences Inc.	PROJECT TITLE:		Donlin Gold		BY:		E. Memon				
	PROJECT NO:		281-1-1		PAGE:	1	OF:	2	SHEET:	CO2e	
	SUBJECT:		GHG Emissions		DATE:					October 14, 2021	
AIR EMISSION CALCULATIONS											
Calculations for LOM: 16											
Greenhouse Gas Emissions Summary (ton/yr)											
Combustion SourceCO2CH4N2OCO2e											
Power Plant Generators (12)1,229,57049.8749.9751,233,790											
Airport Generators (2)2,6820.1090.0222,691											
Black Start Generators (EU ID: 29-30)4590.0190.004461											
Emergency Generators (EU ID: 31-34)2,3220.0940.0192,330											
Fire Pumps (EU ID: 35-37)2160.0090.002216											
Portable Heaters (20)12,2840.4980.10012,326											
POX Boilers (2)41,8371.6970.33941,981											
Oxygen Plant Boiler14,7570.5990.12014,808											
Carbon Elution Heater11,4270.4630.09311,466											
Power Plant Auxiliary Heaters (2)23,5680.9560.19123,649											
SO2 Burner1,0250.0190.0021,026											
Auxiliary SO2 Burner1,4280.0580.0121,433											
Building Heaters (138)12,3740.2330.02312,386											
Air Handlers (19)48,6740.9170.09248,725											
Air Handlers (7)8,9660.1690.0178,976											
Blasting11,7390.4760.09511,779											
Mobile Machinery407,09316.5133.303408,490											
Incinerators3,9341.3880.1824,023											
Autoclaves (1)37,65937,659											
Acidulation Tanks (2)83,81683,816											
Neutralization Tanks (3)189,359189,359											
Impacted Wetlands19,27021,366											
Total2,164,46074.114.62,172,755											
(1) Based on 1.95 t/hr/autoclave of CO2 Donlin											
(2) Based on 8.68 t/hr, of CO2 total Donlin											
(3) Based on 19.61 t/hr, of CO2 total Donlin											
(4) CH4+N2O as CO2e											
Sample Calculations											
Power Plant Generators (12)											
CO21,229,570 ton/yr15,081,772 MMBtu/yr73.96 kg/yr907.2 kg/yr											
CH4 (diesel)49.87 ton/yr15,081,772 MMBtu/yr0.003 kg/yr907.2 kg/yr											
CO2e1,233,790 ton/yr1,229,570 CO2 ton/yr49.87 CH4 ton/yr25 CO2e + 9.97 N2O ton/yr298 CO2e N2O											
Autoclaves											
CO237,659 ton/yr1.95 t/yr1.1023 ton/yr8,760 t/yr2 autoclaves											
Acidulation Tanks											
CO283,816 ton/yr8.68 t/yr1.1023 ton/yr8,760 t/yr											
Conversion(s): 907.2 kg/ton											
1.1023 ton/t											
2.4711 acres/hectare											
3.6641 CO2/CO2-C											
Numbers in blue are direct entries. Green text/numbers are lookup codes or results.											

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Air Sciences Inc.		PROJECT TITLE:						BY:		
		Donlin Gold						E. Memon		
		PROJECT NO:						PAGE:	OF:	SHEET:
AIR EMISSION CALCULATIONS		281-1-1						1	9	HAP
		SUBJECT:						DATE:		
		HAP Emissions						October 14, 2021		
Hazardous Air Pollutants Emissions Summary (ton/yr)										
CAS	Pollutant	Wärtsilä Highest of NG or ULSD	Other Fuel Burning Equipment	Process & Fugitive Dust	MACT 7E & Fugitive Hg Sources	Camp Waste Incinerator	Sewage Sludge Incinerator	CN Leach Processes	Fuel Tanks	Total
71556	1,1,1-Trichloroethane		1.11E-3							1.11E-3
79345	1,1,2,2-Tetrachloroethane	7.32E-3								7.32E-3
79005	1,1,2-Trichloroethane	5.82E-3								5.82E-3
75343	Ethylidene dichloride (1,1-Dichloroethane)	4.32E-3								4.32E-3
107062	Ethylene dichloride (1,2-Dichloroethane)	4.32E-3								4.32E-3
78875	Propylene dichloride (1,2-Dichloropropane)	4.92E-3								4.92E-3
106990	1,3-Butadiene	4.89E-2	6.95E-4							4.96E-2
542756	1,3-Dichloropropene	4.83E-3								4.83E-3
106467	1,4-Dichlorobenzene(p)						5.08E-3			5.08E-3
540841	2,2,4-Trimethylpentane	4.58E-2								4.58E-2
75070	Acetaldehyde	1.53E+0	1.41E-2							1.54E+0
107028	Acrolein	9.41E-1	1.78E-3							9.43E-1
7440360	Antimony			3.13E-2						3.13E-2
7440382	Arsenic		2.70E-3	8.52E-1		9.47E-3	4.65E-5			8.64E-1
71432	Benzene (including benzene from gasoline)	1.44E-1	3.24E-2				4.23E-6		2.50E-5	1.76E-1
7440417	Beryllium		1.94E-3	2.52E-3			4.23E-9			4.46E-3
117817	Bis(2-ethylhexyl)phthalate (DEHP)						8.67E-4			8.67E-4
7440439	Cadmium		2.59E-3	1.10E-3		4.08E-5	3.55E-7			3.74E-3
56235	Carbon tetrachloride	6.72E-3					2.54E-7			6.72E-3
108907	Chlorobenzene	5.56E-3					1.06E-7			5.56E-3
75003	Ethyl chloride (Chloroethane)	3.42E-4								3.42E-4
67663	Chloroform	5.22E-3								5.22E-3
7440473	Chromium		2.77E-3	2.72E-01		1.94E-2	6.77E-6			2.94E-1
7440484	Cobalt		9.63E-5	5.61E-2						5.62E-2
25321226	Dichlorobenzene		1.38E-3							1.38E-3
100414	Ethyl benzene	7.27E-3	3.00E-4						0.00E+0	7.57E-3
106934	Ethylene dibromide (Dibromoethane)	8.11E-3								8.11E-3
50000	Formaldehyde	9.66E+0	2.23E-1							9.89E+0
110543	Hexane	2.03E-1	2.06E+0						3.36E-2	2.30E+0
7647010	Hydrochloric acid					2.45E-3	2.89E-4			2.74E-3
74908	Hydrogen Cyanide							1.86E+0		1.86E+0
7439921	Lead		6.11E-3	5.28E-2		2.66E-4	5.18E-7			5.92E-2
7439965	Manganese		4.10E-3	2.95E+0			6.35E-6			2.95E+0
7439976	Mercury *		2.09E-3	1.33E-2	1.76E-2	6.21E-5	2.22E-5			3.31E-2
67561	Methanol	4.58E-1								4.58E-1
1634044	Methyl tert butyl ether								2.60E-4	2.60E-4
75092	Methylene chloride (Dichloromethane)	3.66E-3								3.66E-3
7440020	Nickel		3.19E-3	1.86E-1		1.70E-2	3.70E-4			2.06E-1
95476	o-Xylenes		5.14E-4							5.14E-4
108952	Phenol	4.39E-3								4.39E-3
7782492	Selenium		9.70E-3	6.50E-3			4.23E-6			1.62E-2
100425	Styrene	4.32E-3							0.00E+0	4.32E-3
108883	Toluene	7.47E-2	4.33E-2						1.70E-4	1.18E-1
79016	Trichloroethylene						5.50E-6			5.50E-6
75014	Vinyl chloride	2.73E-3								2.73E-3
1330207	Xylenes (isomers and mixture)	3.58E-2	8.36E-3						3.10E-4	4.45E-2
POM	Polycyclic Organic Matter	8.42E-2	1.26E-2			1.03E-8	6.66E-12		0.00E+0	9.69E-2
Total		13.31	2.44	4.42	0.02	0.05	0.01	1.86	0.034	22.14
* Detailed mercury calculations are provided beginning on page 134									Highest HAP	9.89
Numbers in blue are direct entries. Green text/numbers are lookup codes or results.										

Air Sciences Inc.		PROJECT TITLE:					BY:		
		Donlin Gold					E. Memon		
		PROJECT NO:					PAGE:	OF:	SHEET:
AIR EMISSION CALCULATIONS		281-1-1					2	9	HAP
		SUBJECT:					DATE:		
		HAP Emissions					October 14, 2021		
AP-42 Emission Factors for Engines and Boilers (NG and ULSD) (lb/MMBtu)									
CAS No.	Pollutant	NG4SLB	DSMALL	DLARGE	NGBOIL	DBOIL	DUALBOIL	POM	
		NG	ULSD	ULSD	NG	ULSD	NG/ULSD		
		Engines <sup>(1)</sup>	Engines <sup>(2)</sup>	Engines <sup>(3)</sup>	Boilers <sup>(4)</sup>	Boilers <sup>(5)</sup>	Boilers <sup>(6)</sup>		
71556	1,1,1-Trichloroethane					1.72E-06	1.72E-06		
79345	1,1,2,2-Tetrachloroethane	4.00E-05							
79005	1,1,2-Trichloroethane	3.18E-05							
75343	1,1-Dichloroethane	2.36E-05							
107062	1,2-Dichloroethane	2.36E-05							
78875	1,2-Dichloropropane	2.69E-05							
106990	1,3-Butadiene	2.67E-04	3.91E-05						
542756	1,3-Dichloropropene	2.64E-05							
540841	2,2,4-Trimethylpentane	2.50E-04							
91576	2-Methylnaphthalene	3.32E-05			2.35E-08		2.35E-08	POM	
56495	3-Methylchloranthrene				1.76E-09		1.76E-09	POM	
57976	7,12-Dimethylbenz(a)anthracene				1.57E-08		1.57E-08	POM	
83329	Acenaphthene	1.25E-06	1.42E-06	4.68E-06	1.76E-09	1.54E-07	1.54E-07	POM	
208968	Acenaphthylene	5.53E-06	5.06E-06	9.23E-06	1.76E-09	1.85E-09	1.85E-09	POM	
75070	Acetaldehyde	8.36E-03	7.67E-04	2.52E-05					
107028	Acrolein	5.14E-03	9.25E-05	7.88E-06					
120127	Anthracene		1.87E-06	1.23E-06	2.35E-09	8.91E-09	8.91E-09	POM	
7440382	Arsenic				1.96E-07	4.00E-06	4.00E-06		
56553	Benz(a)anthracene		1.68E-06	6.22E-07	1.76E-09	2.93E-08	2.93E-08	POM	
71432	Benzene	4.40E-04	9.33E-04	7.76E-04	2.06E-06	1.56E-06	2.06E-06		
50328	Benzo(a)pyrene		1.88E-07	2.57E-07	1.18E-09		1.18E-09	POM	
205992	Benzo(b)fluoranthene	1.66E-07	9.91E-08	1.11E-06	1.76E-09		1.76E-09	POM	
192972	Benzo(e)pyrene	4.15E-07						POM	
191242	Benzo(g,h,i)perylene	4.14E-07	4.89E-07	5.56E-07	1.18E-09	1.65E-08	1.65E-08	POM	
207089	Benzo(k)fluoranthene		1.55E-07	2.18E-07	1.76E-09	1.08E-08	1.08E-08	POM	
7440417	Beryllium				1.18E-08	3.00E-06	3.00E-06		
92524	Biphenyl	2.12E-04						POM	
7440439	Cadmium				1.08E-06	3.00E-06	3.00E-06		
56235	Carbon Tetrachloride	3.67E-05							
108907	Chlorobenzene	3.04E-05							
75003	Chloroethane	1.87E-06							
67663	Chloroform	2.85E-05							
7440473	Chromium				1.37E-06	3.00E-06	3.00E-06		
218019	Chrysene	6.93E-07	3.53E-07	1.53E-06	1.76E-09	1.74E-08	1.74E-08	POM	
7440484	Cobalt				8.24E-08		8.24E-08		
53703	Dibenzo(a,h)anthracene		5.83E-07	3.46E-07	1.18E-09	1.22E-08	1.22E-08	POM	
25321226	Dichlorobenzene				1.18E-06		1.18E-06		
100414	Ethylbenzene	3.97E-05				4.64E-07	4.64E-07		
106934	Ethylene Dibromide	4.43E-05							
206440	Fluoranthene	1.11E-06	7.61E-06	4.03E-06	2.94E-09	3.53E-08	3.53E-08	POM	
86737	Fluorene	5.67E-06	2.92E-05	1.28E-05	2.75E-09	3.26E-08	3.26E-08	POM	
50000	Formaldehyde	5.28E-02	1.18E-03	7.89E-05	7.35E-05	2.41E-04	2.41E-04		
110543	Hexane	1.11E-03			1.76E-03		1.76E-03		
193395	Indeno(1,2,3-c,d)pyrene		3.75E-07	4.14E-07	1.76E-09	1.56E-08	1.56E-08	POM	
7439921	Lead				4.90E-07	9.00E-06	9.00E-06		
7439965	Manganese				3.73E-07	6.00E-06	6.00E-06		
7439976	Mercury	* Detailed mercury calculations are provided beginning on page 134							
67561	Methanol	2.50E-03							
75092	Methylene Chloride	2.00E-05							
91203	Naphthalene	7.44E-05	8.48E-05	1.30E-04	5.98E-07	8.25E-06	8.25E-06	POM	
7440020	Nickel				2.06E-06	3.00E-06	3.00E-06		
95476	o-Xylenes					7.96E-07	7.96E-07		
85018	Phenanthrene	1.04E-05	2.94E-05	4.08E-05	1.67E-08	7.66E-08	7.66E-08	POM	
108952	Phenol	2.40E-05							
129000	Pyrene	1.36E-06	4.78E-06	3.71E-06	4.90E-09	3.10E-08	3.10E-08	POM	
7782492	Selenium				2.35E-08	1.50E-05	1.50E-05		
100425	Styrene	2.36E-05							
108883	Toluene	4.08E-04	4.09E-04	2.81E-04	3.33E-06	4.53E-05	4.53E-05		
75014	Vinyl Chloride	1.49E-05							
1330207	Xylene	1.84E-04	2.85E-04	1.93E-04					
Numbers in blue are direct entries. Green text/numbers are lookup codes or results.									

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	<b>PROJECT TITLE:</b> Donlin Gold		<b>BY:</b> E. Memon		
	<b>PROJECT NO:</b> 281-1-1		<b>PAGE:</b> 3	<b>OF:</b> 9	<b>SHEET:</b> HAP
	<b>SUBJECT:</b> HAP Emissions		<b>DATE:</b> October 14, 2021		

**AP-42 Emission Factors for Engines and Boilers (NG and ULSD) - continued**

References:

(1) AP-42, Tab. 3.2-2, 07/00, 4-stroke lean-burn engines

(2) AP-42, Tab. 3.3-2, 10/96, diesel engines ( $\leq 600$  hp)

(3) AP-42, Tabs. 3.4-3 & 3.4-4, 10/96, large diesel engines ( $> 600$  hp)

(4) AP-42, Tabs. 1.4-2, 1.4-3 & 1.4-4, 07/98, external natural gas combustion, based on 1,020 Btu/Scf

(5) AP-42, Tabs. 1.3-9 & 1.3-10, 05/10, external fuel oil combustion, based on 137,000 Btu/gal

(6) Maximum emission factor from ULSD and NG combustion.

Numbers in *blue* are direct entries. *Green* text/numbers are lookup codes or results.

Air Sciences Inc.				PROJECT TITLE:			BY:		
				Donlin Gold			E. Memon		
				PROJECT NO:			PAGE:	OF:	SHEET:
				281-1-1			4	9	HAP
AIR EMISSION CALCULATIONS				SUBJECT:			DATE:		
				HAP Emissions			October 14, 2021		
Power Plant (EU ID: 1-12)				Heat Input:		14,867,903 MMBtu/yr, NG			
HAP Emissions						15,081,772 MMBtu/yr, ULSD			
CAS No.	Pollutant	Emission Factors NG4SLB		HAP Emissions (ton/yr)	Emission Factors DLARGE		HAP Emissions (ton/yr)	Highest HAP Emissions	
		Uncontrolled	Controlled		Uncontrolled	Controlled		Emissions	Emissions
		(lb/MMBtu) <sup>(1)</sup>	(lb/MMBtu)		(lb/MMBtu) <sup>(4)</sup>	(lb/MMBtu)		(ton/yr)	(ton/yr)
		NG	NG	NG	ULSD	ULSD	ULSD	NG or ULSD	POM
79345	1,1,2,2-Tetrachloroethane	4.00E-05	9.85E-07 <sup>(2)</sup>	0.007				0.007	NG
79005	1,1,2-Trichloroethane	3.18E-05	7.83E-07 <sup>(2)</sup>	0.006				0.006	NG
75343	1,1-Dichloroethane	2.36E-05	5.81E-07 <sup>(2)</sup>	0.004				0.004	NG
107062	1,2-Dichloroethane	2.36E-05	5.81E-07 <sup>(2)</sup>	0.004				0.004	NG
78875	1,2-Dichloropropane	2.69E-05	6.62E-07 <sup>(2)</sup>	0.005				0.005	NG
106990	1,3-Butadiene	2.67E-04	6.57E-06 <sup>(2)</sup>	0.049				0.049	NG
542756	1,3-Dichloropropene	2.64E-05	6.50E-07 <sup>(2)</sup>	0.005				0.005	NG
540841	2,2,4-Trimethylpentane	2.50E-04	6.16E-06 <sup>(2)</sup>	0.046				0.046	NG
91576	2-Methylnaphthalene	3.32E-05	8.17E-07 <sup>(2)</sup>	0.006				0.006	NG
83329	Acenaphthene	1.25E-06	3.08E-08 <sup>(2)</sup>	0.0002	4.68E-06	1.15E-07 <sup>(2)</sup>	0.001	0.001	ULSD
208968	Acenaphthylene	5.53E-06	1.36E-07 <sup>(2)</sup>	0.001	9.23E-06	2.27E-07 <sup>(2)</sup>	0.002	0.002	ULSD
75070	Acetaldehyde	8.36E-03	2.06E-04 <sup>(2)</sup>	1.530	2.52E-05	6.20E-07 <sup>(2)</sup>	0.005	1.530	NG
107028	Acrolein	5.14E-03	1.27E-04 <sup>(2)</sup>	0.941	7.88E-06	1.94E-07 <sup>(2)</sup>	0.001	0.941	NG
120127	Anthracene				1.23E-06	3.03E-08 <sup>(2)</sup>	0.0002	0.0002	NG
56553	Benz(a)anthracene				6.22E-07	1.53E-08 <sup>(2)</sup>	0.0001	0.0001	NG
71432	Benzene	4.40E-04	1.08E-05 <sup>(2)</sup>	0.081	7.76E-04	1.91E-05 <sup>(2)</sup>	0.144	0.144	ULSD
50328	Benzo(a)pyrene				2.57E-07	6.33E-09 <sup>(2)</sup>	0.00005	0.00005	NG
205992	Benzo(b)fluoranthene	1.66E-07	4.09E-09 <sup>(2)</sup>	0.00003	1.11E-06	2.73E-08 <sup>(2)</sup>	0.0002	0.0002	ULSD
192972	Benzo(e)pyrene	4.15E-07	1.02E-08 <sup>(2)</sup>	0.0001				0.0001	NG
191242	Benzo(g,h,i)perylene	4.14E-07	1.02E-08 <sup>(2)</sup>	0.0001	5.56E-07	1.37E-08 <sup>(2)</sup>	0.0001	0.0001	ULSD
207089	Benzo(k)fluoranthene				2.18E-07	5.37E-09 <sup>(2)</sup>	0.00004	0.00004	NG
92524	Biphenyl	2.12E-04	5.22E-06 <sup>(2)</sup>	0.039				0.039	NG
56235	Carbon Tetrachloride	3.67E-05	9.04E-07 <sup>(2)</sup>	0.007				0.007	NG
108907	Chlorobenzene	3.04E-05	7.48E-07 <sup>(2)</sup>	0.006				0.006	NG
75003	Chloroethane	1.87E-06	4.60E-08 <sup>(2)</sup>	0.000				0.000	NG
67663	Chloroform	2.85E-05	7.02E-07 <sup>(2)</sup>	0.005				0.005	NG
218019	Chrysene	6.93E-07	1.71E-08 <sup>(2)</sup>	0.0001	1.53E-06	3.77E-08 <sup>(2)</sup>	0.0003	0.0003	ULSD
53703	Dibenzo(a,h)anthracene				3.46E-07	8.52E-09 <sup>(2)</sup>	0.0001	0.0001	NG
100414	Ethylbenzene	3.97E-05	9.77E-07 <sup>(2)</sup>	0.007				0.007	NG
106934	Ethylene Dibromide	4.43E-05	1.09E-06 <sup>(2)</sup>	0.008				0.008	NG
206440	Fluoranthene	1.11E-06	2.73E-08 <sup>(2)</sup>	0.0002	4.03E-06	9.92E-08 <sup>(2)</sup>	0.001	0.001	ULSD
86737	Fluorene	5.67E-06	1.40E-07 <sup>(2)</sup>	0.001	1.28E-05	3.15E-07 <sup>(2)</sup>	0.002	0.002	ULSD
50000	Formaldehyde	5.28E-02	1.30E-03 <sup>(3)</sup>	9.664	7.89E-05	1.94E-06 <sup>(2)</sup>	0.015	9.664	NG
110543	Hexane	1.11E-03	2.73E-05 <sup>(2)</sup>	0.203				0.203	NG
193395	Indeno(1,2,3-c,d)pyrene				4.14E-07	1.02E-08 <sup>(2)</sup>	0.0001	0.0001	NG
67561	Methanol	2.50E-03	6.16E-05 <sup>(2)</sup>	0.458				0.458	NG
75092	Methylene Chloride	2.00E-05	4.92E-07 <sup>(2)</sup>	0.004				0.004	NG
91203	Naphthalene	7.44E-05	1.83E-06 <sup>(2)</sup>	0.014	1.30E-04	3.20E-06 <sup>(2)</sup>	0.024	0.024	ULSD
85018	Phenanthrene	1.04E-05	2.56E-07 <sup>(2)</sup>	0.002	4.08E-05	1.00E-06 <sup>(2)</sup>	0.008	0.008	ULSD
108952	Phenol	2.40E-05	5.91E-07 <sup>(2)</sup>	0.004				0.004	NG
129000	Pyrene	1.36E-06	3.35E-08 <sup>(2)</sup>	0.0002	3.71E-06	9.13E-08 <sup>(2)</sup>	0.001	0.001	ULSD
100425	Styrene	2.36E-05	5.81E-07 <sup>(2)</sup>	0.004				0.004	NG
108883	Toluene	4.08E-04	1.00E-05 <sup>(2)</sup>	0.075	2.81E-04	6.92E-06 <sup>(2)</sup>	0.052	0.075	NG
75014	Vinyl Chloride	1.49E-05	3.67E-07 <sup>(2)</sup>	0.003				0.003	NG
1330207	Xylene	1.84E-04	4.53E-06 <sup>(2)</sup>	0.034	1.93E-04	4.75E-06 <sup>(2)</sup>	0.036	0.036	ULSD
POM POM Subtotal				0.063				0.084	
Total				13.22			0.29	13.31	
<sup>(1)</sup> AP-42, Tab. 3.2-2, 07/00, 4-stroke lean-burn engines									
<sup>(2)</sup> Ratioed from formaldehyde controlled vs. uncontrolled emission rate from NG firing.									
<sup>(3)</sup> Based on formaldehyde test data from two NG-fired Wärtsilä power plants (Western 102 and the MEA Eklutna Generation Station ). The emission rate represents the average emissions across all engines.									
<sup>(4)</sup> AP-42, Tabs. 3.4-3 & 3.4-4, 10/96, large diesel engines (> 600 hp)									
Conversion(s): 2,000 lb/ton									
Numbers in blue are direct entries. Green text/numbers are lookup codes or results.									

Air Sciences Inc.				PROJECT TITLE:			BY:		
				Donlin Gold			E. Memon		
				PROJECT NO:			PAGE:	OF:	SHEET:
AIR EMISSION CALCULATIONS				281-1-1			5	9	HAP
				SUBJECT:			DATE:		
				HAP Emissions			October 14, 2021		
Other Fuel-Burning Equipment									
HAP Emissions (ton/yr)									
		DSMALL	DLARGE	DSMALL	DBOIL	NGBOIL	DUALBOIL		
Sources:		≤ 600 hp	> 600 hp	≤ 600 hp	ULSD	NG	NG/ULSD	Total	
		Generators	Generators	Fire Pumps	Boilers/Heaters	Boilers/Heaters	Boilers/Heaters		
Heat Input (MMBtu/yr):		32,893	34,113	2,646	168,192	1,214,574	1,123,425		
CAS No.	Pollutant	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	POM	
71556	1,1,1-Trichloroethane				1.45E-4		9.68E-4	1.11E-3	
106990	1,3-Butadiene	6.43E-4		5.17E-5				6.95E-4	
91576	2-Methylnaphthalene					1.43E-5	1.32E-5	2.75E-5	POM
56495	3-Methylchloranthrene					1.07E-6	9.91E-7	2.06E-6	POM
57976	7,12-Dimethylbenz(a)anthracene					9.53E-6	8.81E-6	1.83E-5	POM
83329	Acenaphthene	2.34E-5	7.98E-5	1.88E-6	1.30E-5	1.07E-6	8.65E-5	2.06E-4	POM
208968	Acenaphthylene	8.32E-5	1.57E-4	6.69E-6	1.55E-7	1.07E-6	1.04E-6	2.50E-4	POM
75070	Acetaldehyde	1.26E-2	4.30E-4	1.01E-3				1.41E-2	
107028	Acrolein	1.52E-3	1.34E-4	1.22E-4				1.78E-3	
120127	Anthracene	3.08E-5	2.10E-5	2.47E-6	7.49E-7	1.43E-6	5.00E-6	6.14E-5	POM
7440382	Arsenic				3.36E-4	1.19E-4	2.25E-3	2.70E-3	
56553	Benz(a)anthracene	2.76E-5	1.06E-5	2.22E-6	2.46E-6	1.07E-6	1.64E-5	6.04E-5	POM
71432	Benzene	1.53E-2	1.32E-2	1.23E-3	1.31E-4	1.25E-3	1.16E-3	3.24E-2	
50328	Benzo(a)pyrene	3.09E-6	4.38E-6	2.49E-7		7.14E-7	6.61E-7	9.10E-6	POM
205992	Benzo(b)fluoranthene	1.63E-6	1.89E-5	1.31E-7		1.07E-6	9.91E-7	2.28E-5	POM
191242	Benzo(g,h,i)perylene	8.04E-6	9.48E-6	6.47E-7	1.39E-6	7.14E-7	9.27E-6	2.95E-5	POM
207089	Benzo(k)fluoranthene	2.55E-6	3.72E-6	2.05E-7	9.08E-7	1.07E-6	6.07E-6	1.45E-5	POM
7440417	Beryllium				2.52E-4	7.14E-6	1.69E-3	1.94E-3	
7440439	Cadmium				2.52E-4	6.55E-4	1.69E-3	2.59E-3	
7440473	Chromium				2.52E-4	8.34E-4	1.69E-3	2.77E-3	
218019	Chrysene	5.81E-6	2.61E-5	4.67E-7	1.46E-6	1.07E-6	9.76E-6	4.47E-5	POM
7440484	Cobalt					5.00E-5	4.63E-5	9.63E-5	
53703	Dibenzo(a,h)anthracene	9.59E-6	5.90E-6	7.71E-7	1.03E-6	7.14E-7	6.85E-6	2.48E-5	POM
25321226	Dichlorobenzene					7.14E-4	6.61E-4	1.38E-3	
100414	Ethylbenzene				3.90E-5		2.61E-4	3.00E-4	
206440	Fluoranthene	1.25E-4	6.87E-5	1.01E-5	2.97E-6	1.79E-6	1.98E-5	2.29E-4	POM
86737	Fluorene	4.80E-4	2.18E-4	3.86E-5	2.74E-6	1.67E-6	1.83E-5	7.60E-4	POM
50000	Formaldehyde	1.94E-2	1.35E-3	1.56E-3	2.03E-2	4.47E-2	1.35E-1	2.23E-1	
110543	Hexane					1.07E+0	9.91E-1	2.06E+0	
193395	Indeno(1,2,3-c,d)pyrene	6.17E-6	7.06E-6	4.96E-7	1.31E-6	1.07E-6	8.77E-6	2.49E-5	POM
7439921	Lead				7.57E-4	2.98E-4	5.06E-3	6.11E-3	
7439965	Manganese				5.05E-4	2.26E-4	3.37E-3	4.10E-3	
7439976	Mercury *	* Detailed mercury calculations are provided beginning on page 134							
91203	Naphthalene	1.39E-3	2.22E-3	1.12E-4	6.94E-4	3.63E-4	4.63E-3	9.41E-3	POM
7440020	Nickel				2.52E-4	1.25E-3	1.69E-3	3.19E-3	
95476	o-Xylenes				6.69E-5		4.47E-4	5.14E-4	
85018	Phenanthrene	4.84E-4	6.96E-4	3.89E-5	6.45E-6	1.01E-5	4.31E-5	1.28E-3	POM
129000	Pyrene	7.86E-5	6.33E-5	6.32E-6	2.61E-6	2.98E-6	1.74E-5	1.71E-4	POM
7782492	Selenium				1.26E-3	1.43E-5	8.43E-3	9.70E-3	
108883	Toluene	6.73E-3	4.79E-3	5.41E-4	3.81E-3	2.02E-3	2.54E-2	4.33E-2	
1330207	Xylene	4.69E-3	3.29E-3	3.77E-4				8.36E-3	
POM POM Subtotal								1.26E-2	
Total		0.064	0.027	0.005	0.029	1.124	1.186	2.435	
Conversion(s): 2,000 lb/ton									
Numbers in blue are direct entries. Green text/numbers are lookup codes or results.									



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Air Sciences Inc.			PROJECT TITLE:		BY:		
			Donlin Gold		E. Memon		
			PROJECT NO:		PAGE:	OF:	SHEET:
AIR EMISSION CALCULATIONS			281-1-1		8	9	HAP
			SUBJECT:		DATE:		
			HAP Emissions		October 14, 2021		
Incinerators							
HAP Emissions							
Camp Waste Incinerator (EU ID: 27)							
Waste Throughput			4336.2 ton/yr				
			AP-42	NSPS <sup>(2)</sup>	Potential		
		AP-42 <sup>(1)</sup>	Emissions	Emissions	Emissions		
CAS No.	Pollutant	lb/ton	ton/yr	ton/yr	ton/yr	POM	
7647010	HCl Hydrogen Chloride	6.40E+0	1.39E+1	2.45E-3	2.45E-3		
7440382	Ar Arsenic	4.37E-3	9.47E-3		9.47E-3		
7440439	Cd Cadmium	1.09E-2	2.36E-2	4.08E-5	4.08E-5		
7440473	Cr Chromium	8.97E-3	1.94E-2		1.94E-2		
7439976	Hg Mercury*						* Detailed mercury calculations are provided beginning on page 134
7440020	Ni Nickel	7.85E-3	1.70E-2		1.70E-2		
7439921	Pb Lead	2.13E-1	4.62E-1	2.66E-4	2.66E-4		
1746016	Dioxins/Furans	7.50E-6	1.63E-5	1.03E-8	1.03E-8	POM	
POM	POM Subtotal				1.03E-8		
Total			0.049				
<sup>(1)</sup> AP-42, Tab. 2.1-2 and 2.1-6, 10/96							
<sup>(2)</sup> See "Incinerator" sheet.							
Sewage Sludge Incinerator (EU ID: 28)							
Sludge Throughput			21.15 ton/yr				
			AP-42	NSPS <sup>(2)</sup>	Potential		
		AP-42 <sup>(1)</sup>	Emissions	Emissions	Emissions		
CAS No.	Pollutant	lb/ton	ton/yr	ton/yr	ton/yr	POM	
7647010	HCl Hydrogen Chloride	1.00E-1	1.06E-3	2.89E-4	2.89E-4		
79016	1,1,1-Trichloroethane	5.20E-4	5.50E-6		5.50E-6		
106467	1,4-Dichlorobenzene	4.80E-1	5.08E-3		5.08E-3		
71432	Benzene	4.00E-4	4.23E-6		4.23E-6		
117817	Bis(2-ethylhexyl)phthalate	8.20E-2	8.67E-4		8.67E-4		
56235	Carbon Tetrachloride	2.40E-5	2.54E-7		2.54E-7		
108907	Chlorobenzene	1.00E-5	1.06E-7		1.06E-7		
1746016	Dioxins/Furans	5.48E-8	5.80E-10	6.66E-12	6.66E-12	POM	
7440382	Ar Arsenic	4.40E-3	4.65E-5		4.65E-5		
7440417	Be Beryllium	4.00E-7	4.23E-9		4.23E-9		
7440439	Cd Cadmium	4.40E-3	4.65E-5	3.55E-7	3.55E-7		
7440473	Cr Chromium	6.40E-4	6.77E-6		6.77E-6		
7439965	Mn Manganese	6.00E-4	6.35E-6		6.35E-6		
7439976	Hg Mercury*						* Detailed mercury calculations are provided beginning on page 134
7440020	Ni Nickel	3.50E-2	3.70E-4		3.70E-4		
7782492	Se Selenium	4.00E-4	4.23E-6		4.23E-6		
7439921	Pb Lead			5.18E-7	5.18E-7		
POM	POM Subtotal				6.66E-12		
Total			0.007				
<sup>(1)</sup> AP-42, Tab. 2.2-7 and 2.2-8, 10/96							
<sup>(2)</sup> See "Incinerator" sheet.							
Conversion(s):							
2,000 lb/ton							
Numbers in blue are direct entries. Green text/numbers are lookup codes or results.							

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DONLIN GOLD - HCN EMISSIONS

LOM - Year: 20

Wind Speed: m/s Fw  
3.55 1.14

Area	Source	Cat.	Category Description	Acre	Solution Parameters				pKa	a <sub>o</sub>	H	Overall	Fa x Fw	g/s	lb/yr
					pH	CN <sup>-</sup> g/m <sup>3</sup>	T °C	kG or Flux* m/s or g/m <sup>2</sup> -s							
Tailings	Tailings Impoundment	TA	Tails, Aqueous Surface	749.00	7.00	0.41	3.68	9.804	0.9984	0.00251	1.89E-05	0.44	2.55E-02	1,773.5	
		TW	Tails, Wet Sediment	386.43	7.00	0.41	3.68	9.804	0.9984	0.00251	1.02E-05	0.44	7.12E-03	495.3	
		TD	Tails, Dry Sediment	784.57	7.00	0.41	3.68	9.804	0.9984	0.00251	2.29E-06	1.00	7.41E-03	515.0	
Active Surface Subtotal				1,135.4											
Mill	CIL Tank 1	TK	Tanks	0.0472	10.50	106.16	24.7	9.258	0.0542	0.00539	3.11E-04	0.44	8.09E-04	56.2	
	CIL Tank 2	TK	Tanks	0.0472	10.50	106.16	24.7	9.258	0.0542	0.00539	3.11E-04	0.44	8.09E-04	56.2	
	CIL Tank 3	TK	Tanks	0.0472	10.50	106.16	24.7	9.258	0.0542	0.00539	3.11E-04	0.44	8.09E-04	56.2	
	CIL Tank 4	TK	Tanks	0.0472	10.50	106.16	24.7	9.258	0.0542	0.00539	3.11E-04	0.44	8.09E-04	56.2	
	CIL Tank 5	TK	Tanks	0.0472	10.50	106.16	24.7	9.258	0.0542	0.00539	3.11E-04	0.44	8.09E-04	56.2	
	CIL Tank 6	TK	Tanks	0.0472	10.50	106.16	24.7	9.258	0.0542	0.00539	3.11E-04	0.44	8.09E-04	56.2	
	Cyanide Destruction Tank	TK	Tanks	0.0257	8.00	3.00	24.7	9.258	0.9477	0.00539	3.11E-04	0.44	2.17E-04	15.1	
	Neutralization Tank 1	TK	Tanks	0.0738	7.00	1.00	55.0	8.470	0.9672	0.01620	3.11E-04	0.44	6.39E-04	44.4	
	Neutralization Tank 2	TK	Tanks	0.0738	7.00	1.00	55.0	8.470	0.9672	0.01620	3.11E-04	0.44	6.39E-04	44.4	
	Neutralization Tank 3	TK	Tanks	0.0738	7.00	1.00	55.0	8.470	0.9672	0.01620	3.11E-04	0.44	6.39E-04	44.4	
	Neutralization Tank 4	TK	Tanks	0.0738	7.00	1.00	55.0	8.470	0.9672	0.01620	3.11E-04	0.44	6.39E-04	44.4	
	Neutralization Tank 5	TK	Tanks	0.0738	7.00	1.00	55.0	8.470	0.9672	0.01620	3.11E-04	0.44	6.39E-04	44.4	
TOTAL AREA				1,920.7											
													Fugitive Total (lb/yr)	3,358.2	
													Fugitive Total (ton/yr)	1.68	

Stack Emissions				lb/hr	hr/yr	lb/yr
		EW Cells	0.018	8,760	156.5	
		Pregnant/Barren Tanks	0.024	8,760	209.9	

\* Per EPA's request, three mines conducted fugitive HCN emission measurements in the fourth quarter of 2009 in order to quantify emissions from the various fugitive HCN sources at gold mines. The Quality Assurance Project Plan (QAPP) for this testing, the EPA's approval letter of this QAPP, and the final fugitive HCN test report are provided on the federal docket website at <http://www.regulations.gov/#!docketDetail;D=EPA-HQ-OAR-2010-0239>. The IDs for these documents are EPA-HQ-OAR-2010-0239-0102, EPA-HQ-OAR-2010-0239-0103, and EPA-HQ-OAR-2010-0239-0163 (0163.0 through 0163.6), respectively. The above emission factors were taken from the final fugitive HCN test report, "T. Card and C.E. Schmidt. Evaluation of Air Emissions of Hydrogen Cyanide from Fugitive Sources at Nevada Gold Mines Using the USEPA Surface Isolation Flux Chamber Technology. April 2010."

Stack Total (lb/yr) 366.5  
Facility Total (ton/yr) 1.86

### CN Tank Information

Parameter	Value	Unit	Reference
<b>CIL Tanks</b>			
Quantity	6		Donlin
pH	10.5		Donlin
Temperature	24.7	°C	Donlin
NaCN	0.4	lb/ton	Donlin
Free Cyanide (CN <sup>-</sup> ) Concentration	106.2	g/m <sup>3</sup>	
Diameter	15.6	m	Donlin
	51.2	ft	
Area	2,057.3	ft <sup>2</sup>	
	0.04723	acre	

<b>CN Destruct Tank</b>			
Quantity	1		Donlin
pH	8		Donlin
Temp.	24.7	°C	
NaCN	3	ppm	Estimate
CN <sup>-</sup> Concentration	3.0	g/m <sup>3</sup>	
Diameter	11.5	m	Donlin
	37.7	ft	
Area	1,118.0	ft <sup>2</sup>	
	0.026	acre	

<b>Neutralization Tanks</b>			
Quantity	5		Donlin
pH	7		Donlin
Temp.	55	°C	Donlin
NaCN	1	ppm	Estimate
CN <sup>-</sup> Concentration	1.0	g/m <sup>3</sup>	
Diameter	19.5	m	Donlin
	64.0	ft	
Area	3,214.54	ft <sup>2</sup>	
	0.074	acre	

### HCN Tailings Information

Parameter	Value	Unit	Reference
Beach Area	1,171	acre	LOM - Year: 20
Pond Area	749	acre	LOM - Year: 20
Beach Wet Fraction	33%		Donlin
Beach Dry Fraction	67%		
Beach Wet Area	386.4	acre	
Beach Dry Area	784.6	acre	
pH	7.0		Donlin
CN <sup>-</sup> Concentration	0.41	g/m <sup>3</sup>	Donlin
Temperature	3.7	°C	Assume 5 °C above ambient

### Conversion Factors

3.3 ft/m  
 4046.9 m<sup>2</sup>/acre  
 43,560 ft<sup>2</sup>/acre  
 1 lb/ton NaCN = 265.41 g/m<sup>3</sup> CN

## Sample Calculations

Flux Box	5.385 $\mu\text{g}/\text{m}^2\text{-min}$	$\frac{140 \mu\text{g}}{\text{m}^3}$	$\frac{5 \text{ L}}{\text{min}}$	$\frac{\text{m}^3}{1000 \text{ L}}$	$\frac{0.13 \text{ m}^2}{0.13 \text{ m}^2}$
Flux	9E-08 $\text{g}/\text{m}^2\text{-s}$	$\frac{5.384615 \mu\text{g}}{\text{m}^2\text{-min}}$	$\frac{1 \text{ min}}{60 \text{ s}}$	$\frac{\text{g}}{1.00\text{E}+06 \mu\text{g}}$	

## HCN Air Emission Calculations Methodology

$$E = k_G \times \text{HCN} \times A \times F_a \times F_w \quad \text{or} \quad E = EF \times A$$

Where:

E = HCN emission rate (g/s).

$k_G$  = the gas-phase mass transfer coefficient (m/s).

HCN = the ground level concentration of HCN in the gas phase (g/m<sup>3</sup>).

A = the surface area of emission source (m<sup>2</sup>).

$F_a = [(4 \times 0.13/\text{Pi})^{0.5} / (4 \times A/\text{Pi})^{0.5}]^{0.11}$ , the flux chamber adjustment for area, where A = total area of the source (m<sup>2</sup>).

The flux chamber area is 0.13 m<sup>2</sup>.

$F_w = (U_{10}/3)^{0.78}$ , the flux chamber adjustment for wind speed.  $U_{10}$  = the wind speed (m/s) at a height of 10 m.

EF = the HCN flux rate (g/m<sup>2</sup>-s).

The equations for  $F_a$  and  $F_w$  come from: USEPA. *Air Emissions Models for Waste and Wastewater*. EPA 453/R-94-080A, November 1994.

## Vapor-Liquid Equilibrium Equations for HCN and $a_o$

$$\text{HCN} = a_o \times \text{CN}^- \times H$$

$$a_o = 1/[1 + 10^{(\text{pH} - \text{pKa})}]$$

$$H = 0.0022 \times e^{(0.0363 \times T)}$$

Where:

$a_o$  = the liquid-phase mass fraction of free cyanide that is in the form of HCN.

$\text{CN}^-$  = the liquid-phase free cyanide concentration (mg/l = g/m<sup>3</sup> = ppm, mass).

H = Henry's Constant [vol<sub>liquid</sub> / vol<sub>gas</sub>] or [g/m<sup>3</sup><sub>gas</sub> / g/m<sup>3</sup><sub>liquid</sub>]

pKa = -log(K)

K = Dissociation equilibrium constant

T = Temperature (°C).

## Sample Wind Erosion Calculations

### Calculations for Waste Rock Storage (WRS) Area Wind Erosion

LOM Year 16 - Meteorological Year: 07/01/2008 - 06/30/2009

(Similar Calculations are Completed for Each Area with Stockpiled Material)

Waste Produced	152,276,347 ton/yr		
	417,195 ton/day	Annual average	
	17,383 ton/hr	Annual average	
Truck Dump (TD) Size	399 ton	Weighted average of 400 and 159 ton trucks	
Material Density	2.7 t/m <sup>3</sup>	Average	
	0.08 ton/ft <sup>3</sup>		
Material Specific Volume	11.9 ft <sup>3</sup> /ton		
TD Volume	4,738 ft <sup>3</sup>	=	$\frac{399 \text{ ton}}{\text{ton}} \mid \frac{11.9 \text{ ft}^3}{\text{ton}}$
Conical Surface Calculations			
Side Slope	38 deg		
	0.7 rad	Conversions:	365 day/yr
			1.1023 ton/t
Conical Surface Area (SA)	$\pi \times r \times (h^2 + r^2)^{0.5}$		2.2046 lb/kg
Conical Volume (V)	$(\pi \times h \times r^2) \div 3$		3.2808 ft/m
Conical Base Radius	$r = s \times \cos(\text{slope})$		43,560 ft <sup>2</sup> /acre
Conical Height	$h = s \times \sin(\text{slope})$		4,046.9 m <sup>2</sup> /acre
Sloped Side	$s = (h^2 + r^2)^{0.5}$		1,609.3 m/mi
			3,600 s/hr
Solution of Conical Volume Equation			453.6 g/lb
Replacing h and r with $s \times \sin(\text{slope})$ and $s \times \cos(\text{slope})$ :			2,000 lb/ton
$s = [3 \times V / (\pi \times \sin(\text{slope}) \times \cos^2(\text{slope}))]^{1/3}$	22.8 ft		8,760 hr/yr
r	18.0 ft		
h	14.0 ft		
SA	1,286 ft <sup>2</sup>		
	0.030 acre		
Pile Base Area (Diameter-Square)	1,290 ft <sup>2</sup>		
Unit Surface Area	7.4E-05 acre/ton-TD		
New Area Created Hourly	1.28 acre/hr	=	$\frac{7.39155\text{E-}05 \text{ acre}}{\text{ton-TD}} \mid \frac{17,383 \text{ ton-TD}}{\text{hr}}$
Initial (maximum) Erodible Area	8,061,770 m <sup>2</sup>	Total surface area of the Waste Rock Storage Area	
	1,992 acre		
Threshold Friction Velocity, $u_t^*$	1.02 m/s	AP-42, Page 13.2.5-5, 11/06 (overburden)	
Hourly Average to Fastest-Mile Wind Speed Conversion	1.24	ADEC 2015	
Calculations Follow Example 1 on AP-42, Page 13.2.5-10			
Area ID	A	B	C1+C2
Equivalent Friction Velocity, ( $u_s/u_t$ )	0.9	0.6	0.2 AP-42, Page 13.2.5-10, 11/06
% Pile Surface	12%	48%	40% AP-42, Page 13.2.5-10, 11/06



**Event #1**

Wind Data Start Date	7/1/2008	hour 1
Wind Erosion Event #1 Occurs on	7/9/2008	hour 14
Average Hourly Wind Speed for Event #1	10.53 m/s	
Fastest-Mile Wind Speed, $u_{10+}$ (hourly wind speed $\times 1.24$ )	13.06 m/s	

Area ID	A	B	C1+C2
Initial (maximum) Surface Area of Stockpiles	1,992	1,992	1,992 acre
Friction Velocity, $u^* = (u_s/u_r) \times 0.1 \times u_{10}^+$	1.18	0.78	0.26 m/s
Erosion Potential, $P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$ ; $P = 0$ for $u^* \leq u_t^*$	5.27	0.00	0.00 g/m <sup>2</sup>
	47.1	0.0	0.0 lb/acre
Erodible Area for Event #1	239	956	797 acre
Event #1 Wind Erosion PM Emissions	11,250.1	0.0	0.0 lb

**Event #2**

Wind Erosion Event #2 Occurs on	7/16/2008	hour 14
Average Hourly Wind Speed for Event #2	9.56 m/s	
Fastest-Mile Wind Speed, $u_{10+}$ (hourly wind speed $\times 1.24$ )	11.85 m/s	

Area ID	A	B	C1+C2
Time Elapsed Since Event #1	168	N/A	N/A hr
New Surface Area Created Since Event #1	216	1,992	1,992 acre
Friction Velocity, $u^* = (u_s/u_r) \times 0.1 \times u_{10}^+$	1.07	0.71	0.24 m/s
Erosion Potential, $P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$ ; $P = 0$ for $u^* \leq u_t^*$	1.30	0.00	0.00 g/m <sup>2</sup>
	11.6	0.0	0.0 lb/acre
Erodible Area for Event #2	26	956	797 acre
Event #2 Wind Erosion PM Emissions	300.4	0.0	0.0 lb

N/A = Did not blow during previous event

**Event #3**

Wind Erosion Event #3 Occurs on	10/28/2008	hour 13
Average Hourly Wind Speed for Event #3	9.96 m/s	
Fastest-Mile Wind Speed, $u_{10+}$ (hourly wind speed $\times 1.24$ )	12.35 m/s	

Area ID	A	B	C1+C2
Time Elapsed Since Event #2	2,495	N/A	N/A hr
New Surface Area Created Since Event #2	1,992	1,992	1,992 acre
Friction Velocity, $u^* = (u_s/u_r) \times 0.1 \times u_{10}^+$	1.11	0.74	0.25 m/s
Erosion Potential, $P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$ ; $P = 0$ for $u^* \leq u_t^*$	2.8	0.0	0.0 g/m <sup>2</sup>
	24.8	0.0	0.0 lb/acre
Erodible Area for Event #3	239	956	797 acre
Event #3 Wind Erosion PM Emissions	5,917.2	0.0	0.0 lb

N/A = Did not blow during previous event

**Event #4**

Wind Erosion Event #4 Occurs on 10/28/2008 hour 14

Average Hourly Wind Speed for Event #4 10.17 m/s

Fastest-Mile Wind Speed,  $u_{10+}$  (hourly wind speed  $\times 1.24$ ) 12.61 m/s**Area ID** **A** **B** **C1+C2**

Time Elapsed Since Event #3 1 N/A N/A hr N/A = Did not blow during previous event

New Surface Area Created Since Event #3 1.28 1,992 1,992 acre

Friction Velocity,  $u^* = (u_e/u_t) \times 0.1 \times u_{10}^+$  1.13 0.76 0.25 m/sErosion Potential,  $P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$ ;  $P = 0$  for  $u^* \leq u_t^*$  3.6 0.0 0.0 g/m<sup>2</sup>

32.5 0.0 0.0 lb/acre

Erodible Area for Event #4 0.15 956 797 acre

Event #4 Wind Erosion PM Emissions 5.0 0.0 0.0 lb

**Event #5**

Wind Erosion Event #5 Occurs on 10/28/2008 hour 15

Average Hourly Wind Speed for Event #5 9.46 m/s

Fastest-Mile Wind Speed,  $u_{10+}$  (hourly wind speed  $\times 1.24$ ) 11.73 m/s**Area ID** **A** **B** **C1+C2**

Time Elapsed Since Event #4 1 N/A N/A hr N/A = Did not blow during previous event

New Surface Area Created Since Event #4 1 1,992 1,992 acre

Friction Velocity,  $u^* = (u_e/u_t) \times 0.1 \times u_{10}^+$  1.06 0.70 0.23 m/sErosion Potential,  $P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$ ;  $P = 0$  for  $u^* \leq u_t^*$  1.0 0.0 0.0 g/m<sup>2</sup>

8.6 0.0 0.0 lb/acre

Erodible Area for Event #5 0.15 956 797 acre

Event #5 Wind Erosion PM Emissions 1.3 0.0 0.0 lb

Total Number of Events in Year 248

Total PM Emissions from Events #1 to #248 for WRS 29.0 ton

Total PM<sub>10</sub> Emissions from Events #1 to #248 for WRS 14.5 ton PM/PM<sub>10</sub> Scaling Factor 0.5 AP-42, Page 13.2.5-3, 11/06Total PM<sub>2.5</sub> Emissions from Events #1 to #248 for WRS 2.2 ton PM/PM<sub>2.5</sub> Scaling Factor 0.075 AP-42, Page 13.2.5-3, 11/06

## Dry Tailings Beach Area Wind Erosion

LOM Year - Meteorological Year: 07/01/2008 - 06/30/2009

Initial (maximum) Surface Area of Dry Tailings Beach	798 acre	Donlin
New Surface Area of Dry Tailings Beach Created Every Day	7.3 acre/day	Donlin
Average Hourly New Surface Area of Dry Tailings Beach Created	0.31 acre/hr	

### Event #1

Wind Erosion Event #1 Occurs on	1/16/2009	hour 18
Average Hourly Wind Speed for Event #1	16.06 m/s	
Fastest-Mile Wind Speed, $u_{10+}$ (hourly wind speed $\times 1.24$ )	19.91 m/s	
Friction Velocity, $u^* = 0.053 \times u_{10}^+$	1.06 m/s	
Erosion Potential, $P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$ ; $P = 0$ for $u^* \leq u_t^*$	1.0 g/m <sup>2</sup>	
	8.6 lb/acre	
Initial (maximum) Surface Area of Dry Tailings Beach	798.0 acre	
Event #1 Tailings Wind Erosion PM Emissions	6,831 lb	

### Event #2

Wind Erosion Event #2 Occurs on	1/16/2009	hour 19
Average Hourly Wind Speed for Event #2	17.82 m/s	
Fastest-Mile Wind Speed, $u_{10+}$ (hourly wind speed $\times 1.24$ )	22.10 m/s	
Friction Velocity, $u^* = 0.053 \times u_{10}^+$	1.17 m/s	
Erosion Potential, $P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$ ; $P = 0$ for $u^* \leq u_t^*$	5.1 g/m <sup>2</sup>	
	45.5 lb/acre	
Time Elapsed Since Event #1	1 hr	
New Surface Area Created Since Event #1	0.31 acre	
Event #2 Tailings Wind Erosion PM Emissions	13.93 lb	

### Event #3

Wind Erosion Event #3 Occurs on	1/16/2009	hour 20
Average Hourly Wind Speed for Event #3	19.61 m/s	
Fastest-Mile Wind Speed, $u_{10+}$ (hourly wind speed $\times 1.24$ )	24.32 m/s	
Friction Velocity, $u^* = 0.053 \times u_{10}^+$	1.29 m/s	
Erosion Potential, $P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$ ; $P = 0$ for $u^* \leq u_t^*$	10.9 g/m <sup>2</sup>	
	97.3 lb/acre	
Time Elapsed Since Event #2	1 hr	
New Surface Area Created Since Event #2	0.31 acre	
Event #3 Tailings Wind Erosion PM Emissions	29.78 lb	

**Event #4**

Wind Erosion Event #4 Occurs on	1/16/2009	hour 21
Average Hourly Wind Speed for Event #4	19.13	m/s
Fastest-Mile Wind Speed, $u_{10+}$ (hourly wind speed $\times 1.24$ )	23.72	m/s
Friction Velocity, $u^* = 0.053 \times u_{10+}$	1.26	m/s
Erosion Potential, $P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$ ; $P = 0$ for $u^* \leq u_t^*$	9.2	$\text{g/m}^2$
	82.0	lb/acre
Time Elapsed Since Event #3	1	hr
New Surface Area Created Since Event #3	0.31	acre
Event #4 Tailings Wind Erosion PM Emissions	25.10	lb

**Event #5**

Wind Erosion Event #5 Occurs on	1/16/2009	hour 22
Average Hourly Wind Speed for Event #5	16.22	m/s
Fastest-Mile Wind Speed, $u_{10+}$ (hourly wind speed $\times 1.24$ )	20.11	m/s
Friction Velocity, $u^* = 0.053 \times u_{10+}$	1.07	m/s
Erosion Potential, $P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$ ; $P = 0$ for $u^* \leq u_t^*$	1.3	$\text{g/m}^2$
	11.3	lb/acre
Time Elapsed Since Event #4	1	hr
New Surface Area Created Since Event #4	0.31	acre
Event #5 Tailings Wind Erosion PM Emissions	3.47	lb

**Event #6**

Wind Erosion Event #6 Occurs on	1/16/2009	hour 24
Average Hourly Wind Speed for Event #6	17.52	m/s
Fastest-Mile Wind Speed, $u_{10+}$ (hourly wind speed $\times 1.24$ )	21.72	m/s
Friction Velocity, $u^* = 0.053 \times u_{10+}$	1.15	m/s
Erosion Potential, $P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$ ; $P = 0$ for $u^* \leq u_t^*$	4.3	$\text{g/m}^2$
	38.2	lb/acre
Time Elapsed Since Event #5	2	hr
New Surface Area Created Since Event #5	0.61	acre
Event #6 Tailings Wind Erosion PM Emissions	23.41	lb

**Event #7**

Wind Erosion Event #7 Occurs on	1/17/2009	hour 1
Average Hourly Wind Speed for Event #7	19.58	m/s
Fastest-Mile Wind Speed, $u_{10+}$ (hourly wind speed $\times 1.24$ )	24.28	m/s
Friction Velocity, $u^* = 0.053 \times u_{10}^+$	1.29	m/s
Erosion Potential, $P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$ ; $P = 0$ for $u^* \leq u_t^*$	10.8	$\text{g/m}^2$
	96.3	lb/acre
Time Elapsed Since Event #6	1	hr
New Surface Area Created Since Event #6	0.31	acre
Event #7 Tailings Wind Erosion PM Emissions	29.48	lb

**Event #8**

Wind Erosion Event #8 Occurs on	1/17/2009	hour 2
Average Hourly Wind Speed for Event #8	19.24	m/s
Fastest-Mile Wind Speed, $u_{10+}$ (hourly wind speed $\times 1.24$ )	23.86	m/s
Friction Velocity, $u^* = 0.053 \times u_{10}^+$	1.26	m/s
Erosion Potential, $P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$ ; $P = 0$ for $u^* \leq u_t^*$	9.6	$\text{g/m}^2$
	85.4	lb/acre
Time Elapsed Since Event #7	1	hr
New Surface Area Created Since Event #7	0.31	acre
Event #8 Tailings Wind Erosion PM Emissions	26.15	lb

**Event #9**

Wind Erosion Event #9 Occurs on	1/17/2009	hour 3
Average Hourly Wind Speed for Event #9	18.51	m/s
Fastest-Mile Wind Speed, $u_{10+}$ (hourly wind speed $\times 1.24$ )	22.95	m/s
Friction Velocity, $u^* = 0.053 \times u_{10}^+$	1.22	m/s
Erosion Potential, $P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$ ; $P = 0$ for $u^* \leq u_t^*$	7.2	$\text{g/m}^2$
	63.8	lb/acre
Time Elapsed Since Event #8	1	hr
New Surface Area Created Since Event #8	0.31	acre
Event #9 Tailings Wind Erosion PM Emissions	19.52	lb

**Event #10**

Wind Erosion Event #10 Occurs on	1/17/2009	hour 4
Average Hourly Wind Speed for Event #10	17.56	m/s
Fastest-Mile Wind Speed, $u_{10+}$ (hourly wind speed $\times 1.24$ )	21.77	m/s
Friction Velocity, $u^* = 0.053 \times u_{10}^+$	1.15	m/s
Erosion Potential, $P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$ ; $P = 0$ for $u^* \leq u_t^*$	4.4	$\text{g/m}^2$
	39.2	lb/acre
Time Elapsed Since Event #9	1	hr
New Surface Area Created Since Event #9	0.31	acre
Event #10 Tailings Wind Erosion PM Emissions	11.99	lb

**Event #11**

Wind Erosion Event #11 Occurs on	2/13/2009	hour 6
Average Hourly Wind Speed for Event #11	15.98	m/s
Fastest-Mile Wind Speed, $u_{10+}$ (hourly wind speed $\times 1.24$ )	19.82	m/s
Friction Velocity, $u^* = 0.053 \times u_{10}^+$	1.05	m/s
Erosion Potential, $P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$ ; $P = 0$ for $u^* \leq u_t^*$	0.8	$\text{g/m}^2$
	7.2	lb/acre
Time Elapsed Since Event #10	650	hr
New Surface Area Created Since Event #10	198.89	acre
Event #11 Tailings Wind Erosion PM Emissions	1,433.85	lb

**Event #12**

Wind Erosion Event #12 Occurs on	2/13/2009	hour 7
Average Hourly Wind Speed for Event #12	18.64	m/s
Fastest-Mile Wind Speed, $u_{10+}$ (hourly wind speed $\times 1.24$ )	23.11	m/s
Friction Velocity, $u^* = 0.053 \times u_{10}^+$	1.23	m/s
Erosion Potential, $P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$ ; $P = 0$ for $u^* \leq u_t^*$	7.6	$\text{g/m}^2$
	67.5	lb/acre
Time Elapsed Since Event #11	1	hr
New Surface Area Created Since Event #11	0.31	acre
Event #12 Tailings Wind Erosion PM Emissions	20.65	lb

**Event #13**

Wind Erosion Event #13 Occurs on	2/13/2009	hour 8
Average Hourly Wind Speed for Event #13	17.39	m/s
Fastest-Mile Wind Speed, $u_{10+}$ (hourly wind speed $\times 1.24$ )	21.56	m/s
Friction Velocity, $u^* = 0.053 \times u_{10+}^*$	1.14	m/s
Erosion Potential, $P = 58(u^* - u_{t*})^2 + 25(u^* - u_{t*})$ ; $P = 0$ for $u^* \leq u_{t*}$	3.9	g/m <sup>2</sup>
	35.2	lb/acre
Time Elapsed Since Event #12	1	hr
New Surface Area Created Since Event #12	0.31	acre
Event #13 Tailings Wind Erosion PM Emissions	10.78	lb

**Event #14**

Wind Erosion Event #14 Occurs on	2/13/2009	hour 9
Average Hourly Wind Speed for Event #14	16.49	m/s
Fastest-Mile Wind Speed, $u_{10+}$ (hourly wind speed $\times 1.24$ )	20.45	m/s
Friction Velocity, $u^* = 0.053 \times u_{10+}^*$	1.08	m/s
Erosion Potential, $P = 58(u^* - u_{t*})^2 + 25(u^* - u_{t*})$ ; $P = 0$ for $u^* \leq u_{t*}$	1.8	g/m <sup>2</sup>
	16.3	lb/acre
Time Elapsed Since Event #13	1	hr
New Surface Area Created Since Event #13	0.31	acre
Event #14 Tailings Wind Erosion PM Emissions	4.99	lb

**Event #15**

Wind Erosion Event #15 Occurs on	2/13/2009	hour 10
Average Hourly Wind Speed for Event #15	16.67	m/s
Fastest-Mile Wind Speed, $u_{10+}$ (hourly wind speed $\times 1.24$ )	20.67	m/s
Friction Velocity, $u^* = 0.053 \times u_{10+}^*$	1.10	m/s
Erosion Potential, $P = 58(u^* - u_{t*})^2 + 25(u^* - u_{t*})$ ; $P = 0$ for $u^* \leq u_{t*}$	2.2	g/m <sup>2</sup>
	19.8	lb/acre
Time Elapsed Since Event #14	1	hr
New Surface Area Created Since Event #14	0.31	acre
Event #15 Tailings Wind Erosion PM Emissions	6.06	lb

Total Number of Events in Year

15

Total PM Emissions from Events #1 to #15 for Tailings

8,491 lb

4.2 ton

Total PM<sub>10</sub> Emissions from Events #1 to #15 for Tailings

2.1 ton

PM/PM<sub>10</sub> Scaling Factor

0.5 AP-42, Page 13.2.5-3, 11/06

Total PM<sub>2.5</sub> Emissions from Events #1 to #15 for Tailings

0.3 ton

PM/PM<sub>2.5</sub> Scaling Factor

0.075 AP-42, Page 13.2.5-3, 11/06

## Road Surface Wind Erosion

LOM Year - Meteorological Year: 07/01/2008 - 06/30/2009

Unlike Stockpiles or Tailings Areas, Road Surfaces are Assumed to be Disturbed Continuously.

For road surfaces, an annual erosion potential is calculated as sum of flat surface erosion potentials per year.

(Sum of erosion potentials from Events #1 to #15 calculated for dry tailings beach.)

Flat Area Erosion Potential 713.9 lb/acre

Control Efficiency 90%

Haul/Access Road Segment	Length (m)	Width (m)	Surface Area (m <sup>2</sup> )	Surface Area (acre)	Controlled PM (ton)	Controlled PM <sub>10</sub> (ton)	Controlled PM <sub>2.5</sub> (ton)
Haul Road - Inside Pit	18,206	29	527,974	130.5	4.7	2.3	0.3
Haul Road - Outside Pit	11,749	29	340,728	84.2	3.0	1.5	0.2
Access Road - Camp to Mine Site (EU ID: 158)	6,743	9	60,684	15.0	0.5	0.3	0.0
Access Road - Airport to Camp (EU ID: 159)	10,093	9	90,841	22.4	0.8	0.4	0.1
Access Road - Jungjuk Port to Mine Site	47,442	9	426,977	105.5	3.8	1.9	0.3



# TANKS 4.0.9d

## Emissions Report - Summary Format

### Tank Identification and Physical Characteristics

#### Identification

User Identification: Tank Farm Tanks-VOCs  
City:  
State:  
Company:  
Type of Tank: Vertical Fixed Roof Tank  
Description:

#### Tank Dimensions

Shell Height (ft): 25.59  
Diameter (ft): 140.09  
Liquid Height (ft) : 21.80  
Avg. Liquid Height (ft): 12.79  
Volume (gallons): 2,500,000.00  
Turnovers: 3.00  
Net Throughput(gal/yr): 7,500,000.00  
Is Tank Heated (y/n): N

#### Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good  
Roof Color/Shade: White/White  
Roof Condition: Good

#### Roof Characteristics

Type: Cone  
Height (ft) 0.00  
Slope (ft/ft) (Cone Roof) 0.00

#### Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig) 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Liquid Contents of Storage Tank

#### Tank Farm Tanks-VOCs - Vertical Fixed Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Individual Tank Emission Totals

#### Emissions Report for: Annual

#### Tank Farm Tanks-VOCs - Vertical Fixed Roof Tank

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	71.96	131.01	202.97

TANKS 4.0.9d

Emissions Report - Summary Format

Tank Identification and Physical Characteristics

Identification

User Identification: Tank Farm Tanks-HAPs

City:

State:

Company:

Type of Tank: Vertical Fixed Roof Tank

Description:

Tank Dimensions

Shell Height (ft): 25.59

Diameter (ft): 140.09

Liquid Height (ft) : 21.80

Avg. Liquid Height (ft): 12.79

Volume (gallons): 2,500,000.00

Turnovers: 3.00

Net Throughput(gal/yr): 7,500,000.00

Is Tank Heated (y/n): N

Paint Characteristics

Shell Color/Shade: White/White

Shell Condition: Good

Roof Color/Shade: White/White

Roof Condition: Good

Roof Characteristics

Type: Cone

Height (ft) 0.00

Slope (ft/ft) (Cone Roof) 0.00

Breather Vent Settings

Vacuum Settings (psig): -0.03

Pressure Settings (psig) 0.03

Meterological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

TANKS 4.0.9d

Emissions Report - Summary Format

Liquid Contents of Storage Tank

Tank Farm Tanks-HAPs - Vertical Fixed Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0001	0.0001	0.0001	86.3820			1.02	Option 1: VP40 = .0031
Benzene						0.4771	0.4271	0.5318	78.1100	0.0000	0.0005	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0352	0.0306	0.0403	106.1700	0.0001	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						0.8269	0.7456	0.9155	86.1700	0.0100	0.9836	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0006	0.0005	0.0007	128.2000	0.0055	0.0004	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Non-HAPs						0.0000	0.0000	0.0000	1.0000	0.9809	0.0000	1.00	Option 1: VP40 = .000000001
Styrene						0.0232	0.0202	0.0266	104.1500	0.0003	0.0008	104.15	Option 2: A=7.14, B=1574.51, C=224.09
Toluene						0.1208	0.1066	0.1365	92.1300	0.0003	0.0043	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Xylenes (mixed isomers)						0.0290	0.0252	0.0333	106.1700	0.0029	0.0100	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d  
Emissions Report - Summary Format  
Individual Tank Emission Totals

Emissions Report for: Annual

Tank Farm Tanks-HAPs - Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	1.53	2.79	4.32
Benzene	0.00	0.00	0.00
Ethylbenzene	0.00	0.00	0.00
Hexane (-n)	1.51	2.75	4.25
Naphthalene	0.00	0.00	0.00
Non-HAPs	0.00	0.00	0.00
Styrene	0.00	0.00	0.00
Toluene	0.01	0.01	0.02
Xylenes (mixed isomers)	0.02	0.03	0.04

TANKS 4.0.9d  
Emissions Report - Summary Format  
Tank Identification and Physical Characteristics

Identification

User Identification: Fuel Station Tanks- VOCs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

Tank Dimensions

Shell Length (ft): 42.75  
Diameter (ft): 10.00  
Volume (gallons): 25,000.00  
Turnovers: 761.40  
Net Throughput(gal/yr): 19,035,000.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

TANKS 4.0.9d  
Emissions Report - Summary Format  
Liquid Contents of Storage Tank

Fuel Station Tanks- VOCs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031

TANKS 4.0.9d  
Emissions Report - Summary Format  
Individual Tank Emission Totals

Emissions Report for: Annual

Fuel Station Tanks- VOCs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	37.64	1.42	39.06

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Tank Identification and Physical Characteristics

#### Identification

User Identification: Fuel Station Tanks-HAPs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

#### Tank Dimensions

Shell Length (ft): 42.75  
Diameter (ft): 10.00  
Volume (gallons): 25,000.00  
Turnovers: 761.40  
Net Throughput(gal/yr): 19,035,000.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

#### Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

#### Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Liquid Contents of Storage Tank

#### Fuel Station Tanks-HAPs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0001	0.0001	0.0001	86.3820			1.02	Option 1: VP40 = .0031
Benzene						0.4771	0.4271	0.5318	78.1100	0.0000	0.0005	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0352	0.0306	0.0403	106.1700	0.0001	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						0.8269	0.7456	0.9155	86.1700	0.0100	0.9836	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0006	0.0005	0.0007	128.2000	0.0055	0.0004	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Non-HAPs						0.0000	0.0000	0.0000	1.0000	0.9809	0.0000	1.00	Option 1: VP40 = .000000001
Styrene						0.0232	0.0202	0.0266	104.1500	0.0003	0.0008	104.15	Option 2: A=7.14, B=1574.51, C=224.09
Toluene						0.1208	0.1066	0.1365	92.1300	0.0003	0.0043	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Xylenes (mixed isomers)						0.0290	0.0252	0.0333	106.1700	0.0029	0.0100	106.17	Option 2: A=7.009, B=1462.266, C=215.11

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Individual Tank Emission Totals

#### Emissions Report for: Annual

#### Fuel Station Tanks-HAPs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.80	0.03	0.83
Benzene	0.00	0.00	0.00
Ethylbenzene	0.00	0.00	0.00
Hexane (-n)	0.79	0.03	0.82
Naphthalene	0.00	0.00	0.00
Non-HAPs	0.00	0.00	0.00
Styrene	0.00	0.00	0.00
Toluene	0.00	0.00	0.00
Xylenes (mixed isomers)	0.01	0.00	0.01

TANKS 4.0.9d  
Emissions Report - Summary Format  
Tank Identification and Physical Characteristics

Identification

User Identification: ANFO Mixing Plant Tank- VOCs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

Tank Dimensions

Shell Length (ft): 26.75  
Diameter (ft): 8.00  
Volume (gallons): 10,000.00  
Turnovers: 79.31  
Net Throughput(gal/yr): 793,103.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

TANKS 4.0.9d  
Emissions Report - Summary Format  
Liquid Contents of Storage Tank

ANFO Mixing Plant Tank- VOCs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031

TANKS 4.0.9d  
Emissions Report - Summary Format  
Individual Tank Emission Totals

Emissions Report for: Annual

ANFO Mixing Plant Tank- VOCs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	4.15	0.57	4.72

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Tank Identification and Physical Characteristics

#### Identification

User Identification: ANFO Mixing Plant Tank-HAPs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

#### Tank Dimensions

Shell Length (ft): 26.75  
Diameter (ft): 8.00  
Volume (gallons): 10,000.00  
Turnovers: 79.31  
Net Throughput(gal/yr): 793,103.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

#### Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

#### Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Liquid Contents of Storage Tank

#### ANFO Mixing Plant Tank-HAPs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0001	0.0001	0.0001	86.3820			1.02	Option 1: VP40 = .0031
Benzene						0.4771	0.4271	0.5318	78.1100	0.0000	0.0005	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0352	0.0306	0.0403	106.1700	0.0001	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						0.8269	0.7456	0.9155	86.1700	0.0100	0.9836	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0006	0.0005	0.0007	128.2000	0.0055	0.0004	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Non-HAPs						0.0000	0.0000	0.0000	1.0000	0.9809	0.0000	1.00	Option 1: VP40 = .000000001
Styrene						0.0232	0.0202	0.0266	104.1500	0.0003	0.0008	104.15	Option 2: A=7.14, B=1574.51, C=224.09
Toluene						0.1208	0.1066	0.1365	92.1300	0.0003	0.0043	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Xylenes (mixed isomers)						0.0290	0.0252	0.0333	106.1700	0.0029	0.0100	106.17	Option 2: A=7.009, B=1462.266, C=215.11

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Individual Tank Emission Totals

#### Emissions Report for: Annual

#### ANFO Mixing Plant Tank-HAPs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.09	0.01	0.10
Benzene	0.00	0.00	0.00
Ethylbenzene	0.00	0.00	0.00
Hexane (-n)	0.09	0.01	0.10
Naphthalene	0.00	0.00	0.00
Non-HAPs	0.00	0.00	0.00
Styrene	0.00	0.00	0.00
Toluene	0.00	0.00	0.00
Xylenes (mixed isomers)	0.00	0.00	0.00

TANKS 4.0.9d  
Emissions Report - Summary Format  
Tank Identification and Physical Characteristics

Identification

User Identification: Fire Pump Tanks- VOCs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

Tank Dimensions

Shell Length (ft): 6.00  
Diameter (ft): 3.17  
Volume (gallons): 270.00  
Turnovers: 25.10  
Net Throughput(gal/yr): 6,776.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

TANKS 4.0.9d  
Emissions Report - Summary Format  
Liquid Contents of Storage Tank

Fire Pump Tanks- VOCs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031

TANKS 4.0.9d  
Emissions Report - Summary Format  
Individual Tank Emission Totals

Emissions Report for: Annual

Fire Pump Tanks- VOCs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.07	0.02	0.09



# TANKS 4.0.9d

## Emissions Report - Summary Format

### Tank Identification and Physical Characteristics

#### Identification

User Identification: Fire Pump Tanks-HAPs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

#### Tank Dimensions

Shell Length (ft): 6.00  
Diameter (ft): 3.17  
Volume (gallons): 270.00  
Turnovers: 25.10  
Net Throughput(gal/yr): 6,776.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

#### Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

#### Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Liquid Contents of Storage Tank

#### Fire Pump Tanks-HAPs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0001	0.0001	0.0001	86.3820			1.02	Option 1: VP40 = .0031
Benzene						0.4771	0.4271	0.5318	78.1100	0.0000	0.0005	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0352	0.0306	0.0403	106.1700	0.0001	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						0.8269	0.7456	0.9155	86.1700	0.0100	0.9836	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0006	0.0005	0.0007	128.2000	0.0055	0.0004	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Non-HAPs						0.0000	0.0000	0.0000	1.0000	0.9809	0.0000	1.00	Option 1: VP40 = .000000001
Styrene						0.0232	0.0202	0.0266	104.1500	0.0003	0.0008	104.15	Option 2: A=7.14, B=1574.51, C=224.09
Toluene						0.1208	0.1066	0.1365	92.1300	0.0003	0.0043	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Xylenes (mixed isomers)						0.0290	0.0252	0.0333	106.1700	0.0029	0.0100	106.17	Option 2: A=7.009, B=1462.266, C=215.11

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Individual Tank Emission Totals

#### Emissions Report for: Annual

#### Fire Pump Tanks-HAPs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.00	0.00	0.00
Benzene	0.00	0.00	0.00
Ethylbenzene	0.00	0.00	0.00
Hexane (-n)	0.00	0.00	0.00
Naphthalene	0.00	0.00	0.00
Non-HAPs	0.00	0.00	0.00
Styrene	0.00	0.00	0.00
Toluene	0.00	0.00	0.00
Xylenes (mixed isomers)	0.00	0.00	0.00

TANKS 4.0.9d  
Emissions Report - Summary Format  
Tank Identification and Physical Characteristics

Identification

User Identification: POX Boilers Tank-VOCs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

Tank Dimensions

Shell Length (ft): 23.67  
Diameter (ft): 6.00  
Volume (gallons): 5,000.00  
Turnovers: 788.48  
Net Throughput(gal/yr): 3,942,411.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

TANKS 4.0.9d  
Emissions Report - Summary Format  
Liquid Contents of Storage Tank

POX Boilers Tank-VOCs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031

TANKS 4.0.9d  
Emissions Report - Summary Format  
Individual Tank Emission Totals

Emissions Report for: Annual

POX Boilers Tank-VOCs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	7.74	0.28	8.03

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Tank Identification and Physical Characteristics

#### Identification

User Identification: POX Boilers Tank-HAPs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

#### Tank Dimensions

Shell Length (ft): 23.67  
Diameter (ft): 6.00  
Volume (gallons): 5,000.00  
Turnovers: 788.48  
Net Throughput(gal/yr): 3,942,411.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

#### Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

#### Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meterological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Liquid Contents of Storage Tank

#### POX Boilers Tank-HAPs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0001	0.0001	0.0001	86.3864			1.02	Option 1: VP40 = .0031
Benzene						0.4771	0.4271	0.5318	78.1100	0.0000	0.0005	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0352	0.0306	0.0403	106.1700	0.0001	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						0.8269	0.7456	0.9155	86.1700	0.0100	0.9831	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0006	0.0005	0.0007	128.2000	0.0055	0.0004	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Non-HAPs						0.0000	0.0000	0.0000	1.0000	0.9808	0.0000	1.00	Option 1: VP40 = .000000001
Styrene						0.0232	0.0202	0.0266	104.1500	0.0003	0.0009	104.15	Option 2: A=7.14, B=1574.51, C=224.09
Toluene						0.1208	0.1066	0.1365	92.1300	0.0003	0.0046	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Xylenes (mixed isomers)						0.0290	0.0252	0.0333	106.1700	0.0029	0.0100	106.17	Option 2: A=7.009, B=1462.266, C=215.11

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Individual Tank Emission Totals

#### Emissions Report for: Annual

#### POX Boilers Tank-HAPs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.16	0.01	0.17
Benzene	0.00	0.00	0.00
Ethylbenzene	0.00	0.00	0.00
Hexane (-n)	0.16	0.01	0.17
Naphthalene	0.00	0.00	0.00
Styrene	0.00	0.00	0.00
Toluene	0.00	0.00	0.00
Xylenes (mixed isomers)	0.00	0.00	0.00
Non-HAPs	0.00	0.00	0.00

TANKS 4.0.9d  
Emissions Report - Summary Format  
Tank Identification and Physical Characteristics

Identification

User Identification: Oxygen Plant Boiler Tank-VOCs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

Tank Dimensions

Shell Length (ft): 23.67  
Diameter (ft): 6.00  
Volume (gallons): 5,000.00  
Turnovers: 278.12  
Net Throughput(gal/yr): 1,390,621.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

TANKS 4.0.9d  
Emissions Report - Summary Format  
Liquid Contents of Storage Tank

Oxygen Plant Boiler Tank-VOCs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031

TANKS 4.0.9d  
Emissions Report - Summary Format  
Individual Tank Emission Totals

Emissions Report for: Annual

Oxygen Plant Boiler Tank-VOCs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	3.66	0.28	3.95

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Tank Identification and Physical Characteristics

#### Identification

User Identification: Oxygen Plant Boiler Tank-HAPs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

#### Tank Dimensions

Shell Length (ft): 23.67  
Diameter (ft): 6.00  
Volume (gallons): 5,000.00  
Turnovers: 278.12  
Net Throughput(gal/yr): 1,390,621.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

#### Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

#### Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Liquid Contents of Storage Tank

#### Oxygen Plant Boiler Tank-HAPs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0001	0.0001	0.0001	86.3864			1.02	Option 1: VP40 = .0031
Benzene						0.4771	0.4271	0.5318	78.1100	0.0000	0.0005	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0352	0.0306	0.0403	106.1700	0.0001	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						0.8269	0.7456	0.9155	86.1700	0.0100	0.9831	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0006	0.0005	0.0007	128.2000	0.0055	0.0004	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Non-HAPs						0.0000	0.0000	0.0000	1.0000	0.9808	0.0000	1.00	Option 1: VP40 = .000000001
Styrene						0.0232	0.0202	0.0266	104.1500	0.0003	0.0009	104.15	Option 2: A=7.14, B=1574.51, C=224.09
Toluene						0.1208	0.1066	0.1365	92.1300	0.0003	0.0046	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Xylenes (mixed isomers)						0.0290	0.0252	0.0333	106.1700	0.0029	0.0100	106.17	Option 2: A=7.009, B=1462.266, C=215.11

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Individual Tank Emission Totals

#### Emissions Report for: Annual

#### Oxygen Plant Boiler Tank-HAPs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.08	0.01	0.08
Benzene	0.00	0.00	0.00
Ethylbenzene	0.00	0.00	0.00
Hexane (-n)	0.08	0.01	0.08
Naphthalene	0.00	0.00	0.00
Styrene	0.00	0.00	0.00
Toluene	0.00	0.00	0.00
Xylenes (mixed isomers)	0.00	0.00	0.00
Non-HAPs	0.00	0.00	0.00

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Tank Identification and Physical Characteristics

#### Identification

User Identification: Carbon Elution Heater Tank-VOCs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

#### Tank Dimensions

Shell Length (ft): 23.67  
Diameter (ft): 6.00  
Volume (gallons): 5,000.00  
Turnovers: 174.98  
Net Throughput(gal/yr): 874,876.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

#### Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

#### Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Liquid Contents of Storage Tank

#### Carbon Elution Heater Tank-VOCs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Individual Tank Emission Totals

#### Emissions Report for: Annual

#### Carbon Elution Heater Tank-VOCs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	2.84	0.28	3.12

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Tank Identification and Physical Characteristics

#### Identification

User Identification: Carbon Elution Heater Tank-HAPs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

#### Tank Dimensions

Shell Length (ft): 23.67  
Diameter (ft): 6.00  
Volume (gallons): 5,000.00  
Turnovers: 174.98  
Net Throughput(gal/yr): 874,876.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

#### Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

#### Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Liquid Contents of Storage Tank

#### Carbon Elution Heater Tank-HAPs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0001	0.0001	0.0001	86.3864			1.02	Option 1: VP40 = .0031
Benzene						0.4771	0.4271	0.5318	78.1100	0.0000	0.0005	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0352	0.0306	0.0403	106.1700	0.0001	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						0.8269	0.7456	0.9155	86.1700	0.0100	0.9831	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0006	0.0005	0.0007	128.2000	0.0055	0.0004	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Non-HAPs						0.0000	0.0000	0.0000	1.0000	0.9808	0.0000	1.00	Option 1: VP40 = .000000001
Styrene						0.0232	0.0202	0.0266	104.1500	0.0003	0.0009	104.15	Option 2: A=7.14, B=1574.51, C=224.09
Toluene						0.1208	0.1066	0.1365	92.1300	0.0003	0.0046	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Xylenes (mixed isomers)						0.0290	0.0252	0.0333	106.1700	0.0029	0.0100	106.17	Option 2: A=7.009, B=1462.266, C=215.11

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Individual Tank Emission Totals

#### Emissions Report for: Annual

#### Carbon Elution Heater Tank-HAPs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.06	0.01	0.07
Benzene	0.00	0.00	0.00
Ethylbenzene	0.00	0.00	0.00
Hexane (-n)	0.06	0.01	0.07
Naphthalene	0.00	0.00	0.00
Styrene	0.00	0.00	0.00
Toluene	0.00	0.00	0.00
Xylenes (mixed isomers)	0.00	0.00	0.00
Non-HAPs	0.00	0.00	0.00

TANKS 4.0.9d  
Emissions Report - Summary Format  
Tank Identification and Physical Characteristics

Identification

User Identification: Auxiliary SO2 Burner Tank-VOCs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

Tank Dimensions

Shell Length (ft): 6.00  
Diameter (ft): 4.00  
Volume (gallons): 500.00  
Turnovers: 269.19  
Net Throughput(gal/yr): 134,596.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

TANKS 4.0.9d  
Emissions Report - Summary Format  
Liquid Contents of Storage Tank

Auxiliary SO2 Burner Tank-VOCs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031

TANKS 4.0.9d  
Emissions Report - Summary Format  
Individual Tank Emission Totals

Emissions Report for: Annual

Auxiliary SO2 Burner Tank-VOCs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.36	0.03	0.39



# TANKS 4.0.9d

## Emissions Report - Summary Format

### Tank Identification and Physical Characteristics

#### Identification

User Identification: Auxiliary SO2 Burner Tank-HAPs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

#### Tank Dimensions

Shell Length (ft): 6.00  
Diameter (ft): 4.00  
Volume (gallons): 500.00  
Turnovers: 269.19  
Net Throughput(gal/yr): 134,596.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

#### Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

#### Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Liquid Contents of Storage Tank

#### Auxiliary SO2 Burner Tank-HAPs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0001	0.0001	0.0001	86.3864			1.02	Option 1: VP40 = .0031
Benzene						0.4771	0.4271	0.5318	78.1100	0.0000	0.0005	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0352	0.0306	0.0403	106.1700	0.0001	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						0.8269	0.7456	0.9155	86.1700	0.0100	0.9831	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0006	0.0005	0.0007	128.2000	0.0055	0.0004	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Non-HAPs						0.0000	0.0000	0.0000	1.0000	0.9808	0.0000	1.00	Option 1: VP40 = .000000001
Styrene						0.0232	0.0202	0.0266	104.1500	0.0003	0.0009	104.15	Option 2: A=7.14, B=1574.51, C=224.09
Toluene						0.1208	0.1066	0.1365	92.1300	0.0003	0.0046	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Xylenes (mixed isomers)						0.0290	0.0252	0.0333	106.1700	0.0029	0.0100	106.17	Option 2: A=7.009, B=1462.266, C=215.11

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Individual Tank Emission Totals

#### Emissions Report for: Annual

#### Auxiliary SO2 Burner Tank-HAPs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.01	0.00	0.01
Benzene	0.00	0.00	0.00
Ethylbenzene	0.00	0.00	0.00
Hexane (-n)	0.01	0.00	0.01
Naphthalene	0.00	0.00	0.00
Styrene	0.00	0.00	0.00
Toluene	0.00	0.00	0.00
Xylenes (mixed isomers)	0.00	0.00	0.00
Non-HAPs	0.00	0.00	0.00

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Tank Identification and Physical Characteristics

#### Identification

User Identification: Power Plant Tanks- VOCs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

#### Tank Dimensions

Shell Length (ft): 47.33  
Diameter (ft): 12.00  
Volume (gallons): 33,000.00  
Turnovers: 109.03  
Net Throughput(gal/yr): 3,597,855.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

#### Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

#### Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Liquid Contents of Storage Tank

#### Power Plant Tanks- VOCs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Individual Tank Emission Totals

#### Emissions Report for: Annual

#### Power Plant Tanks- VOCs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	15.25	2.27	17.52

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Tank Identification and Physical Characteristics

#### Identification

User Identification: Power Plant Tanks-HAPs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

#### Tank Dimensions

Shell Length (ft): 47.33  
Diameter (ft): 12.00  
Volume (gallons): 33,000.00  
Turnovers: 109.03  
Net Throughput(gal/yr): 3,597,855.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

#### Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

#### Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Liquid Contents of Storage Tank

#### Power Plant Tanks-HAPs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0001	0.0001	0.0001	86.3864			1.02	Option 1: VP40 = .0031
Benzene						0.4771	0.4271	0.5318	78.1100	0.0000	0.0005	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0352	0.0306	0.0403	106.1700	0.0001	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						0.8269	0.7456	0.9155	86.1700	0.0100	0.9831	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0006	0.0005	0.0007	128.2000	0.0055	0.0004	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Non-HAPs						0.0000	0.0000	0.0000	1.0000	0.9808	0.0000	1.00	Option 1: VP40 = .000000001
Styrene						0.0232	0.0202	0.0266	104.1500	0.0003	0.0009	104.15	Option 2: A=7.14, B=1574.51, C=224.09
Toluene						0.1208	0.1066	0.1365	92.1300	0.0003	0.0046	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Xylenes (mixed isomers)						0.0290	0.0252	0.0333	106.1700	0.0029	0.0100	106.17	Option 2: A=7.009, B=1462.266, C=215.11

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Individual Tank Emission Totals

#### Emissions Report for: Annual

#### Power Plant Tanks-HAPs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.32	0.05	0.37
Benzene	0.00	0.00	0.00
Ethylbenzene	0.00	0.00	0.00
Hexane (-n)	0.32	0.05	0.37
Naphthalene	0.00	0.00	0.00
Styrene	0.00	0.00	0.00
Toluene	0.00	0.00	0.00
Xylenes (mixed isomers)	0.00	0.00	0.00
Non-HAPs	0.00	0.00	0.00

TANKS 4.0.9d  
Emissions Report - Summary Format  
Tank Identification and Physical Characteristics

Identification

User Identification: Camp Emergency Generators Tank- VOCs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

Tank Dimensions

Shell Length (ft): 42.75  
Diameter (ft): 10.00  
Volume (gallons): 25,000.00  
Turnovers: 8.75  
Net Throughput(gal/yr): 218,800.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

TANKS 4.0.9d  
Emissions Report - Summary Format  
Liquid Contents of Storage Tank

Camp Emergency Generators Tank- VOCs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031

TANKS 4.0.9d  
Emissions Report - Summary Format  
Individual Tank Emission Totals

Emissions Report for: Annual

Camp Emergency Generators Tank- VOCs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	2.10	1.42	3.52

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Tank Identification and Physical Characteristics

#### Identification

User Identification: Camp Emergency Generator Tank-HAPs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

#### Tank Dimensions

Shell Length (ft): 42.75  
Diameter (ft): 10.00  
Volume (gallons): 25,000.00  
Turnovers: 8.75  
Net Throughput(gal/yr): 218,800.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

#### Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

#### Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meterological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Liquid Contents of Storage Tank

#### Camp Emergency Generator Tank-HAPs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0001	0.0001	0.0001	86.3864			1.02	Option 1: VP40 = .0031
Benzene						0.4771	0.4271	0.5318	78.1100	0.0000	0.0005	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0352	0.0306	0.0403	106.1700	0.0001	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						0.8269	0.7456	0.9155	86.1700	0.0100	0.9831	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0006	0.0005	0.0007	128.2000	0.0055	0.0004	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Non-HAPs						0.0000	0.0000	0.0000	1.0000	0.9808	0.0000	1.00	Option 1: VP40 = .000000001
Styrene						0.0232	0.0202	0.0266	104.1500	0.0003	0.0009	104.15	Option 2: A=7.14, B=1574.51, C=224.09
Toluene						0.1208	0.1066	0.1365	92.1300	0.0003	0.0046	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Xylenes (mixed isomers)						0.0290	0.0252	0.0333	106.1700	0.0029	0.0100	106.17	Option 2: A=7.009, B=1462.266, C=215.11

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Individual Tank Emission Totals

#### Emissions Report for: Annual

#### Camp Emergency Generator Tank-HAPs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.04	0.03	0.07
Benzene	0.00	0.00	0.00
Ethylbenzene	0.00	0.00	0.00
Hexane (-n)	0.04	0.03	0.07
Naphthalene	0.00	0.00	0.00
Styrene	0.00	0.00	0.00
Toluene	0.00	0.00	0.00
Xylenes (mixed isomers)	0.00	0.00	0.00
Non-HAPs	0.00	0.00	0.00

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Tank Identification and Physical Characteristics

#### Identification

User Identification: Airport Jet Fuel Tanks- VOCs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

#### Tank Dimensions

Shell Length (ft): 26.75  
Diameter (ft): 8.00  
Volume (gallons): 9,900.00  
Turnovers: 6.00  
Net Throughput(gal/yr): 55,000.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

#### Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

#### Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Liquid Contents of Storage Tank

#### Airport Jet Fuel Tanks- VOCs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Jet naphtha (JP-4)	All	30.00	26.58	33.41	28.98	0.8000	0.8000	0.8000	80.0000			120.00	Option 1: VP40 = .8

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Individual Tank Emission Totals

#### Emissions Report for: Annual

#### Airport Jet Fuel Tanks- VOCs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Jet naphtha (JP-4)	83.81	76.60	160.41

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Tank Identification and Physical Characteristics

#### Identification

User Identification: Airport Jet Fuel Tanks- HAPs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

#### Tank Dimensions

Shell Length (ft): 26.75  
Diameter (ft): 8.00  
Volume (gallons): 9,900.00  
Turnovers: 6.00  
Net Throughput(gal/yr): 55,000.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

#### Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

#### Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Liquid Contents of Storage Tank

#### Airport Jet Fuel Tanks- HAPs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Jet Fuel	All	30.00	26.58	33.41	28.98	0.0008	0.0007	0.0008	86.1184			1.16	
Benzene						0.4771	0.4271	0.5318	78.1100	0.0100	0.0851	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0352	0.0306	0.0403	106.1700	0.0050	0.0031	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						0.8269	0.7456	0.9155	86.1700	0.0560	0.8262	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0006	0.0005	0.0007	128.2000	0.0047	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Non-HAPs						0.0000	0.0000	0.0000	1.0000	0.8603	0.0000	1.00	Option 1: VP40 = .000000001
Toluene						0.1208	0.1066	0.1365	92.1300	0.0320	0.0689	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Xylenes (mixed isomers)						0.0290	0.0252	0.0333	106.1700	0.0320	0.0166	106.17	Option 2: A=7.009, B=1462.266, C=215.11

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Individual Tank Emission Totals

#### Emissions Report for: Annual

#### Airport Jet Fuel Tanks- HAPs - Horizontal Tank

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Jet Fuel	0.09	0.09	0.18
Benzene	0.01	0.01	0.02
Ethylbenzene	0.00	0.00	0.00
Hexane (-n)	0.07	0.08	0.15
Naphthalene	0.00	0.00	0.00
Toluene	0.01	0.01	0.01
Xylenes (mixed isomers)	0.00	0.00	0.00
Non-HAPs	0.00	0.00	0.00

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Tank Identification and Physical Characteristics

#### Identification

User Identification: Airport Aviation Gasoline Tank-VOCs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

#### Tank Dimensions

Shell Length (ft): 16.00  
Diameter (ft): 8.00  
Volume (gallons): 5,000.00  
Turnovers: 2.00  
Net Throughput(gal/yr): 10,000.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

#### Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

#### Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Liquid Contents of Storage Tank

#### Airport Aviation Gasoline Tank-VOCs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Gasoline (RVP 7)	All	30.00	26.58	33.41	28.98	1.8217	1.6835	1.9691	68.0000			92.00	Option 4: RVP=7, ASTM Slope=3

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Individual Tank Emission Totals

#### Emissions Report for: Annual

#### Airport Aviation Gasoline Tank-VOCs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 7)	29.49	145.10	174.59



# TANKS 4.0.9d

## Emissions Report - Summary Format

### Tank Identification and Physical Characteristics

#### Identification

User Identification: Airport Aviation Gasoline Tank-HAPs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

#### Tank Dimensions

Shell Length (ft): 16.00  
Diameter (ft): 8.00  
Volume (gallons): 5,000.00  
Turnovers: 2.00  
Net Throughput(gal/yr): 10,000.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

#### Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

#### Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Liquid Contents of Storage Tank

#### Airport Aviation Gasoline Tank-HAPs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Gasoline (RVP 7)	All	30.00	26.58	33.41	28.98	0.0069	0.0068	0.0071	87.7859			1.66	Option 4: RVP=7, ASTM Slope=3
Benzene						0.4771	0.4271	0.5318	78.1100	0.0161	0.0210	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0352	0.0306	0.0403	106.1700	0.0161	0.0015	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						0.8269	0.7456	0.9155	86.1700	0.0714	0.1613	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Methyl-tert-butyl ether (MTBE)						1.9200	1.9200	1.9200	88.1500	0.1500	0.7867	88.15	Option 1: VP40 = 1.92
Naphthalene						0.0006	0.0005	0.0007	128.2000	0.0044	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Non-HAPs						0.0000	0.0000	0.0000	1.0000	0.5982	0.0000	1.00	Option 1: VP40 = .000000001
Toluene						0.1208	0.1066	0.1365	92.1300	0.0721	0.0238	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Xylenes (mixed isomers)						0.0290	0.0252	0.0333	106.1700	0.0717	0.0057	106.17	Option 2: A=7.009, B=1462.266, C=215.11

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Individual Tank Emission Totals

#### Emissions Report for: Annual

#### Airport Aviation Gasoline Tank-HAPs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 7)	0.14	0.51	0.66
Benzene	0.00	0.01	0.01
Ethylbenzene	0.00	0.00	0.00
Hexane (-n)	0.02	0.08	0.11
Methyl-tert-butyl ether (MTBE)	0.11	0.40	0.52
Naphthalene	0.00	0.00	0.00
Non-HAPs	0.00	0.00	0.00
Toluene	0.00	0.01	0.02
Xylenes (mixed isomers)	0.00	0.00	0.00

TANKS 4.0.9d  
Emissions Report - Summary Format  
Tank Identification and Physical Characteristics

Identification

User Identification: Airport Generators Tank-VOCs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

Tank Dimensions

Shell Length (ft): 26.75  
Diameter (ft): 8.00  
Volume (gallons): 9,900.00  
Turnovers: 25.52  
Net Throughput(gal/yr): 252,695.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

TANKS 4.0.9d  
Emissions Report - Summary Format  
Liquid Contents of Storage Tank

Airport Generators Tank-VOCs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031

TANKS 4.0.9d  
Emissions Report - Summary Format  
Individual Tank Emission Totals

Emissions Report for: Annual

Airport Generators Tank-VOCs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	2.42	0.57	2.99

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Tank Identification and Physical Characteristics

#### Identification

User Identification: Airport Generators Tank-HAPs  
City:  
State:  
Company:  
Type of Tank: Horizontal Tank  
Description:

#### Tank Dimensions

Shell Length (ft): 26.75  
Diameter (ft): 8.00  
Volume (gallons): 9,900.00  
Turnovers: 25.52  
Net Throughput(gal/yr): 252,695.00  
Is Tank Heated (y/n): N  
Is Tank Underground (y/n): N

#### Paint Characteristics

Shell Color/Shade: White/White  
Shell Condition: Good

#### Breather Vent Settings

Vacuum Settings (psig): -0.03  
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Bethel, Alaska (Avg Atmospheric Pressure = 14.54 psia)

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Liquid Contents of Storage Tank

#### Airport Generators Tank-HAPs - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	30.00	26.58	33.41	28.98	0.0001	0.0001	0.0001	86.3864			1.02	Option 1: VP40 = .0031
Benzene						0.4771	0.4271	0.5318	78.1100	0.0000	0.0005	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0352	0.0306	0.0403	106.1700	0.0001	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						0.8269	0.7456	0.9155	86.1700	0.0100	0.9831	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0006	0.0005	0.0007	128.2000	0.0055	0.0004	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Non-HAPs						0.0000	0.0000	0.0000	1.0000	0.9808	0.0000	1.00	Option 1: VP40 = .000000001
Styrene						0.0232	0.0202	0.0266	104.1500	0.0003	0.0009	104.15	Option 2: A=7.14, B=1574.51, C=224.09
Toluene						0.1208	0.1066	0.1365	92.1300	0.0003	0.0046	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Xylenes (mixed isomers)						0.0290	0.0252	0.0333	106.1700	0.0029	0.0100	106.17	Option 2: A=7.009, B=1462.266, C=215.11

# TANKS 4.0.9d

## Emissions Report - Summary Format

### Individual Tank Emission Totals

#### Emissions Report for: Annual

#### Airport Generators Tank-HAPs - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.05	0.01	0.06
Benzene	0.00	0.00	0.00
Ethylbenzene	0.00	0.00	0.00
Hexane (-n)	0.05	0.01	0.06
Naphthalene	0.00	0.00	0.00
Styrene	0.00	0.00	0.00
Toluene	0.00	0.00	0.00
Xylenes (mixed isomers)	0.00	0.00	0.00
Non-HAPs	0.00	0.00	0.00

AIR SCIENCES INC.		Project Title		By	
		Donlin Gold		K. Lewis	
		Project No		Page of Sheet	
AIR EMISSION CALCULATIONS		281-21B-1		19Hg EI	
		Subject:		Date:	
		Mercury Emissions		October 11, 2021	
Summary of Hg Emission					
		Hg Emissions			
Type	Source	kg/yr	lb/yr		
Fugitive Evaporative Mercury Emissions (Peak LOM Year)					
	Stockpiles	0.14	0.30		
	Rock Dumps	0.95	2.10		
	Pits	0.65	1.42		
	Tailings - dry beach	0.43	0.96		
	Tailings - wet beach	5.53	12.18		
	Tailings - pond	1.52	3.34		
	Subtotal	9.21	20.30	9.209	9.209chk
Mining Fugitive Dust Mercury Emissions (Peak LOM Year)					
	Pit	1.40	3.08		
	Stockpiles	0.18	0.40		
	WRF	0.98	2.15		
	TSF	0.002	0.00		
	Area (Process Area)	0.21	0.47		
	Subtotal	2.77	6.11	2.771	2.771chk
Ore Processing and Analysis Dust Mercury Emissions					
	ROM Ore Discharge and Crushing	0.04	0.08		
	Coarse Ore Transfer	0.02	0.05		
	Pebble Crushers and Recycle	0.02	0.05		
	Laboratories	0.01	0.02		
	Subtotal	0.09	0.20	0.089	0.089chk
Ore Thermal Processing Mercury Emissions					
	Autoclave 101	0.29	0.64		
	Autoclave 201	0.29	0.64		
	Carbon Regeneration Kiln	3.97	8.75		
	EW Cells	7.03	15.50		
	Retort	0.68	1.50		
	Induction Melting Furnace	3.69	8.14		
	Subtotal	15.95	35.16	15.946	15.946chk
Fuel Combustion and Incineration Mercury Emissions					
	Boilers/Heaters	1.90	4.18		
	Incinerators	0.08	0.17		
	Subtotal	1.97	4.35	1.975	1.975chk
Total		29.99	66.12		
Conversions					
2.20462 lb/kg					

AIR SCIENCES INC.	Project Title		By	
	Donlin Gold		K. Lewis	
	Project No		Page of Sheet	
AIR EMISSION CALCULATIONS	281-21B-1		29Hg EI	
	Subject:		Date:	
	Mercury Emissions		October 11, 2021	
Fugitive Evaporative Mercury Emissions				
Activity Information				
Tailings Storage Facility (TSF)				
LOM	Beach	Pond	Total	Stockpiles WRF Pit
Year	acre	acre	acre	acre acre acre
	(1)	(1)		(2) (3) (4)
1	111	192	303	204 318 22
2	190	252	442	204 318 75
3	270	311	581	204 842 145
4	349	371	720	204 1,171 215
5	428	430	858	204 1,253 270
6	501	448	949	204 1,545 355
7	574	467	1,041	204 1,625 447
8	646	485	1,131	204 1,702 551
9	719	503	1,222	204 1,892 649
10	773	523	1,296	204 1,927 711
11	827	542	1,369	204 2,042 772
12	880	562	1,442	204 2,094 819
13	934	581	1,515	204 2,138 866
14	977	599	1,576	204 2,205 965
15	1,021	618	1,639	204 2,220 1,051
16	1,064	636	1,700	204 2,278 1,137
17	1,107	654	1,761	204 2,309 1,181
18	1,128	686	1,814	204 2,347 1,226
19	1,150	717	1,867	204 2,347 1,265
20	1,171	749	1,920	204 2,412 1,305
21	1,192	780	1,972	204 2,412 1,344
22	1,227	787	2,014	204 2,412 1,462
23	1,263	794	2,057	204 2,412 1,462
24	1,298	801	2,099	204 2,412 1,462
25	1,333	808	2,141	204 2,412 1,462
26	1,418	774	2,192	204 2,412 1,462
27	1,502	740	2,242	204 2,412 1,462
28	1,733	501	2,234	204 2,412 1,462
Peak (LOM Year 28)		7.48	0.14	0.95 0.65
(1) (Donlin Gold 2015a), (Donlin Gold 2015b)				
(2) Area estimated from DXF contour files (Donlin Gold 2013).				
(3) Area estimated from DXF contour files (Donlin Gold 2013). Ultimate area is 2,541 acres, p. 11 (Corps 2018).				
WRF Area Adjustment				
LOM	DXF	FEIS	LT Stock E	WRF Adj
Source	Year	acre	acre	acre acre %
WRF	Ultimate	2,123	2,541	129 2,412 13.6%
(4) Section 4.6.3 and Figures 4-15 and 4-25 (AMEC 2011). Ultimate area is 1,462 acres, Year 22, Figure 2.3-3 (Corps 2018).				
Pit Area Adjustment				
LOM	Figures	FEIS	Adj	
Source	Year	acre	acre	%
Pit	Ultimate	1,191	1,462	22.8%

<div>AIR SCIENCES INC.</div> <div>AIR EMISSION CALCULATIONS</div>	Project Title	By	
	Donlin Gold	K. Lewis	
	Project No	Page	of Sheet
	281-21B-1	3	9 Hg EI
	Subject:	Date:	
	Mercury Emissions	October 11, 2021	

Fugitive Evaporative Mercury Emissions - Continued

LOM Year

28

Mercury Emissions (Hg0)

Source	Surface Area		Hg Flux	Hg0	
	acre	m2	µg/m2-yr	kg/yr	
Stockpiles	204	825,559	165.5	0.14	
Rock Dumps	2,412	9,761,026	97.4	0.95	
Pits	1,462	5,916,509	109.1	0.65	
Tailings - dry beach	1,161	4,698,850	92.5	0.43	
Tailings - wet beach	572	2,314,359	2,387.7	5.53	
Tailings - pond	501	2,027,477	747.3	1.52	7.48 kg/yr TSF Subtotal
Total				9.21	7.476
Percent of tailings beach wet:					33% (Donlin Gold 2015a) chk

Mercury Flux Emission Factors for Dry Surfaces (Stockpiles, Rock Dumps, Pits, and Tailings - dry beach)

Source	Donlin		
	Hg Conc.	Hg Flux	Hg Flux
	µg/g	ng/m2-d	µg/m2-yr
	(1)	(2)	(2)
Stockpiles	1.27	453.4	165.5
Rock Dumps	0.59	266.9	97.4
Pits	0.695	298.9	109.1
Tailings - dry beach	0.7	253.3	92.5

(1) (Donlin Gold 2014) for ore and waste; (SRK 2017) Table C-2, Feasibility Pilot (Phase 2) for tailings solids

Total Ore Mined	505	MMtonne	(AMEC 2011) App. C4-23
Total Waste Mined	2,765	MMtonne	(AMEC 2011) App. C4-23
Weighted average of ore and waste	0.695	µg/g	

(2) (Eckley 2010) Figure 2:  $\log(y) = m \cdot \log(x) + b$

y = Hg Flux (ng/m2-d)

x = material Hg concentration (µg/g)

m = slope, f(solar rad)

b = intercept

Cortez (used for Stockpiles, Rock Dumps, Pits, and Tailings - dry beach)

Solar Cat.	W/m2	m	b
Low	<140	0.67	2.49
Middle	≥140, ≤252	0.71	2.69
High	>252	0.73	2.85

Twin Creeks (used for Tailings - dry beach)

Solar Cat.	W/m2	m	b
Low	<140	0.59	2.59
Middle	≥140, ≤252	0.60	2.88
High	>252	0.77	2.97

Donlin Camp Station Temperature and Solar Radiation

Month	Mo Avg. of	Mo Avg. of	Mo Avg.	Solar Cat.	Snow/Ice Cover	
	Daily Mean	Daily Mean	snow Depth			
	°C	W/m2	in			
	(A)	(A)	(B)			
8-2020	Aug-20	12.7	161	17	Middle	No 31
9-2020	Sep-20	6.1	93	6	Low	No 30
10-2020	Oct-20	0.5	46	0	Low	No 31
11-2020	Nov-20	-8.2	15	3	Low	Yes 30
12-2020	Dec-20	-12.4	5	9	Low	Yes 31
1-2021	Jan-21	-13.8	13	12	Low	Yes 31
2-2021	Feb-21	-15.3	39	18	Low	Yes 28
3-2021	Mar-21	-11.2	89	29	Low	Yes 31
4-2021	Apr-21	-1.9	179	25	Middle	No 30
5-2021	May-21	8.6	237	2	Middle	No 31
6-2021	Jun-21	11.7	187	19	Middle	No 30
7-2021	Jul-21	12.9	142	32	Middle	No 31

- (A) (Air Sciences 2021)
- (B) (NOAA 2021) for snow depth and Snow/Ice category.
- (C) (Eckley 2010) for Low, Middle, and High categories.
- (D) Snow/Ice cover is based on monthly average temperature, snow depth, and solar radiation.

Dry Surface Emission Factors Based on Donlin Site-Specific Conditions

Dry Surface Type	x	Low	Middle	High	Average
	µg/g	y(L)	y(M)	y(H)	y(A)
		ng/m2-d	ng/m2-d	ng/m2-d	ng/m2-d
No Snow/Ice	Solar Cat:	Low	Middle	High	Total
Adjustment	Days:	7	5	0	12
Calculated from Cortez data					
Stockpiles	1.27	363	580	843	453.4
Rock Dumps	0.59	217	337	482	266.9
Pits	0.695	242	378	543	298.9
Snow/Ice	Solar Cat:	Low	Middle	High	Total
Adjustment	Days:	2	5	0	12
Calculated from Cortez data					
Tailings	0.7	243	380	546	199.0
Calculated from Twin Creeks data					
Tailings	0.7	315	612	709	307.7
Tailings - Average		279	496	N/A	253







<p>AIR SCIENCES INC.</p> <p>AIR EMISSION CALCULATIONS</p>	Project Title	By
	Donlin Gold	K. Lewis
	Project No	Page of Sheet
	281-21B-1	6 9 Hg EI
	Subject:	Date:
	Mercury Emissions	October 11, 2021

Mining Fugitive Dust Mercury Emissions - Continued

Mining Fugitive Dust Emissions							Mercury Emissions (HgP)					
Ore			Project				Pit	Stockpiles	WRF	TSF	Area	Total
LOM	Pit	Stockpiles	WRF	TSF	Area	Total	Mix	Ore	Waste	Waste	Waste	HgP
Year	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	kg/yr	kg/yr	kg/yr	kg/yr	kg/yr	kg/yr
1	897.2	85.0	726.2	0.2	314.9	2,023.5	0.566	0.098	0.389	0.000	0.169	1.221
2	1,295.8	109.8	972.4	0.3	317.9	2,696.3	0.817	0.127	0.520	0.000	0.170	1.634
3	1,284.5	153.8	886.7	0.5	334.1	2,659.6	0.810	0.177	0.475	0.000	0.179	1.641
4	1,446.8	205.6	1,001.8	1.7	398.5	3,054.5	0.912	0.237	0.536	0.001	0.213	1.899
5	1,627.1	197.3	1,166.4	2.0	398.0	3,390.9	1.026	0.227	0.624	0.001	0.213	2.092
6	1,789.7	177.8	1,336.4	2.3	450.3	3,756.5	1.128	0.205	0.715	0.001	0.241	2.291
7	1,686.4	232.0	1,154.4	2.6	428.7	3,504.2	1.063	0.267	0.618	0.001	0.229	2.179
8	1,925.9	158.7	1,475.8	3.0	437.0	4,000.4	1.214	0.183	0.790	0.002	0.234	2.423
9	2,081.5	140.5	1,645.7	3.1	440.5	4,311.4	1.312	0.162	0.881	0.002	0.236	2.593
10	1,689.9	172.0	1,232.0	3.3	434.0	3,531.1	1.065	0.198	0.659	0.002	0.232	2.157
11	1,858.3	155.9	1,422.5	3.4	440.8	3,880.9	1.172	0.180	0.761	0.002	0.236	2.350
12	1,762.5	169.6	1,321.9	3.5	433.2	3,690.7	1.111	0.195	0.708	0.002	0.232	2.248
13	1,959.7	126.1	1,558.0	3.7	437.5	4,085.0	1.236	0.145	0.834	0.002	0.234	2.451
14	1,908.0	105.3	1,546.8	3.7	435.5	3,999.2	1.203	0.121	0.828	0.002	0.233	2.387
15	1,995.9	112.2	1,626.0	3.8	438.0	4,175.9	1.258	0.129	0.870	0.002	0.234	2.494
16	2,169.5	115.4	1,811.9	3.9	443.7	4,544.4	1.368	0.133	0.970	0.002	0.237	2.710
17	2,159.3	149.3	1,750.4	3.9	443.7	4,506.6	1.361	0.172	0.937	0.002	0.237	2.710
18	2,064.7	139.3	1,692.0	4.0	437.8	4,337.7	1.302	0.160	0.906	0.002	0.234	2.604
19	2,055.8	147.5	1,682.3	4.0	431.6	4,321.3	1.296	0.170	0.900	0.002	0.231	2.600
20	<b>2,217.9</b>	<b>158.5</b>	<b>1,822.7</b>	<b>4.0</b>	<b>397.4</b>	<b>4,600.5</b>	<b>1.398</b>	<b>0.183</b>	<b>0.976</b>	<b>0.002</b>	<b>0.213</b>	<b>2.771</b>
21	2,104.2	182.5	1,652.0	4.1	442.0	4,384.7	1.327	0.210	0.884	0.002	0.237	2.660
22	1,232.5	170.0	808.6	4.1	386.1	2,601.4	0.777	0.196	0.433	0.002	0.207	1.615
23	869.7	140.3	554.8	4.2	309.5	1,878.5	0.548	0.162	0.297	0.002	0.166	1.175
24	772.9	142.6	491.0	4.3	272.0	1,682.7	0.487	0.164	0.263	0.002	0.146	1.062
25	343.8	136.8	165.7	4.4	194.9	845.6	0.217	0.158	0.089	0.002	0.104	0.570
26	122.8	158.0	10.0	4.5	3.2	298.5	0.077	0.182	0.005	0.002	0.002	0.269
27	106.5	137.2	10.0	3.1	3.2	260.0	0.067	0.158	0.005	0.002	0.002	0.234
<b>Peak Yr</b>	<b>2,217.9</b>	<b>158.5</b>	<b>1,822.7</b>	<b>4.0</b>	<b>397.4</b>	<b>4,600.5</b>	<b>1.398</b>	<b>0.183</b>	<b>0.976</b>	<b>0.002</b>	<b>0.213</b>	<b>2.771</b>

See Sheet: MineDust

87,022.1

87,022.1

chk

Ore 1.27 ppm Hg

Waste 0.59 ppm Hg

Mix 0.69 ppm Hg

Conversions

2.20462 lb/kg

2000 lb/ton

1,000,000 parts/million

<p style="text-align: center;">AIR SCIENCES INC.</p> <p style="text-align: center;">AIR EMISSION CALCULATIONS</p>	Project Title	By
	Donlin Gold	K. Lewis
	Project No 281-21B-1	Page of Sheet 7 9 Hg EI
	Subject: Mercury Emissions	Date: August 3, 2021

**Mining Fugitive Dust Mercury Emissions - Continued**

Mercury Emissions (HgP10)							Mercury Emissions (HgP2.5)					
LOM	Pit	Stockpile	WRF	TSF	Area	Total	Pit	Stockpile	WRF	TSF	Area	Total
Year	Mix	Ore	Waste	Waste	Waste	HgP10	Mix	Ore	Waste	Waste	Waste	HgP2.5
	kg/yr	kg/yr	kg/yr	kg/yr	kg/yr	kg/yr	kg/yr	kg/yr	kg/yr	kg/yr	kg/yr	kg/yr
1	0.180	0.031	0.115	0.000	0.034	0.360	0.019	0.004	0.014	0.000	0.017	0.053
2	0.267	0.036	0.151	0.000	0.034	0.489	0.027	0.004	0.018	0.000	0.017	0.066
3	0.272	0.051	0.139	0.000	0.036	0.498	0.027	0.006	0.016	0.000	0.018	0.067
4	0.300	0.071	0.155	0.000	0.045	0.571	0.030	0.009	0.018	0.000	0.018	0.075
5	0.332	0.066	0.178	0.001	0.045	0.622	0.033	0.008	0.021	0.000	0.018	0.080
6	0.363	0.061	0.203	0.001	0.051	0.678	0.036	0.007	0.023	0.000	0.020	0.088
7	0.352	0.078	0.179	0.001	0.048	0.658	0.035	0.009	0.021	0.000	0.020	0.085
8	0.387	0.053	0.223	0.001	0.050	0.712	0.038	0.006	0.025	0.000	0.020	0.090
9	0.410	0.045	0.245	0.001	0.051	0.751	0.041	0.005	0.028	0.000	0.020	0.094
10	0.348	0.057	0.190	0.001	0.050	0.645	0.035	0.007	0.022	0.000	0.020	0.083
11	0.373	0.051	0.215	0.001	0.051	0.690	0.037	0.006	0.025	0.000	0.020	0.088
12	0.357	0.055	0.202	0.001	0.050	0.666	0.036	0.006	0.023	0.000	0.020	0.086
13	0.387	0.040	0.234	0.001	0.050	0.712	0.039	0.004	0.027	0.000	0.020	0.090
14	0.379	0.035	0.234	0.001	0.050	0.698	0.038	0.004	0.027	0.000	0.020	0.089
15	0.392	0.037	0.244	0.001	0.051	0.725	0.039	0.004	0.028	0.000	0.020	0.092
16	0.418	0.039	0.269	0.001	0.052	0.779	0.042	0.005	0.030	0.000	0.020	0.097
17	0.417	0.047	0.260	0.001	0.052	0.777	0.042	0.005	0.029	0.000	0.020	0.097
18	0.396	0.045	0.250	0.001	0.051	0.743	0.040	0.005	0.028	0.000	0.020	0.093
19	0.390	0.047	0.246	0.001	0.050	0.734	0.039	0.005	0.027	0.000	0.020	0.092
20	<b>0.422</b>	<b>0.050</b>	<b>0.269</b>	<b>0.001</b>	<b>0.047</b>	<b>0.790</b>	<b>0.043</b>	<b>0.006</b>	<b>0.030</b>	<b>0.000</b>	<b>0.017</b>	<b>0.096</b>
21	0.411	0.058	0.246	0.001	0.051	0.766	0.041	0.006	0.028	0.000	0.020	0.096
22	0.266	0.056	0.129	0.001	0.042	0.494	0.026	0.006	0.015	0.000	0.018	0.066
23	0.186	0.046	0.088	0.001	0.034	0.355	0.018	0.005	0.010	0.000	0.015	0.049
24	0.157	0.045	0.074	0.001	0.030	0.308	0.015	0.005	0.008	0.000	0.013	0.042
25	0.070	0.047	0.026	0.001	0.020	0.164	0.006	0.006	0.003	0.000	0.010	0.025
26	0.019	0.054	0.003	0.001	0.001	0.077	0.002	0.006	0.000	0.000	0.000	0.009
27	0.016	0.047	0.003	0.001	0.001	0.067	0.002	0.006	0.000	0.000	0.000	0.008
<b>Peak</b>	<b>0.422</b>	<b>0.050</b>	<b>0.269</b>	<b>0.001</b>	<b>0.047</b>	<b>0.790</b>	<b>0.043</b>	<b>0.006</b>	<b>0.030</b>	<b>0.000</b>	<b>0.017</b>	<b>0.096</b>
<i>Ore</i>	<i>1.27 ppm Hg</i>						<i>Ore</i>	<i>1.27 ppm Hg</i>				
<i>Waste</i>	<i>0.59 ppm Hg</i>						<i>Waste</i>	<i>0.59 ppm Hg</i>				
<i>Mix</i>	<i>0.69 ppm Hg</i>						<i>Mix</i>	<i>0.69 ppm Hg</i>				

**Ore Processing and Analysis Dust Mercury Emissions**

Source/ Activity	PM	HgP	PM10	PM2.5	HgP10	HgP2.5
	ton/yr	kg/yr	ton/yr	ton/yr	kg/yr	kg/yr
	(1)	(2)	(1)	(1)	(2)	(2)
ROM Ore Discharge and Crushing	30.67	0.035	19.46	10.92	0.022	0.013
Coarse Ore Transfer	20.41	0.024	14.08	9.26	0.016	0.011
Pebble Crushers and Recycle	18.16	0.021	14.53	11.76	0.017	0.014
Laboratories	8.11	0.009	8.11	8.11	0.009	0.009
Total	77.36	0.089	56.18	40.05	0.065	0.046

(1) (Donlin\_EI\_FSU2) Dust emissions are based on equipment design capacity for all LOM years.

(2) Ore 1.27 ppm Hg

Conversions

2.20462 lb/kg

2000 lb/ton

1,000,000 parts/million

AIR SCIENCES INC.	Project Title				By						
	Donlin Gold				K. Lewis						
	Project No				Page of Sheet						
AIR EMISSION CALCULATIONS	281-21B-1				8 9 Hg EI						
	Subject:				Date:						
				Mercury Emissions				October 11, 2021			
Ore Thermal Processing Mercury Emissions											
Emissions at Maximum Operation											
Source/ Activity	Controlled		Stack	Max	Total	Speciated Emissions					
	Hg Concentration					Flow	Operation	Hg	Hg0	Hg2	HgP2.5
	gr/dscf	Ref.	dscfm	hr/yr	kg/yr						
			(1)			(3)	(3)	(3)			
Autoclave 101	1.1E-06	(1)	7,436	8,760	0.29	0.231	0.015	0.043			
Autoclave 201	1.1E-06	(1)	7,436	8,760	0.29	0.231	0.015	0.043			
Carbon Regeneration Kiln	5.0E-05	(1)	2,311	8,760	3.97	3.165	0.108	0.694			
EW Cells	5.0E-05	(2)	4,128	8,760	7.03	6.863	0.134	0.033			
Retort	1.0E-04	(2)	200	8,760	0.68	0.600	0.032	0.049			
Induction Melting Furnace	1.0E-05	(2)	21,674	4,380	3.69	3.618	0.048	0.025			
Total					15.95	14.71	0.35	0.89	15.95	chk	
(1) (Hatch 2014) Table 4-2 multiplied by an adjustment factor based on Nevada test data and limits for similar units.											
	Autoclave 101		5.7E-07	gr/dscf	2x						
	Autoclave 201		5.7E-07	gr/dscf	2x						
	Carbon Regeneration Kiln		2.1E-04	gr/dscf	0.24x						
	EW Cells		2.1E-04	gr/dscf	N/A						
	Retort		1.8E-03	gr/dscf	N/A						
	Induction Melting Furnace		1.0E-06	gr/dscf	N/A						
(2) (NDEP 2016)											
	Autoclave		case-by-case								
	Carbon Kiln		1E-04 gr/dscf								
	Fluid System (Pregnant Tanks, Barren Tanks, Electro Winning, etc.)		5E-05 gr/dscf								
	Retort		1E-04 gr/dscf								
	Furnaces		1E-05 gr/dscf								
(3) Goldstrike Test Data, Permit Limits, and Hg Speciation (Alliance 2018-2020)											
		Average	Maximum	Permit	Average						
		Hg	Hg	Limit	Flow	Mercury Speciation					
Source	Test Years	gr/dscf	gr/dscf	gr/dscf	dscfm	Hg0	Hg2	HgP			
Autoclaves 456 (1)	2018-2020	6.6E-07	8.0E-07	7.8E-05	7,337	80.0%	5.2%	14.9%			
Kiln & P/B Tanks	2018-2020	5.2E-06	8.7E-06	5.0E-05	1,526	79.8%	2.7%	17.5%			
EW Cells	2018-2020	7.4E-05	6.4E-04	7.3E-04	4,230	97.6%	1.9%	0.5%			
Retort	2018-2020	9.4E-06	1.6E-05	1.0E-04	78	88.1%	4.7%	7.2%			
E/W Furnces & EW	2018-2020	3.0E-04	6.4E-04	7.3E-04	4,547	98.0%	1.3%	0.7%			
NESHAP 7E Limits											
Carbon Processes with Retort	0.8 lb/ton concentrate				0.04097 ton/hr	(2)	8760 hr/yr	=	130 kg/yr		
Autoclaves	84 lb/MMton of ore processed				420 ton/hr	(1)	8760 hr/yr	=	140 kg/yr		
(2) (Hatch 2013a)											
(1) (Hatch 2013b)											
Conversions											
60 min/hr											
7000 gr/lb											
2.20462 lb/kg											
1.10231 ton/tonne											
1,000,000 unit/MM unit											

AIR SCIENCES INC.						Project Title		By																																																																																																																																				
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Camp Incinerator	0.0035 mg	0.26 Nm3@0%O2	( 20.9% - 0.0% )	g	=	1.4E-06 g Hg																																																																																																																																						
		Nm3@7%O2	MJ	( 20.9% - 7.0% )	1,000 mg	MJ																																																																																																																																						
Highest of 40 CFR 60 Subpart CCCC, Table 8 for small remote unit and Table 5 for large unit																																																																																																																																												
Sewage Sludge Incinerator	0.15 mg/Nm3 @ 7% O2, dry	40 CFR 60 Subpart LLLL, Table 2				= 5.9E-05 g Hg/MJ																																																																																																																																						
Conversions																																																																																																																																												
2,000 lb/ton 0.26 Nm3/MJ @ 0% O2, incenerator																																																																																																																																												
2.2046 lb/kg 10,466 J/g solid waste																																																																																																																																												
1,000 g/kg or mg/g 7,700 Btu/lb dry sludge																																																																																																																																												
453.5929 g/lb 1,055 J/Btu 1,000,000 unit/MM unit																																																																																																																																												

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>					BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>					PAGE: <div>1</div>	OF: <div>7</div>	SHEET: <div>Summary</div>
	SUBJECT: <div>Emissions Summary</div>					DATE: <div>October 14, 2021</div>		

Calculations for LOM:19

Facility-Wide Emissions Summary (ton/yr)

Activity	CO	NOx	PM2.5	PM10	PM	SO2	VOC
Mining Activities	1,921.0	51.6	155.1	1,214.5	4,321.3	0.2	
Power Generation	367.0	1,032.8	564.2	564.2	564.2	11.5	1,123.7
Emergency Equipment	18.7	33.3	1.1	1.1	1.1	0.03	33.3
Mobile Machinery	2,045.8	1,978.9	22.9	22.9	22.9	3.9	111.1
Processing Operations	774.9	0.1	64.5	80.6	101.8	9.8	2.3
Boilers	94.9	158.1	8.9	9.5	20.9	1.4	6.5
Incinerators	0.4	0.8	0.3	0.3	0.3	0.53	--
Access Roads	4.5	2.3	4.3	43.2	174.2	0.01	0.2
Tanks							1.8
Process and Ancillary Source Subtotal	1,256	1,225	639	656	688	23	1,168
Mining Activity (including access roads) Subtotal	1,925	54	159	1,258	4,495	0	0
Mobile Machinery Subtotal	2,046	1,979	23	23	23	4	111
Facility Total	5,227	3,258	821	1,936	5,207	27	1,279

Assessable PTE10,835 ton/yr

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>					BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>					PAGE: <div>2</div>	OF: <div>7</div>	SHEET: <div>Summary</div>
	SUBJECT: <div>Emissions Summary</div>					DATE: <div>October 14, 2021</div>		

Calculations for LOM:19

Detailed Emissions Summary		(ton/yr)						
Activity	Rate	CO	NOx	PM2.5	PM10	PM	SO2	VOC
Mining Activities - Subtotal		1,921	52	155	1,214	4,321	0.17	0.00
Drilling (EU ID: 113)	131,003 holes/yr			2.55	44.28	85.15		
Blasting (EU ID: 114)	550 blasts/yr	1,921	51.61	4.80	83.22	160.04	0.17	
Material Handling (Loading and Unloading) (EU ID: 115-120)								
Ore Loading (In-Pit)	16,049,018 ton/yr			1.82	12.01	25.39		
Ore Unloading (Short-Term Stockpile)	7,222,058 ton/yr			0.82	5.40	11.43		
Ore Unloading (Long-Term Stockpile)	0 ton/yr			0.00	0.00	0.00		
Ore Reloading (Long-Term Stockpile)	5,487,648 ton/yr			0.62	4.11	8.68		
Waste (incl. OVB/PAG) Loading (In-Pit)	122,842,043 ton/yr			13.92	91.9	194.4		
Waste (incl. OVB/PAG) Un- & Re-loading	124,244,181 ton/yr			14.08	93.0	196.6		
Material Hauling (EU ID: 160)								
Ore Hauling	373,876 VMT/yr			6.13	61.31	252.1		
Waste Hauling	4,345,270 VMT/yr			71.26	712.6	2,930		
Maintenance Equipment (EU ID: 121-123)								
Dozer Use	75,495 hr/yr			34.07	58.14	324.5		
Grader Use	45,653 hr/yr			1.32	18.86	42.70		
Water Truck Use	11,795 hr/yr			1.49	14.90	61.28		
Wind Erosion of Exposed Surfaces (EU ID: 161)								
Tailings Beach (Dry)	863 acre			0.30	1.99	3.98		
Haul Roads	215 acre			0.13	0.90	1.79		
Access Roads	143 acre			0.09	0.60	1.19		
Waste Rock Facility	variable acre			1.57	10.47	20.95		
Short-term Stockpile	variable acre			0.02	0.16	0.33		
Long-term Stockpile West	variable acre			0.0285	0.1901	0.380		
Long-term Stockpile East (& PAG)	variable acre			0.0488	0.3254	0.651		
Overburden Stockpile South	variable acre			0.0153	0.1021	0.204		
Power Generation - Subtotal		367.0	1,033	564.2	564.2	564.2	11.54	1,124
Power Plant Generators (12)	204,912 kWVe	350.1	1,031	564.1	564.1	564.1	11.51	1,123
Airport Generators (2)	400 kWVe	16.90	1.93	0.097	0.097	0.097	0.026	0.92
Mobile Machinery - Subtotal		2,046	1,979	22.95	22.95	22.95	3.87	111.1
Hydraulic Shovel	9,954,953 hp-hr/yr	28.64	28.64	0.33	0.33	0.33	0.05	1.55
Front-End Loader	11,594,785 hp-hr/yr	33.36	33.36	0.38	0.38	0.38	0.06	1.81
Haul Truck	594,518,171 hp-hr/yr	1,710	1,710	19.55	19.55	19.55	3.23	92.85
Drill	30,233,452 hp-hr/yr	86.98	79.16	0.94	0.94	0.94	0.16	4.72
Track Dozer	27,401,903 hp-hr/yr	78.83	55.94	0.75	0.75	0.75	0.15	4.28
Wheel Dozer	11,963,331 hp-hr/yr	34.42	34.42	0.39	0.39	0.39	0.07	1.87
Grader	10,220,103 hp-hr/yr	29.40	3.36	0.17	0.17	0.17	0.06	1.60
Water Truck	5,794,339 hp-hr/yr	16.67	16.67	0.19	0.19	0.19	0.03	0.90
Hydraulic Excavator	4,519,036 hp-hr/yr	13.00	9.96	0.13	0.13	0.13	0.02	0.71
Fuel Truck	2,089,431 hp-hr/yr	6.01	6.01	0.07	0.07	0.07	0.01	0.33
Service Truck	171,440 hp-hr/yr	0.49	0.056	0.0028	0.0028	0.0028	0.0009	0.027
Mobile Crane	214,301 hp-hr/yr	0.62	0.070	0.0035	0.0035	0.0035	0.0012	0.033
Low Boy Truck	1,000,069 hp-hr/yr	2.88	0.33	0.016	0.016	0.016	0.0054	0.16
Tire Handler	1,428,671 hp-hr/yr	4.11	0.47	0.023	0.023	0.023	0.0078	0.22
Light Plant	3,428,810 hp-hr/yr	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<p style="text-align: center;"><b>Air Sciences Inc.</b></p> <p style="text-align: center;"><b>AIR EMISSION CALCULATIONS</b></p>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 3	OF: 7	SHEET: Summary
	SUBJECT: Emissions Summary		DATE: October 14, 2021		

Calculations for LOM:

19

**Detailed Emissions Summary (ton/yr) - continued**

Activity	Rate	CO	NOx	PM2.5	PM10	PM	SO2	VOC
<b>Emergency Equipment - Subtotal</b>		<b>18.74</b>	<b>33.29</b>	<b>1.07</b>	<b>1.07</b>	<b>1.07</b>	<b>0.03</b>	<b>33.29</b>
Black Start Generators (2)	1,200 <i>kWe</i>	2.89	5.29	0.17	0.17	0.17	0.0044	5.29
Emergency Generators (4)	6,000 <i>kWe</i>	14.47	26.46	0.83	0.83	0.83	0.022	26.46
Fire Pumps (3)	756 <i>hp</i>	1.38	1.54	0.079	0.079	0.079	0.00205	1.54
<b>Processing Operations - Subtotal</b>		<b>774.88</b>	<b>0.08</b>	<b>64.50</b>	<b>80.63</b>	<b>101.81</b>	<b>9.79</b>	<b>2.30</b>
ROM Ore Discharge and Crushing	5,100 <i>ton/hr</i>			10.92	19.456	30.67		
Coarse Ore Transfer	5,100 <i>ton/hr</i>			9.26	14.081	20.41		
Pebble Crushers and Recycle	660 <i>ton/hr</i>			11.76	14.529	18.16		
Reagents Handling and Mixing				12.61	12.613	12.61		
Refinery Sources		774.9	0.1	10.71	10.71	10.71	9.79	2.30
Laboratories				8.11	8.11	8.11		
Water Treatment Plant				1.13	1.13	1.13		
<b>Boilers - Subtotal</b>		<b>94.94</b>	<b>158.14</b>	<b>8.87</b>	<b>9.49</b>	<b>20.90</b>	<b>1.36</b>	<b>6.52</b>
POX Boilers (2)	58.58 <i>MMBtu/hr</i>	21.13	39.42	1.91	1.97	6.50	0.40	1.38
Oxygen Plant Boiler	20.66 <i>MMBtu/hr</i>	7.45	13.91	0.67	0.70	2.29	0.14	0.49
Carbon Elution Heater	16 <i>MMBtu/hr</i>	5.77	10.77	0.52	0.54	1.78	0.11	0.38
Power Plant Auxiliary Heaters (2)	33 <i>MMBtu/hr</i>	11.90	22.21	1.08	1.11	3.66	0.22	0.78
SO2 Burner	2 <i>MMBtu/hr</i>	0.72	0.86	0.07	0.07	0.07	0.01	0.05
Auxiliary SO2 Burner	2 <i>MMBtu/hr</i>	0.34	1.35	0.02	0.07	0.22	0.01	0.02
Building Heaters (138)	24.15 <i>MMBtu/hr</i>	4.15	9.75	0.79	0.79	0.79	0.06	0.57
Air Handlers (19)	95 <i>MMBtu/hr</i>	34.27	40.79	3.10	3.10	3.10	0.24	2.24
Air Handlers (7)	17.5 <i>MMBtu/hr</i>	6.31	7.51	0.57	0.57	0.57	0.05	0.41
Portable Heaters (20)	17.2 <i>MMBtu/hr</i>	2.89	11.58	0.14	0.58	1.91	0.12	0.20
<b>Incinerators - Subtotal</b>		<b>0.361</b>	<b>0.84</b>	<b>0.33</b>	<b>0.33</b>	<b>0.33</b>	<b>0.531</b>	
Camp Waste Incinerator (EU ID: 27)	0.50 <i>ton/hr</i>	0.351	0.78	0.32	0.32	0.32	0.5197	
Sewage Sludge Incinerator (EU ID: 28)	0.007 <i>ton/hr</i>	0.0096	0.064	0.0089	0.0089	0.0089	0.0110	
<b>Access Roads - Subtotal</b>		<b>4.47</b>	<b>2.29</b>	<b>4.30</b>	<b>43.18</b>	<b>174.15</b>	<b>0.0091</b>	<b>0.183</b>
Camp to Mine Site (EU ID: 158)		0.344	0.113	0.32	3.22	13.09	0.00069	0.0118
Airport to Camp (EU ID: 159)		0.297	0.049	0.186	1.88	7.55	0.00038	0.0113
Jungjuk Port to Mine Site		3.83	2.13	3.79	38.08	153.51	0.0080	0.160
<b>Tanks - Subtotal</b>								<b>1.840</b>
Mine Site Tanks								1.57
Power Plant Tanks								0.018
Camp Site Tanks								0.002
Airport Tanks								0.249

Numbers in *blue* are direct entries. *Green* text/numbers are lookup codes or results.



<p style="text-align: center;"><b>Air Sciences Inc.</b></p> <p style="text-align: center;"><b>AIR EMISSION CALCULATIONS</b></p>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 4	OF: 7	SHEET: Summary
	SUBJECT: Emissions Summary		DATE: October 14, 2021		

**Life-of-Mine Mining Activity, Machinery Tailpipes, Wind Erosion, and Access Roads Emissions Summary (ton/yr)**

LOM	CO	NOX	PM2.5	PM10	PM	SO2	VOC	Total
4	3,097.4	1,159.0	140.7	967.6	3,241.6	2.40	63.80	8,672
5	3,240.5	1,302.9	151.3	1,059.9	3,579.6	2.67	71.57	9,408
6	3,296.9	1,354.7	165.6	1,162.4	3,945.9	2.77	74.63	10,003
7	3,411.3	1,465.4	160.6	1,111.1	3,694.8	2.99	80.85	9,927
8	3,568.3	1,622.5	174.0	1,230.8	4,192.8	3.29	89.37	10,881
9	3,702.0	1,752.5	182.6	1,306.3	4,505.3	3.54	96.63	11,549
10	3,484.2	1,539.9	161.1	1,110.2	3,722.6	3.13	84.80	10,106
11	3,487.7	1,547.0	169.6	1,193.9	4,072.5	3.13	84.99	10,559
12	3,602.4	1,664.9	166.6	1,149.6	3,883.6	3.35	91.22	10,562
13	3,692.2	1,755.7	176.8	1,243.7	4,278.9	3.52	96.09	11,247
14	3,764.3	1,829.3	176.4	1,226.7	4,194.0	3.66	100.01	11,294
15	3,868.1	1,930.2	181.7	1,271.3	4,371.9	3.85	105.64	11,733
16	3,967.8	2,031.7	192.4	1,364.1	4,741.4	4.04	111.06	12,413
17	3,900.3	1,961.9	190.0	1,351.5	4,702.9	3.91	107.39	12,218
18	3,894.6	1,958.2	183.7	1,296.9	4,534.0	3.90	107.08	11,978
19	3,971.3	2,032.8	182.3	1,280.6	4,518.4	4.05	111.24	12,101
20	3,891.3	1,951.6	188.2	1,372.3	4,796.7	3.90	106.90	12,311
21	3,559.2	1,621.3	183.2	1,319.9	4,577.1	3.27	88.88	11,353
22	2,749.4	829.9	123.3	844.7	2,784.6	1.74	44.91	7,379
23	2,522.8	616.3	91.5	614.4	2,059.2	1.31	32.61	5,938
24	2,551.2	643.7	80.9	535.1	1,863.7	1.36	34.15	5,710
25	2,199.0	309.0	46.7	286.5	1,022.7	0.70	15.03	3,880
26	2,013.3	141.8	15.1	129.4	473.7	0.35	4.95	2,779
27	2,001.7	130.1	13.8	118.5	435.0	0.33	4.32	2,704

Red numbers represent the highest values

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<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>		BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>		PAGE: <div>5</div>	OF: <div>7</div>	SHEET: <div>Summary</div>
	SUBJECT: <div>Emissions Summary</div>		DATE: <div>October 14, 2021</div>		

TOT\_MINING\_FU\TOT\_MINING\_FUG\_NOX\TOT\_MINING\_FUG\_ TOT\_MINING\_FU\TOT\_MINING\_I\TOT\_MINING\_FUG\_SO2

Life-of-Mine Mining Activity Fugitive Emissions Summary (ton/yr)

APP\_C4\_23

LOM	CO	NOX	PM2.5	PM10	PM	SO2
4	1,921	51.61	121.4	897.7	3,027	0.17
5	1,921	51.61	130.3	988.5	3,364	0.17
6	1,921	51.61	143.8	1,089.0	3,727	0.17
7	1,921	51.61	137.5	1,036.2	3,474	0.17
8	1,921	51.61	149.1	1,154.0	3,970	0.17
9	1,921	51.61	156.4	1,228.9	4,283	0.17
10	1,921	51.61	137.1	1,034.4	3,501	0.17
11	1,921	51.61	145.6	1,117.9	3,850	0.17
12	1,921	51.61	141.2	1,072.2	3,660	0.17
13	1,921	51.61	150.5	1,166.2	4,056	0.17
14	1,921	51.61	149.1	1,147.3	3,968	0.17
15	1,921	51.61	153.3	1,190.6	4,145	0.17
16	1,921	51.61	162.8	1,282.2	4,513	0.17
17	1,921	51.61	161.3	1,271.4	4,477	0.17
18	1,921	51.61	155.1	1,216.5	4,307	0.17
19	1,921	51.61	152.9	1,199.7	4,292	0.17
20	1,921	51.61	160.0	1,294.6	4,576	0.17
21	1,921	51.61	159.2	1,248.8	4,365	0.17
22	1,921	51.61	108.4	782.9	2,582	0.17
23	1,921	51.61	79.2	555.3	1,860	0.17
24	1,921	51.61	68.2	475.5	1,664	0.17
25	1,921	51.61	38.0	230.9	827	0.17
26	1,921	51.61	8.4	75.9	280	0.17
27	1,921	51.61	7.3	65.8	243	0.17

Red numbers represent the highest values

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<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>		BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>		PAGE: <div>6</div>	OF: <div>7</div>	SHEET: <div>Summary</div>
	SUBJECT: <div>Emissions Summary</div>		DATE: <div>October 14, 2021</div>		

TOT\_MACHINES\_FUG\_CTOT\_MACHINES\_FUTOT\_MACHINES\_TOT\_MACHINETOT\_MACHINES\_FUG\_NMHC

Life-of-Mine Machinery Tailpipes Emissions Summary (ton/yr)

APP\_C4\_23

LOM	CO	NOx	PM	SO2	VOC
4	1,172	1,105	12.96	2.21	63.6
5	1,315	1,249	14.60	2.48	71.4
6	1,371	1,301	15.22	2.59	74.5
7	1,486	1,412	16.50	2.81	80.7
8	1,643	1,569	18.30	3.10	89.2
9	1,777	1,699	19.80	3.36	96.4
10	1,559	1,486	17.34	2.95	84.6
11	1,562	1,493	17.41	2.95	84.8
12	1,677	1,611	18.74	3.17	91.0
13	1,767	1,702	19.77	3.34	95.9
14	1,839	1,775	20.61	3.47	99.8
15	1,943	1,876	21.77	3.67	105.5
16	2,042	1,978	22.92	3.86	110.9
17	1,975	1,908	22.14	3.73	107.2
18	1,969	1,904	22.09	3.72	106.9
19	2,046	1,979	22.95	3.87	111.1
20	1,966	1,898	22.03	3.71	106.7
21	1,634	1,567	18.24	3.09	88.7
22	824	776	9.11	1.56	44.7
23	597	562	6.60	1.13	32.4
24	626	590	6.92	1.18	34.0
25	274	255	3.01	0.52	14.9
26	88	88	1.00	0.17	4.8
27	76	76	0.87	0.14	4.1

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<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 7	OF: 7	SHEET: Summary
	SUBJECT: Emissions Summary		DATE: October 14, 2021		

**Life-of-Mine Wind Erosion and Access Road Fugitive Emissions Summary (ton/yr)**

LOM	CO	NOX	PM2.5	PM10	PM	SO2	VOC
4	4.47	2.29	6.37	56.95	201.70	0.01	0.18
5	4.47	2.29	6.35	56.82	201.43	0.01	0.18
6	4.47	2.29	6.55	58.14	204.09	0.01	0.18
7	4.47	2.29	6.58	58.33	204.47	0.01	0.18
8	4.47	2.29	6.60	58.49	204.77	0.01	0.18
9	4.47	2.29	6.47	57.60	203.00	0.01	0.18
10	4.47	2.29	6.60	58.47	204.74	0.01	0.18
11	4.47	2.29	6.61	58.55	204.90	0.01	0.18
12	4.47	2.29	6.62	58.62	205.04	0.01	0.18
13	4.47	2.29	6.49	57.74	203.28	0.01	0.18
14	4.47	2.29	6.64	58.79	205.38	0.01	0.18
15	4.47	2.29	6.66	58.87	205.55	0.01	0.18
16	4.47	2.29	6.67	58.98	205.76	0.01	0.18
17	4.47	2.29	6.51	57.91	203.63	0.01	0.18
18	4.47	2.29	6.58	58.33	204.46	0.01	0.18
19	4.47	2.29	6.51	57.91	203.63	0.01	0.18
20	4.47	2.29	6.17	55.63	199.05	0.01	0.18
21	4.47	2.29	5.75	52.84	193.48	0.01	0.18
22	4.47	2.29	5.73	52.70	193.21	0.01	0.18
23	4.47	2.29	5.70	52.51	192.81	0.01	0.18
24	4.47	2.29	5.72	52.60	192.99	0.01	0.18
25	4.47	2.29	5.71	52.55	192.89	0.01	0.18
26	4.47	2.29	5.71	52.56	192.91	0.01	0.18
27	4.47	2.29	5.60	51.84	191.48	0.01	0.18

*Red numbers represent the highest values*

*Numbers in blue are direct entries. Green text/numbers are lookup codes or results.*

Air Sciences Inc.	PROJECT TITLE: Donlin Gold					BY: E. Memon		
	PROJECT NO: 281-1-2					PAGE: 1	OF: 11	SHEET: Mining
	SUBJECT: Mining Activity Emissions					DATE: October 14, 2021		
AIR EMISSION CALCULATIONS								

Calculations for LOM: 19Max Daily Ore: Yes

Mining Activity Emissions Summary

HgDustPM2.5HgDustPM10HgDust

Particulate Emissions								
Activity	Rate	PM2.5		PM10		PM10		PM
		(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(ton/yr)
Drilling (EU ID: 113)	131,003 holes/yr	0.58	14.00	2.55	10.11	242.62	44.28	85.2
Blasting (EU ID: 114)	550 blasts/yr	87.30	87.30	4.80	1,513.12	1,513.12	83.22	160.0
Material Handling (Loading and Unloading) (EU ID: 115-120)								
Ore Loading (In-Pit)	16,049,018 ton/yr	1.16	27.74	1.82	7.63	183.19	12.01	25.4
Ore Unloading (Short-Term Stockpile)	7,222,058 ton/yr	0.19	4.48	0.82	1.23	29.61	5.40	11.4
Ore Unloading (Long-Term Stockpile)	0 ton/yr	0.00	0.00	0.00	0.00	0.00	0.00	0.0
Ore Reloading (Long-Term Stockpile)	5,487,648 ton/yr	0.14	3.41	0.62	0.94	22.50	4.11	8.7
Waste (incl. OVB/PAG) Loading (In-Pit)	122,842,043 ton/yr	3.18	76.27	13.92	20.99	503.70	91.93	194.4
Waste (incl. OVB/PAG) Un- & Re-loading	124,244,181 ton/yr	3.21	77.15	14.08	21.23	509.45	92.97	196.6
Material Hauling (EU ID: 160)								
Ore Hauling	373,876 VMT/yr	1.40	33.60	6.13	14.00	335.95	61.31	252.1
Waste Hauling	4,345,270 VMT/yr	16.27	390.45	71.26	162.69	3,904.53	712.58	2,929.6
Maintenance Equipment (EU ID: 121-123)								
Dozer Use	75,495 hr/yr	7.78	186.68	34.07	13.28	318.60	58.14	324.5
Grader Use	45,653 hr/yr	0.30	7.25	1.32	4.31	103.34	18.86	42.7
Water Truck Use	11,795 hr/yr	0.34	8.17	1.49	3.40	81.67	14.90	61.3
Wind Erosion of Exposed Surfaces (EU ID: 161)								
Tailings Beach (Dry)	862.5 acre	0.07	1.64	0.30	0.45	10.92	1.99	3.98
Haul Roads	214.7 acre	0.03	0.74	0.13	0.20	4.91	0.90	1.79
Access Roads	143.0 acre	0.02	0.49	0.09	0.14	3.27	0.60	1.19
Waste Rock Facility	variable acre	0.36	8.61	1.57	2.39	57.39	10.47	20.95
Short-term Stockpile	variable acre	0.01	0.13	0.02	0.04	0.90	0.16	0.33
Long-term Stockpile West	variable acre	0.0065	0.16	0.029	0.043	1.04	0.19	0.38
Long-term Stockpile East (& PAG)	variable acre	0.0111	0.27	0.049	0.074	1.78	0.33	0.65
Overburden Stockpile South	variable acre	0.0035	0.08	0.015	0.023	0.56	0.10	0.20
Total		122.35	928.61	155.10	1,776.28	7,829.05	1,214.46	4,321.28

Other Emissions

Activity	CO			NOx			SO2		
	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
Blasting (EU ID: 114)	34,926.6	34,926.6	1,921.0	938.33	938.33	51.61	3.13	3.13	0.17

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.



<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>		PROJECT TITLE: Donlin Gold		BY: E. Memon		
		PROJECT NO: 281-1-2		PAGE: 3	OF: 11	SHEET: Mining
		SUBJECT: Mining Activity Emissions		DATE: October 14, 2021		

Calculations for LOM: 19

**Blasting (EU ID: 114)**

**Activity Information**

Total Material Mined 126,000,000 t/yr Donlin APP\_C4\_23

BVol 46,203,451 m<sup>3</sup>/yr Donlin

Con: Blasting Agent Use 60,000 t/yr Donlin (11/08/2016)

Excluding Water (13.3%) 52,020 t/yr Donlin

57,342 ton/yr

Blas No. of Blasts 550 blasts/yr Donlin

Bench Height 12 m Donlin

Operation 365 days/yr

24 hr/day

**Emission Factor(s)**

Emission Factor Equation TSP (lb/blast) = 0.000014 x A<sup>1.5</sup> AP-42, Tab. 11.9-1, 7/98 (blasting, overburden)

Where, A = Area per Blast 120,000 ft<sup>2</sup> Donlin (11/08/2016)

TSP 582.0 lb/blast

CO 67 lb/ton-ANFO AP-42, Tab. 13.3-1, 2/80 (ANFO)

NOx 0.9 kg/t-ANFO CSIRO

1.80 lb/ton-ANFO

SO2 0.006 lb/ton-ANFO Based on 15 ppm S in FO and a maximum of 10% FO in ANFO

**PM Scaling Factors (SF)**

PM2.5 0.03

PM10 0.52

AP-42, Tab. 11.9-1, 7/98 (blasting, overburden)

AP-42, Tab. 11.9-1, 7/98 (blasting, overburden)

Emissions	(lb/blast)	(lb/hr) <sup>(1)</sup>	(lb/day) <sup>(1)</sup>	(ton/yr)
PM2.5	17.46	87.30	87.30	4.80
PM10	302.62	1,513.12	1,513.12	83.22
PM	581.97	2,909.85	2,909.85	160.04
CO	6,985.32	34,926.59	34,926.59	1,920.96
NOx	187.67	938.33	938.33	51.61
SO2	0.63	3.13	3.13	0.17

<sup>(1)</sup> Based on: 5 blasts/day, occurring in 1 hour

**Sample Calculations**

**PM10**

83.2 ton/yr

(Activity)	(TSP EF)	(SF)	(Conversion)
550 blast/yr	582.0 lb/blast	0.52	ton/2,000 lb

**SO2 Emission Factor**

0.006 lb/ton-ANFO

0.000015 lb-S	2 lb SO2	10% lb FO	2,000 lb
lb FO	lb-S	lb ANFO	ton

Conversion(s):

2,000 lb/ton

1.1023 ton/t

2.2046 lb/kg

3.2808 ft/m

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

Air Sciences Inc.  AIR EMISSION CALCULATIONS		PROJECT TITLE: Donlin Gold		BY: E. Memon		
		PROJECT NO: 281-1-2		PAGE: 4	OF: 11	SHEET: Mining
		SUBJECT: Mining Activity Emissions		DATE: October 14, 2021		

Calculations for LOM: 19

Material Handling (Loading and Unloading) (EU ID: 115-120)

Activity Information

Ore

In-Pit Ore Removed

14,559,441 t/yr

Donlin

APP\_C4\_23

16,049,018 ton/yr

122,400 ton/day (daily maximum ore processing rate)

M2S1

Long-Term Ore Stockpiled

0 t/yr

Donlin

0 ton/yr

S2S2

Short-Term Ore Stockpiled

6,551,748 t/yr

Donlin

7,222,058 ton/yr

S2PT

Long-Term Stockpile Ore Processed (to Crusher)

4,978,317 t/yr

Donlin

5,487,648 ton/yr

Wast

In-Pit Waste (including OVB and PAG) Removed

111,440,559 t/yr

Donlin

122,842,043 ton/yr

W&C

Waste (including OVB) Deposited to Waste Dump

111,408,572 t/yr

Donlin

122,806,782 ton/yr

OVB

OVB Stockpiled

0 t/yr

Donlin

0 ton/yr

PAG

PAG Stockpiled

31,987 t/yr

Donlin

35,260 ton/yr

OVB

Stockpiled OVB to Waste Dump Reclamation

636,000 t/yr

Donlin

701,069 ton/yr

PAG

Stockpiled PAG to In-Pit Backfill

0 t/yr

Donlin

0 ton/yr

W-BF

In-Pit Waste to In-Pit Backfill

0 t/yr

Donlin

0 ton/yr

W-TI

Waste Deposited to Tails Dam

0 t/yr

Donlin

0 ton/yr

Operation

365 days/yr

24 hr/day

Emission Factor(s)

Emission Factor Equation

U = Mean wind speed

M = Material moisture content

PM2.5

PM10

PM

k = Particle size multiplier

E = Emission factor

E = 0.0032k(U/5)<sup>1.3</sup>/(M/2)<sup>1.4</sup>

7.947 mph

2.5 %

AP-42, Sec. 13.2.4, Eq. 1, 11/06

American Ridge 07/05 - 06-10

Donlin

0.053

0.35

0.74

AP-42, Sec. 13.2.4, Pg. 4, 11/06

0.000227

0.001497

0.003164 lb/ton

Ore Loading (In-Pit)

(EU ID: 115)

Emissions

(lb/hr)\*

(lb/day)\*

(ton/yr)

PM2.5

PM10

PM

1.2

27.7

1.8

7.6

183.2

12.0

16.1

387.3

25.4

Note: For modeling, emissions from this activity are adjusted hourly based on wind speed and modeled using an hourly file.

\* Based on the daily maximum ore processing rate.

Ore Unloading (Long-Term Stockpile)

(EU ID: 117)

Emissions

(lb/hr)

(lb/day)

(ton/yr)

PM2.5

PM10

PM

0.00

0.0

0.00

0.00

0.0

0.00

0.00

0.00

Conversion(s):

2,000 lb/ton

1.1023 ton/t

2.2369 mph/mps

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>		BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>		PAGE: <div>5</div>	OF: <div>11</div>	SHEET: <div>Mining</div>
	SUBJECT: <div>Mining Activity Emissions</div>		DATE: <div>October 14, 2021</div>		

Calculations for LOM: 19

Material Handling (Loading and Unloading) (EU ID: 115-120) - continued

Ore Unloading (Short-Term Stockpile) <sup>(1)</sup> (EU ID: 116)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.2	4.5	0.8
PM10	1.2	29.6	5.4
PM	2.6	62.6	11.4

<sup>(1)</sup> See Mill emissions for ore unloading at crusher

Ore Reloading (Long-Term Stockpile) <sup>(1)</sup> (EU ID: 118)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.1	3.4	0.6
PM10	0.9	22.5	4.1
PM	2.0	47.6	8.7

<sup>(1)</sup> See Mill emissions for ore unloading at crusher

Waste (including OVB and PAG) Loading (In-Pit) (EU ID: 119)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	3.2	76.3	13.9
PM10	21.0	503.7	91.9
PM	44.4	1,065.0	194.4

Note: For modeling, emissions from this activity are adjusted hourly based on wind speed and modeled using an hourly file.

Waste (including OVB\*) Unloading (Waste Dump) (EU ID: 120)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	3.2	76.7	14.0
PM10	21.1	506.4	92.4
PM	44.6	1,070.7	195.4

Note: For modeling, emissions from this activity are adjusted hourly based on wind speed and modeled using an hourly file.

\* Includes stockpiled OVB for reclamation

OVB Unloading (OVB Stockpile)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.0	0.0	0.0
PM10	0.0	0.0	0.0
PM	0.0	0.0	0.0

OVB Reloading (OVB Stockpile)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.0	0.4	0.1
PM10	0.1	2.9	0.5
PM	0.3	6.1	1.1

PAG Unloading (PAG Stockpile)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.0	0.0	0.0
PM10	0.0	0.1	0.0
PM	0.0	0.3	0.1

PAG Reloading (PAG Stockpile)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.0	0.0	0.0
PM10	0.0	0.0	0.0
PM	0.0	0.0	0.0

Backfill (PAG and In-Pit Waste) Unloading (In-Pit)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.0	0.0	0.0
PM10	0.0	0.0	0.0
PM	0.0	0.0	0.0

Waste Unloading (Tails Dam)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.0	0.0	0.0
PM10	0.0	0.0	0.0
PM	0.0	0.0	0.0

Note: For modeling, emissions from this activity are adjusted hourly based on wind speed and modeled using an hourly file.

Sample Calculations

PM10 - Ore Loading

	(Activity)	(PM10 EF)	(Conversion)
12.0 ton/yr	16,049,018 <del>ton</del>	0.0015 <del>lb</del>	ton
	yr	<del>ton</del>	2,000 <del>lb</del>

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.



Air Sciences Inc.  AIR EMISSION CALCULATIONS				PROJECT TITLE: Donlin Gold		BY: E. Memon		
				PROJECT NO: 281-1-2		PAGE: 6	OF: 11	SHEET: Mining
				SUBJECT: Mining Activity Emissions		DATE: October 14, 2021		
Calculations for LOM: 19								
Material Hauling (EU ID: 160)								
Activity Information								
Ore Hauled (from Pit and Stockpile)		19,537,758 t/yr	Donlin		OPSUM_P1			
		21,536,666 ton/yr						
Ore-VKT		601,694 VKT/yr	Donlin					
		373,876 VMT/yr						
Waste Hauled* (from Pit and Stockpile)		112,076,559 t/yr	Donlin					
* Includes OVB and PAG		123,543,112 ton/yr						
Waste-VKT		6,993,016 VKT/yr	Donlin					
		4,345,270 VMT/yr						
Operation		365 days/yr						
		24 hr/day						
Control Type		Water/Chemical Application						
Control Efficiency		90%			Based on AP-42, Figures 13.2.2-2 & 13.2.2-5, 11/06. See note below.			
Truck Hauling Fraction Calculation								
351-	Liebherr T282B	7,237,451 t-km	95.3%	Donlin	APP_C4_23			
131-	Caterpillar 785C	357,259 t-km	4.7%	Donlin				
Haul Truck Information								
Make and Model		Empty (ton)	Payload (ton)	Total (ton)				
Liebherr T282B		261	400	661	Liebherr, BK-RP LME 1100398-web-08.10			
Caterpillar 785C		116	159	275	Caterpillar, AEHQ5320-02 (4-02)			
Emission Factor(s)								
Emission Factor Equation		E = k(s/12) <sup>a</sup> (W/3) <sup>b</sup> [(365-P)/365]		AP-42, Sec. 13.2.2, Eqs. 1a and 2, 11/06				
s = Surface material silt content		3.8 %		(2)				
W = Mean vehicle weight		448.5 ton		Average of empty and full weights of fleet.				
P = Days/year with ≥0.01 in precip.		129		American Ridge, 2007-08, 2010-12				
(2) AP-42, Chapter 13.2-2, Related Information "r13s0202_dec03.xls" ( <a href="http://www.epa.gov/ttn/chieff/ap42/ch13/related/c13s02-2.html">http://www.epa.gov/ttn/chieff/ap42/ch13/related/c13s02-2.html</a> )								
		PM2.5	PM10	PM				
k = Size-specific empirical constant		0.15	1.5	4.9	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06			
a = Size-specific empirical constant		0.9	0.9	0.7	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06			
b = Size-specific empirical constant		0.45	0.45	0.45	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06			
E = Size-specific emission factor		0.33	3.28	13.48 lb/VMT				
Ore Hauling								
Emissions		(lb/hr)	(lb/day)	(ton/yr)				
PM2.5		1.4	33.6	6.1				
PM10		14.0	336.0	61.3				
PM		57.6	1,381.2	252.1				
Note:								
In section 13.2.2 of AP-42, Figures 13.2.2-2 and 13.2.2-5 provide estimated unpaved road control efficiencies for water application and chemical dust suppressants. These figures provide a range of up to 95 percent control for water application only and a range of up to 91 percent control for chemical application only. Donlin will apply a combination of water (or snow, as applicable) and chemical dust suppressant. In addition, see Section 2.18 of Appendix C and Section 3.7.1 of Appendix D								
Conversion(s):		2,000 lb/ton						
		1.1023 ton/t						
		1.609 km/mi						
Numbers in blue are direct entries. Green text/numbers are lookup codes or results.								

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 7	OF: 11	SHEET: Mining
	SUBJECT: Mining Activity Emissions		DATE: October 14, 2021		

Calculations for LOM: 19

Material Hauling (EU ID: 160) - continued

Waste Hauling

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	16.3	390.5	71.3
PM10	162.7	3,904.5	712.6
PM	668.9	16,052.9	2,929.6

Sample Calculations

PM10 - Waste Hauling

	(Activity)	(PM10 EF)	(Conversion)	(Control)
712.6 ton/yr	4,345,270 VMT	3.3 lb	ton	(1 - 0.9)
	yr	VMT	2,000 lb	

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 8	SHEET: 11 Mining
	SUBJECT: Mining Activity Emissions		DATE: October 14, 2021	

Calculations for LOM: 19

**Maintenance Equipment (EU ID: 121-123)**

**Activity Information**

DOZ Dozer Use 75,495 hr/yr Donlin APP\_C4\_23

GRA Grader Use 45,653 hr/yr Donlin

Eqp. Water Truck Use 11,795 hr/yr Donlin

HT\_ Water Truck Speed 18.58 kph Average haul truck speed HaulDist AirModel

136,168 VMT

Operation 365 days/yr

24 hr/day

**Control and Efficiency**

Dozer Use None 0%

Grader Use None 0%

Water Truck Use Water/Chemical Application 90% Based on AP-42, Figures 13.2.2-2 & 13.2.2-5, 11/06. See note below.

**Dozer Use**

**Emission Factor(s)**

Emission Factor Equation TSP (lb/hr) = 5.7 (s)<sup>1.2</sup> / (M)<sup>1.3</sup> AP-42, Tab. 11.9-1, 07/98, (bulldozing, overburden)

PM15 (lb/hr) = 1 (s)<sup>1.5</sup> / (M)<sup>1.4</sup> AP-42, Tab. 11.9-1, 07/98, (bulldozing, overburden)

M = Material moisture content 2.5 % Donlin

s = Surface material silt content 3.8 % (2)

<sup>(2)</sup> AP-42, Chapter 13.2-2, Related Information "r13s0202\_dec03.xls" (<http://www.epa.gov/ttn/chief/ap42/ch13/related/c13s02-2.html>)

**PM Scaling Factors (SF)**

PM2.5 0.105 AP-42, Tab. 11.9-1, 07/98, (applies to TSP EF, footnote e)

PM10 0.75 AP-42, Tab. 11.9-1, 07/98, (applies to PM15 EF, footnote d)

**Estimated Emission Factors**

PM2.5 0.9 lb/hr

PM10 1.54 lb/hr

PM 8.60 lb/hr

**Dozer Use (EU ID: 122)**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	7.78	186.7	34.1
PM10	13.28	318.6	58.1
PM	74.08	1,777.9	324.5

**Sample Calculations**

**PM10 - Dozer Use**

58.1 ton/yr	(Activity)	(PM10 EF)	(Conversion)	(Control)
	75,495 hr/yr	1.5 lb/hr	ton	(1 - 0)
		hr	2,000 lb	

**Grader Use**

**Emission Factor(s)**

Emission Factor Equation TSP (lb/VMT) = 0.04 (S)<sup>2.5</sup> AP-42, Tab. 11.9-1, 07/98, (grading)

PM15 (lb/VMT) = 0.051 (S)<sup>2</sup> AP-42, Tab. 11.9-1, 07/98, (grading)

S = Mean vehicle speed 3 mph Donlin

Note:

In section 13.2.2 of AP-42, Figures 13.2.2-2 and 13.2.2-5 provide estimated unpaved road control efficiencies for water application and chemical dust suppressants. These figures provide a range of up to 95 percent control for water application only and a range of up to 91 percent control for chemical application only. Donlin will apply a combination of water (or snow, as applicable) and chemical dust suppressant. In addition, see Section 2.18 of Appendix C and Section 3.7.1 of Appendix D

Conversion(s): 2,000 lb/ton

1.609 km/mi

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

Air Sciences Inc.  AIR EMISSION CALCULATIONS	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 9	OF: 11	SHEET: Mining
	SUBJECT: Mining Activity Emissions		DATE: October 14, 2021		

Calculations for LOM: 19

Maintenance Equipment (EU ID: 121-123) - continued

PM Scaling Factors (SF)

PM2.50.031

PM100.6

AP-42, Tab. 11.9-1, 07/98, (applies to TSP EF, footnote e)

AP-42, Tab. 11.9-1, 07/98, (applies to PM15 EF, footnote d)

Estimated Emission Factors

PM2.50.02 lb/VMT

PM100.28 lb/VMT

PM0.62 lb/VMT

Grader Use(EU ID: 123)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.30	7.3	1.3
PM10	4.31	103.3	18.9
PM	9.75	234.0	42.7

Sample Calculations

PM10 - Grader Use

18.9 ton/yr

(Activity)45,653 #/yr

(PM10 EF)0.3 #/VMT

(Speed)3 #/VMT

(Conversion)ton2,000 #

(Control)(1 - 0)

Water Truck Use

Truck Specifications

Make and ModelEmpty (ton)Payload (ton)Total (ton)

Caterpillar 785C116134249

Caterpillar, AEHQ5320-02 (4-02)

32,000 gal

Emission Factor(s)

Emission Factor Equation

$E = k(s/12)^a (W/3)^b [(365-P)/365]$

AP-42, Sec. 13.2.2, Eqs. 1a and 2, 11/06

s = Surface material silt content3.8 %

(1) AP-42, Chapter 13.2-2, Related Information "r13s0202\_dec03.xls" (http://www.epa.gov/ttn/chieff/ap42/ch13/related/c13s02-2.html)

W = Mean vehicle weight183 ton

Average of empty and full weights

P = Days/year with ≥0.01 in precip.129

American Ridge, 2007-08, 2010-12

PM2.5

PM10

PM

k = Size-specific empirical constant0.151.54.9 lb/VMT

a = Size-specific empirical constant0.90.90.7

b = Size-specific empirical constant0.450.450.45

E = Size-specific emission factor0.222.199.00 lb/VMT

AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06

AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06

AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06

Water Truck Use(EU ID: 121)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.3	8.2	1.5
PM10	3.4	81.7	14.9
PM	14.0	335.8	61.3

Sample Calculations

PM10 - Water Truck Use

14.9 ton/yr

(Activity)136,168 #/VMT

(PM10 EF)2.2 #/VMT

(Conversion)ton2,000 #

(Control)(1 - 0.9)

Conversion(s):

2,000 lb/ton

8.345 lb/gal water

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

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<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>		BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>		PAGE: <div>11</div>	OF: <div>11</div>	SHEET: <div>Mining</div>
	SUBJECT: <div>Mining Activity Emissions</div>		DATE: <div>October 14, 2021</div>		

Calculations for LOM:19

Wind Erosion of Exposed Surfaces (EU ID: 161) - continued

Exposed Stockpile/Waste Rock Facility

Emissions <sup>(1)</sup>	PM2.5			PM10			PM		
	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
WA Waste Rock Facility <sup>(2)</sup>	0.36	8.61	1.57	2.39	57.39	10.47	4.78	114.79	20.95
STF Short-term Stockpile	0.01	0.13	0.02	0.04	0.90	0.16	0.07	1.79	0.33
LTF Long-term Stockpile West	0.01	0.16	0.03	0.04	1.04	0.19	0.09	2.08	0.38
LTF Long-term Stockpile East (& PAG)	0.01	0.27	0.05	0.07	1.78	0.33	0.15	3.57	0.65
OV Overburden Stockpile South	0.003	0.08	0.02	0.02	0.56	0.10	0.05	1.12	0.20

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>		BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>		PAGE: <div>1</div>	OF: <div>4</div>	SHEET: <div>Machines</div>
	SUBJECT: <div>Mobile Machinery Tailpipes</div>		DATE: <div>October 14, 2021</div>		

Calculations for LOM:19

Mobile Machinery Tailpipes Emissions Summary (ton/yr)

Machinery Type	Output (hp-hr/yr)	CO	NOx	PM	SO2	VOC
Hydraulic Shovel	9,954,953	28.64	28.64	0.33	0.05	1.55
Front-End Loader	11,594,785	33.36	33.36	0.38	0.06	1.81
Haul Truck	594,518,171	1,710.42	1,710.42	19.55	3.23	92.85
Drill	30,233,452	86.98	79.16	0.94	0.16	4.72
Track Dozer	27,401,903	78.83	55.94	0.75	0.15	4.28
Wheel Dozer	11,963,331	34.42	34.42	0.39	0.07	1.87
Grader	10,220,103	29.40	3.36	0.17	0.06	1.60
Water Truck	5,794,339	16.67	16.67	0.19	0.03	0.90
Hydraulic Excavator	4,519,036	13.00	9.96	0.13	0.02	0.71
Fuel Truck	2,089,431	6.01	6.01	0.07	0.01	0.33
Service Truck	171,440	0.49	0.06	0.003	0.001	0.03
Mobile Crane	214,301	0.62	0.07	0.004	0.001	0.03
Low Boy Truck	1,000,069	2.88	0.33	0.02	0.01	0.16
Tire Handler	1,428,671	4.11	0.47	0.02	0.01	0.22
Light Plant	3,428,810	0.00	0.00	0.00	0.00	0.00
Total		2,045.83	1,978.87	22.95	3.87	111.06

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<div style="text-align: center;"> <b>Air Sciences Inc.</b>   <b>AIR EMISSION CALCULATIONS</b> </div>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 2	SHEET: Machines
	SUBJECT: Mobile Machinery Tailpipes		DATE: October 14, 2021	

Calculations for LOM:

19

Mobile Machinery

Machinery Specifications

Make and Model <sup>(1)</sup>	Type	Engine	Rating (hp) <sup>(1)</sup>	Units <sup>(1)</sup>
Eqp Komatsu PC8000	Hydraulic Shovel	2 X Komatsu SDA16V160	4,020	1
Eqp LeTourneau L2350	Front-End Loader	MTU/DD 16V4000	2,300	2
Eqp Caterpillar 994F	Front-End Loader	Cat 3516B	1,577	1
Eqp Liebherr T282C	Haul Truck	MTU/DD 20V4000	3,755	69
Eqp Caterpillar 785C	Haul Truck	Cat 3512B	1,450	8
Eqp Atlas Copco PV 275	Drill	Cat C32 ACERT	950	5
Eqp Atlas Copco DML	Drill	Cat C27 ACERT	800	14
Eqp Atlas Copco L8	Drill		540	5
Eqp Caterpillar D11T	Track Dozer	Cat C27 ACERT	850	6
Eqp Caterpillar D10T	Track Dozer	Cat C32 ACERT	646	4
Eqp Caterpillar 854G	Wheel Dozer	Cat C32 ACERT	904	6
Eqp Caterpillar 24H	Grader	Cat C13 ACERT	533	3
Eqp Caterpillar 16H	Grader	Cat C18 ACERT	297	7
Eqp Caterpillar 785C	Water Truck	Cat 3512B	1,450	4
Eqp Caterpillar 390DL	Hydraulic Excavator	Cat C18 ATAAC	523	1
Eqp Komatsu PC2000	Hydraulic Excavator		976	2
Eqp Caterpillar 777F	Fuel Truck	Cat C32 ACERT	1,016	2
Eqp QTE Body on Peterbilt Chassis	Service Truck		300	1
Eqp Grove GMK6350 (200T)	Mobile Crane	Benz OM906LA	563	1
Eqp QTE Body on Peterbilt Chassis	Low Boy Truck		300	1
Eqp Caterpillar 988	Tire Handler		501	2
Eqp Terex LT7000	Light Plant		25	20

(1) Donlin

Operation

365 day/yr

24 hr/day

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.



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<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>		BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>		PAGE: <div>4</div>	OF: <div>4</div>	SHEET: <div>Machines</div>
	SUBJECT: <div>Mobile Machinery Tailpipes</div>		DATE: <div>October 14, 2021</div>		

Calculations for LOM:19

Machine-Specific Emissions

(ton/yr)

Make and Model	PM	NOx	NMHC	CO	SO2 <sup>(1)</sup>
Komatsu PC8000	0.33	28.64	1.55	28.64	0.05
LeTourneau L2350	0.33	28.84	1.57	28.84	0.05
Caterpillar 994F	0.05	4.52	0.25	4.52	0.01
Liebherr T282C	19.14	1,675.18	90.94	1,675.18	3.17
Caterpillar 785C	0.40	35.24	1.91	35.24	0.07
Atlas Copco PV 275	0.25	21.55	1.17	21.55	0.04
Atlas Copco DML	0.65	56.61	3.07	56.61	0.11
Atlas Copco L8	0.05	1.01	0.48	8.83	0.02
Caterpillar D11T	0.61	52.99	2.88	52.99	0.10
Caterpillar D10T	0.15	2.95	1.40	25.85	0.05
Caterpillar 854G	0.39	34.42	1.87	34.42	0.07
Caterpillar 24H	0.06	1.23	0.59	10.78	0.02
Caterpillar 16H	0.11	2.13	1.01	18.63	0.04
Caterpillar 785C	0.19	16.67	0.90	16.67	0.03
Caterpillar 390DL	0.02	0.39	0.19	3.43	0.01
Komatsu PC2000	0.11	9.57	0.52	9.57	0.02
Caterpillar 777F	0.07	6.01	0.33	6.01	0.01
QTE Body on Peterbilt Chassis	0.003	0.06	0.03	0.49	0.001
Grove GMK6350 (200T)	0.004	0.07	0.03	0.62	0.001
QTE Body on Peterbilt Chassis	0.02	0.33	0.16	2.88	0.01
Caterpillar 988	0.02	0.47	0.22	4.11	0.01
Terex LT7000					Set to zero per ADEC 3/16/2015
Total Emissions	22.95	1,978.87	111.06	2,045.83	3.87

<sup>(1)</sup> Based on15 ppm S content and diesel density of6.74 lb/galMSDS - Ultra Low Sulfur Diesel No. 1

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

October 14, 2021

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>					BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>					PAGE: <div>2</div>	OF: <div>7</div>	SHEET: <div>Summary</div>
	SUBJECT: <div>Emissions Summary</div>					DATE: <div>October 14, 2021</div>		

Calculations for LOM:20

Detailed Emissions Summary (ton/yr)								
Activity	Rate	CO	NOx	PM2.5	PM10	PM	SO2	VOC
Mining Activities - Subtotal		1,921	52	162	1,307	4,601	0.17	0.00
Drilling (EU ID: 113)	158,920 holes/yr			3.10	53.71	103.30		
Blasting (EU ID: 114)	521 blasts/yr	1,921	51.61	4.55	78.83	151.60	0.17	
Material Handling (Loading and Unloading) (EU ID: 115-120)								
Ore Loading (In-Pit)	17,058,389 ton/yr			1.93	12.77	26.99		
Ore Unloading (Short-Term Stockpile)	7,672,868 ton/yr			0.87	5.74	12.14		
Ore Unloading (Long-Term Stockpile)	7,572 ton/yr			0.00	0.01	0.01		
Ore Reloading (Long-Term Stockpile)	4,585,798 ton/yr			0.52	3.43	7.26		
Waste (incl. OVB/PAG) Loading (In-Pit)	148,288,108 ton/yr			16.80	111.0	234.6		
Waste (incl. OVB/PAG) Un- & Re-loading	153,389,715 ton/yr			17.38	114.8	242.7		
Material Hauling (EU ID: 160)								
Ore Hauling	406,810 VMT/yr			6.70	67.01	275.5		
Waste Hauling	4,618,097 VMT/yr			76.07	760.7	3,127		
Maintenance Equipment (EU ID: 121-123)								
Dozer Use	64,028 hr/yr			28.90	49.31	275.2		
Grader Use	45,653 hr/yr			1.32	18.86	42.70		
Water Truck Use	13,953 hr/yr			1.86	18.57	76.33		
Wind Erosion of Exposed Surfaces (EU ID: 161)								
Tailings Beach (Dry)	878 acre			0.30	2.01	4.01		
Haul Roads	215 acre			0.13	0.90	1.79		
Access Roads	143 acre			0.09	0.60	1.19		
Waste Rock Facility	variable acre			1.22	8.17	16.33		
Short-term Stockpile	variable acre			0.03	0.17	0.34		
Long-term Stockpile West	variable acre			0.0285	0.1901	0.380		
Long-term Stockpile East (& PAG)	variable acre			0.0490	0.3264	0.653		
Overburden Stockpile South	variable acre			0.0153	0.1021	0.204		
Power Generation - Subtotal		367.0	1,033	564.2	564.2	564.2	11.54	1,124
Power Plant Generators (12)	204,912 kWVe	350.1	1,031	564.1	564.1	564.1	11.51	1,123
Airport Generators (2)	400 kWVe	16.90	1.93	0.097	0.097	0.097	0.026	0.92
Mobile Machinery - Subtotal		1,966	1,898	22.03	22.03	22.03	3.71	106.7
Hydraulic Shovel	11,046,049 hp-hr/yr	31.78	31.78	0.36	0.36	0.36	0.06	1.73
Front-End Loader	12,683,216 hp-hr/yr	36.49	36.49	0.42	0.42	0.42	0.07	1.98
Haul Truck	562,694,041 hp-hr/yr	1,619	1,619	18.50	18.50	18.50	3.06	87.88
Drill	37,261,674 hp-hr/yr	107.20	98.16	1.17	1.17	1.17	0.20	5.82
Track Dozer	20,079,105 hp-hr/yr	57.77	34.87	0.51	0.51	0.51	0.11	3.14
Wheel Dozer	11,963,331 hp-hr/yr	34.42	34.42	0.39	0.39	0.39	0.07	1.87
Grader	10,220,103 hp-hr/yr	29.40	3.36	0.17	0.17	0.17	0.06	1.60
Water Truck	6,854,052 hp-hr/yr	19.72	19.72	0.23	0.23	0.23	0.04	1.07
Hydraulic Excavator	5,703,012 hp-hr/yr	16.41	13.18	0.17	0.17	0.17	0.03	0.89
Fuel Truck	2,089,431 hp-hr/yr	6.01	6.01	0.07	0.07	0.07	0.01	0.33
Service Truck	171,440 hp-hr/yr	0.49	0.056	0.0028	0.0028	0.0028	0.0009	0.027
Mobile Crane	116,187 hp-hr/yr	0.33	0.038	0.0019	0.0019	0.0019	0.0006	0.018
Low Boy Truck	1,000,069 hp-hr/yr	2.88	0.33	0.016	0.016	0.016	0.0054	0.16
Tire Handler	1,428,671 hp-hr/yr	4.11	0.47	0.023	0.023	0.023	0.0078	0.22
Light Plant	857,202 hp-hr/yr	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<p style="text-align: center;"><b>Air Sciences Inc.</b></p> <p style="text-align: center;"><b>AIR EMISSION CALCULATIONS</b></p>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 3	OF: 7	SHEET: Summary
	SUBJECT: Emissions Summary		DATE: October 14, 2021		

Calculations for LOM:

20

**Detailed Emissions Summary (ton/yr) - continued**

Activity	Rate	CO	NOx	PM2.5	PM10	PM	SO2	VOC
<b>Emergency Equipment - Subtotal</b>		<b>18.74</b>	<b>33.29</b>	<b>1.07</b>	<b>1.07</b>	<b>1.07</b>	<b>0.03</b>	<b>33.29</b>
Black Start Generators (2)	1,200 <i>kWe</i>	2.89	5.29	0.17	0.17	0.17	0.0044	5.29
Emergency Generators (4)	6,000 <i>kWe</i>	14.47	26.46	0.83	0.83	0.83	0.022	26.46
Fire Pumps (3)	756 <i>hp</i>	1.38	1.54	0.079	0.079	0.079	0.00205	1.54
<b>Processing Operations - Subtotal</b>		<b>774.88</b>	<b>0.08</b>	<b>64.50</b>	<b>80.63</b>	<b>101.81</b>	<b>9.79</b>	<b>2.30</b>
ROM Ore Discharge and Crushing	5,100 <i>ton/hr</i>			10.92	19.456	30.67		
Coarse Ore Transfer	5,100 <i>ton/hr</i>			9.26	14.081	20.41		
Pebble Crushers and Recycle	660 <i>ton/hr</i>			11.76	14.529	18.16		
Reagents Handling and Mixing				12.61	12.613	12.61		
Refinery Sources		774.9	0.1	10.71	10.71	10.71	9.79	2.30
Laboratories				8.11	8.11	8.11		
Water Treatment Plant				1.13	1.13	1.13		
<b>Boilers - Subtotal</b>		<b>94.94</b>	<b>158.14</b>	<b>8.87</b>	<b>9.49</b>	<b>20.90</b>	<b>1.36</b>	<b>6.52</b>
POX Boilers (2)	58.58 <i>MMBtu/hr</i>	21.13	39.42	1.91	1.97	6.50	0.40	1.38
Oxygen Plant Boiler	20.66 <i>MMBtu/hr</i>	7.45	13.91	0.67	0.70	2.29	0.14	0.49
Carbon Elution Heater	16 <i>MMBtu/hr</i>	5.77	10.77	0.52	0.54	1.78	0.11	0.38
Power Plant Auxiliary Heaters (2)	33 <i>MMBtu/hr</i>	11.90	22.21	1.08	1.11	3.66	0.22	0.78
SO2 Burner	2 <i>MMBtu/hr</i>	0.72	0.86	0.07	0.07	0.07	0.01	0.05
Auxiliary SO2 Burner	2 <i>MMBtu/hr</i>	0.34	1.35	0.02	0.07	0.22	0.01	0.02
Building Heaters (138)	24.15 <i>MMBtu/hr</i>	4.15	9.75	0.79	0.79	0.79	0.06	0.57
Air Handlers (19)	95 <i>MMBtu/hr</i>	34.27	40.79	3.10	3.10	3.10	0.24	2.24
Air Handlers (7)	17.5 <i>MMBtu/hr</i>	6.31	7.51	0.57	0.57	0.57	0.05	0.41
Portable Heaters (20)	17.2 <i>MMBtu/hr</i>	2.89	11.58	0.14	0.58	1.91	0.12	0.20
<b>Incinerators - Subtotal</b>		<b>0.361</b>	<b>0.84</b>	<b>0.33</b>	<b>0.33</b>	<b>0.33</b>	<b>0.531</b>	
Camp Waste Incinerator (EU ID: 27)	0.50 <i>ton/hr</i>	0.351	0.78	0.32	0.32	0.32	0.5197	
Sewage Sludge Incinerator (EU ID: 28)	0.007 <i>ton/hr</i>	0.0096	0.064	0.0089	0.0089	0.0089	0.0110	
<b>Access Roads - Subtotal</b>		<b>4.47</b>	<b>2.29</b>	<b>4.30</b>	<b>43.18</b>	<b>174.15</b>	<b>0.0091</b>	<b>0.183</b>
Camp to Mine Site (EU ID: 158)		0.344	0.113	0.32	3.22	13.09	0.00069	0.0118
Airport to Camp (EU ID: 159)		0.297	0.049	0.186	1.88	7.55	0.00038	0.0113
Jungjuk Port to Mine Site		3.83	2.13	3.79	38.08	153.51	0.0080	0.160
<b>Tanks - Subtotal</b>								<b>1.840</b>
Mine Site Tanks								1.57
Power Plant Tanks								0.018
Camp Site Tanks								0.002
Airport Tanks								0.249

Numbers in *blue* are direct entries. *Green* text/numbers are lookup codes or results.

<p style="text-align: center;"><b>Air Sciences Inc.</b></p> <p style="text-align: center;"><b>AIR EMISSION CALCULATIONS</b></p>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 4	OF: 7	SHEET: Summary
	SUBJECT: Emissions Summary		DATE: October 14, 2021		

**Life-of-Mine Mining Activity, Machinery Tailpipes, Wind Erosion, and Access Roads Emissions Summary (ton/yr)**

LOM	CO	NOX	PM2.5	PM10	PM	SO2	VOC	Total
4	3,097.4	1,159.0	140.7	967.6	3,241.6	2.40	63.80	8,672
5	3,240.5	1,302.9	151.3	1,059.9	3,579.6	2.67	71.57	9,408
6	3,296.9	1,354.7	165.6	1,162.4	3,945.9	2.77	74.63	10,003
7	3,411.3	1,465.4	160.6	1,111.1	3,694.8	2.99	80.85	9,927
8	3,568.3	1,622.5	174.0	1,230.8	4,192.8	3.29	89.37	10,881
9	3,702.0	1,752.5	182.6	1,306.3	4,505.3	3.54	96.63	11,549
10	3,484.2	1,539.9	161.1	1,110.2	3,722.6	3.13	84.80	10,106
11	3,487.7	1,547.0	169.6	1,193.9	4,072.5	3.13	84.99	10,559
12	3,602.4	1,664.9	166.6	1,149.6	3,883.6	3.35	91.22	10,562
13	3,692.2	1,755.7	176.8	1,243.7	4,278.9	3.52	96.09	11,247
14	3,764.3	1,829.3	176.4	1,226.7	4,194.0	3.66	100.01	11,294
15	3,868.1	1,930.2	181.7	1,271.3	4,371.9	3.85	105.64	11,733
16	3,967.8	2,031.7	192.4	1,364.1	4,741.4	4.04	111.06	12,413
17	3,900.3	1,961.9	190.0	1,351.5	4,702.9	3.91	107.39	12,218
18	3,894.6	1,958.2	183.7	1,296.9	4,534.0	3.90	107.08	11,978
19	3,971.3	2,032.8	182.3	1,280.6	4,518.4	4.05	111.24	12,101
20	3,891.3	1,951.6	188.2	1,372.3	4,796.7	3.90	106.90	12,311
21	3,559.2	1,621.3	183.2	1,319.9	4,577.1	3.27	88.88	11,353
22	2,749.4	829.9	123.3	844.7	2,784.6	1.74	44.91	7,379
23	2,522.8	616.3	91.5	614.4	2,059.2	1.31	32.61	5,938
24	2,551.2	643.7	80.9	535.1	1,863.7	1.36	34.15	5,710
25	2,199.0	309.0	46.7	286.5	1,022.7	0.70	15.03	3,880
26	2,013.3	141.8	15.1	129.4	473.7	0.35	4.95	2,779
27	2,001.7	130.1	13.8	118.5	435.0	0.33	4.32	2,704

Red numbers represent the highest values

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>		BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>		PAGE: <div>5</div>	OF: <div>7</div>	SHEET: <div>Summary</div>
	SUBJECT: <div>Emissions Summary</div>		DATE: <div>October 14, 2021</div>		

TOT\_MINING\_FU\TOT\_MINING\_FUG\_NOX\TOT\_MINING\_FUG\_ TOT\_MINING\_FU\TOT\_MINING\_I\TOT\_MINING\_FUG\_SO2

Life-of-Mine Mining Activity Fugitive Emissions Summary (ton/yr)

APP\_C4\_23

LOM	CO	NOX	PM2.5	PM10	PM	SO2
4	1,921	51.61	121.4	897.7	3,027	0.17
5	1,921	51.61	130.3	988.5	3,364	0.17
6	1,921	51.61	143.8	1,089.0	3,727	0.17
7	1,921	51.61	137.5	1,036.2	3,474	0.17
8	1,921	51.61	149.1	1,154.0	3,970	0.17
9	1,921	51.61	156.4	1,228.9	4,283	0.17
10	1,921	51.61	137.1	1,034.4	3,501	0.17
11	1,921	51.61	145.6	1,117.9	3,850	0.17
12	1,921	51.61	141.2	1,072.2	3,660	0.17
13	1,921	51.61	150.5	1,166.2	4,056	0.17
14	1,921	51.61	149.1	1,147.3	3,968	0.17
15	1,921	51.61	153.3	1,190.6	4,145	0.17
16	1,921	51.61	162.8	1,282.2	4,513	0.17
17	1,921	51.61	161.3	1,271.4	4,477	0.17
18	1,921	51.61	155.1	1,216.5	4,307	0.17
19	1,921	51.61	152.9	1,199.7	4,292	0.17
20	1,921	51.61	160.0	1,294.6	4,576	0.17
21	1,921	51.61	159.2	1,248.8	4,365	0.17
22	1,921	51.61	108.4	782.9	2,582	0.17
23	1,921	51.61	79.2	555.3	1,860	0.17
24	1,921	51.61	68.2	475.5	1,664	0.17
25	1,921	51.61	38.0	230.9	827	0.17
26	1,921	51.61	8.4	75.9	280	0.17
27	1,921	51.61	7.3	65.8	243	0.17

Red numbers represent the highest values

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

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<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 7	OF: 7	SHEET: Summary
	SUBJECT: Emissions Summary		DATE: October 14, 2021		

**Life-of-Mine Wind Erosion and Access Road Fugitive Emissions Summary (ton/yr)**

LOM	CO	NOX	PM2.5	PM10	PM	SO2	VOC
4	4.47	2.29	6.37	56.95	201.70	0.01	0.18
5	4.47	2.29	6.35	56.82	201.43	0.01	0.18
6	4.47	2.29	6.55	58.14	204.09	0.01	0.18
7	4.47	2.29	6.58	58.33	204.47	0.01	0.18
8	4.47	2.29	6.60	58.49	204.77	0.01	0.18
9	4.47	2.29	6.47	57.60	203.00	0.01	0.18
10	4.47	2.29	6.60	58.47	204.74	0.01	0.18
11	4.47	2.29	6.61	58.55	204.90	0.01	0.18
12	4.47	2.29	6.62	58.62	205.04	0.01	0.18
13	4.47	2.29	6.49	57.74	203.28	0.01	0.18
14	4.47	2.29	6.64	58.79	205.38	0.01	0.18
15	4.47	2.29	6.66	58.87	205.55	0.01	0.18
16	4.47	2.29	6.67	58.98	205.76	0.01	0.18
17	4.47	2.29	6.51	57.91	203.63	0.01	0.18
18	4.47	2.29	6.58	58.33	204.46	0.01	0.18
19	4.47	2.29	6.51	57.91	203.63	0.01	0.18
20	4.47	2.29	6.17	55.63	199.05	0.01	0.18
21	4.47	2.29	5.75	52.84	193.48	0.01	0.18
22	4.47	2.29	5.73	52.70	193.21	0.01	0.18
23	4.47	2.29	5.70	52.51	192.81	0.01	0.18
24	4.47	2.29	5.72	52.60	192.99	0.01	0.18
25	4.47	2.29	5.71	52.55	192.89	0.01	0.18
26	4.47	2.29	5.71	52.56	192.91	0.01	0.18
27	4.47	2.29	5.60	51.84	191.48	0.01	0.18

*Red numbers represent the highest values*

*Numbers in blue are direct entries. Green text/numbers are lookup codes or results.*

Air Sciences Inc.	PROJECT TITLE: Donlin Gold					BY: E. Memon		
	PROJECT NO: 281-1-2					PAGE: 1	OF: 11	SHEET: Mining
	SUBJECT: Mining Activity Emissions					DATE: October 14, 2021		
AIR EMISSION CALCULATIONS								

Calculations for LOM: 20Max Daily Ore: Yes

Mining Activity Emissions Summary

HgDustPM2.5HgDustPM10HgDust

Particulate Emissions								
Activity	Rate	PM2.5		PM2.5		PM10		PM
		(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(ton/yr)
Drilling (EU ID: 113)	158,920 holes/yr	0.71	16.98	3.10	12.26	294.33	53.71	103.3
Blasting (EU ID: 114)	521 blasts/yr	87.30	87.30	4.55	1,513.12	1,513.12	78.83	151.6
Material Handling (Loading and Unloading) (EU ID: 115-120)								
Ore Loading (In-Pit)	17,058,389 ton/yr	1.16	27.74	1.93	7.63	183.19	12.77	27.0
Ore Unloading (Short-Term Stockpile)	7,672,868 ton/yr	0.20	4.76	0.87	1.31	31.46	5.74	12.1
Ore Unloading (Long-Term Stockpile)	7,572 ton/yr	0.00	0.00	0.00	0.00	0.03	0.01	0.0
Ore Reloading (Long-Term Stockpile)	4,585,798 ton/yr	0.12	2.85	0.52	0.78	18.80	3.43	7.3
Waste (incl. OVB/PAG) Loading (In-Pit)	148,288,108 ton/yr	3.84	92.07	16.80	25.33	608.04	110.97	234.6
Waste (incl. OVB/PAG) Un- & Re-loading	153,389,715 ton/yr	3.97	95.24	17.38	26.21	628.96	114.78	242.7
Material Hauling (EU ID: 160)								
Ore Hauling	406,810 VMT/yr	1.53	36.72	6.70	15.30	367.16	67.01	275.5
Waste Hauling	4,618,097 VMT/yr	17.37	416.80	76.07	173.67	4,167.99	760.66	3,127.3
Maintenance Equipment (EU ID: 121-123)								
Dozer Use	64,028 hr/yr	6.60	158.33	28.90	11.26	270.21	49.31	275.2
Grader Use	45,653 hr/yr	0.30	7.25	1.32	4.31	103.34	18.86	42.7
Water Truck Use	13,953 hr/yr	0.42	10.17	1.86	4.24	101.73	18.57	76.3
Wind Erosion of Exposed Surfaces (EU ID: 161)								
Tailings Beach (Dry)	878.3 acre	0.07	1.65	0.30	0.46	10.99	2.01	4.01
Haul Roads	214.7 acre	0.03	0.74	0.13	0.20	4.91	0.90	1.79
Access Roads	143.0 acre	0.02	0.49	0.09	0.14	3.27	0.60	1.19
Waste Rock Facility	variable acre	0.28	6.71	1.22	1.86	44.75	8.17	16.33
Short-term Stockpile	variable acre	0.01	0.14	0.03	0.04	0.92	0.17	0.34
Long-term Stockpile West	variable acre	0.0065	0.16	0.029	0.043	1.04	0.19	0.38
Long-term Stockpile East (& PAG)	variable acre	0.0112	0.27	0.049	0.075	1.79	0.33	0.65
Overburden Stockpile South	variable acre	0.0035	0.08	0.015	0.023	0.56	0.10	0.20
Total		123.93	966.45	161.86	1,798.26	8,356.59	1,307.10	4,600.55

Other Emissions

Activity	CO			NOx			SO2		
	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
Blasting (EU ID: 114)	36,870.7	36,870.7	1,921.0	990.56	990.56	51.61	3.30	3.30	0.17

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>		PROJECT TITLE:		Donlin Gold		BY:		E. Memon			
		PROJECT NO:		281-1-2		PAGE:	2	OF:	11	SHEET:	Mining
		SUBJECT:		Mining Activity Emissions		DATE:		October 14, 2021			

Calculations for LOM:

20

Drilling (EU ID: 113)

Activity Information

Total Drilling

2,161,301 m/yr

Donlin

APP\_C4\_23

Drill Hole Depth

13.6 m

Donlin

No. of Holes

158,920 holes/yr

Operation

365 days/yr

24 hr/day

Emission Factor(s)

TSP

1.3 lb/hole

AP-42, Tab. 11.9-4, 7/98 (overburden)

PM Scaling Factors (SF)

PM2.5

0.03

AP-42, Tab. 11.9-1, 7/98 (blasting, overburden)

PM10

0.52

AP-42, Tab. 11.9-1, 7/98 (blasting, overburden)

PM

1

Emissions	(lb/hole)	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.039	0.7	17.0	3.1
PM10	0.676	12.3	294.3	53.7
PM	1.3	23.6	566.0	103.3

Sample Calculations

PM10

53.7 ton/yr

(Activity)

158,920 hole

(TSP EF)

1.3 lb

(Conversion)

ton

(SF)

0.52

yr

hole

2,000 lb

Conversion(s):

2,000 lb/ton

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 3	OF: 11
	SHEET: Mining		DATE: October 14, 2021	

Calculations for LOM: 20

**Blasting (EU ID: 114)**

**Activity Information**

Total Material Mined 149,999,997 t/yr Donlin APP\_C4\_23

BVol 56,571,849 m<sup>3</sup>/yr Donlin

Con: Blasting Agent Use 60,000 t/yr Donlin (11/08/2016)

Excluding Water (13.3%) 52,020 t/yr Donlin

57,342 ton/yr

Blas No. of Blasts 521 blasts/yr Donlin

Bench Height 12 m Donlin

Operation 365 days/yr

24 hr/day

**Emission Factor(s)**

Emission Factor Equation TSP (lb/blast) = 0.000014 x A<sup>1.5</sup> AP-42, Tab. 11.9-1, 7/98 (blasting, overburden)

Where, A = Area per Blast 120,000 ft<sup>2</sup> Donlin (11/08/2016)

TSP 582.0 lb/blast

CO 67 lb/ton-ANFO AP-42, Tab. 13.3-1, 2/80 (ANFO)

NOx 0.9 kg/t-ANFO CSIRO

1.80 lb/ton-ANFO

SO2 0.006 lb/ton-ANFO Based on 15 ppm S in FO and a maximum of 10% FO in ANFO

**PM Scaling Factors (SF)**

PM2.5 0.03

PM10 0.52

AP-42, Tab. 11.9-1, 7/98 (blasting, overburden)

AP-42, Tab. 11.9-1, 7/98 (blasting, overburden)

Emissions	(lb/blast)	(lb/hr) <sup>(1)</sup>	(lb/day) <sup>(1)</sup>	(ton/yr)
PM2.5	17.46	87.30	87.30	4.55
PM10	302.62	1,513.12	1,513.12	78.83
PM	581.97	2,909.85	2,909.85	151.60
CO	7,374.14	36,870.68	36,870.68	1,920.96
NOx	198.11	990.56	990.56	51.61
SO2	0.66	3.30	3.30	0.17

<sup>(1)</sup> Based on: 5 blasts/day, occurring in 1 hour

**Sample Calculations**

**PM10**

78.8 ton/yr

(Activity)	(TSP EF)	(SF)	(Conversion)
521 <del>blast</del> yr	582.0 <del>lb</del> <del>blast</del>	0.52	ton 2,000 <del>lb</del>

**SO2 Emission Factor**

0.006 lb/ton-ANFO

0.000015 <del>lb-S</del> <del>lb-FO</del>	2 lb SO2 <del>lb-S</del>	10% <del>lb-FO</del> <del>lb ANFO</del>	2,000 <del>lb</del> ton
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Conversion(s):

2,000 lb/ton

1.1023 ton/t

2.2046 lb/kg

3.2808 ft/m

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

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<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>		BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>		PAGE: <div>5</div>	OF: <div>11</div>	SHEET: <div>Mining</div>
	SUBJECT: <div>Mining Activity Emissions</div>		DATE: <div>October 14, 2021</div>		

Calculations for LOM: 20

Material Handling (Loading and Unloading) (EU ID: 115-120) - continued

Ore Unloading (Short-Term Stockpile) <sup>(1)</sup> (EU ID: 116)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.2	4.8	0.9
PM10	1.3	31.5	5.7
PM	2.8	66.5	12.1

<sup>(1)</sup> See Mill emissions for ore unloading at crusher

Ore Reloading (Long-Term Stockpile) <sup>(1)</sup> (EU ID: 118)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.1	2.8	0.5
PM10	0.8	18.8	3.4
PM	1.7	39.8	7.3

<sup>(1)</sup> See Mill emissions for ore unloading at crusher

Waste (including OVB and PAG) Loading (In-Pit) (EU ID: 119)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	3.8	92.1	16.8
PM10	25.3	608.0	111.0
PM	53.6	1,285.6	234.6

Note: For modeling, emissions from this activity are adjusted hourly based on wind speed and modeled using an hourly file.

Waste (including OVB\*) Unloading (Waste Dump) (EU ID: 120)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	1.8	42.8	7.8
PM10	11.8	282.4	51.5
PM	24.9	597.1	109.0

Note: For modeling, emissions from this activity are adjusted hourly based on wind speed and modeled using an hourly file.

\* Includes stockpiled OVB for reclamation

OVB Unloading (OVB Stockpile)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.0	0.0	0.0
PM10	0.0	0.0	0.0
PM	0.0	0.0	0.0

OVB Reloading (OVB Stockpile)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.0	0.0	0.0
PM10	0.0	0.0	0.0
PM	0.0	0.0	0.0

PAG Unloading (PAG Stockpile)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.0	0.0	0.0
PM10	0.0	0.2	0.0
PM	0.0	0.4	0.1

PAG Reloading (PAG Stockpile)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.1	1.6	0.3
PM10	0.4	10.5	1.9
PM	0.9	22.1	4.0

Backfill (PAG and In-Pit Waste) Unloading (In-Pit)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	2.1	50.9	9.3
PM10	14.0	335.9	61.3
PM	29.6	710.2	129.6

Waste Unloading (Tails Dam)

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.0	0.0	0.0
PM10	0.0	0.0	0.0
PM	0.0	0.0	0.0

Note: For modeling, emissions from this activity are adjusted hourly based on wind speed and modeled using an hourly file.

Sample Calculations

PM10 - Ore Loading

	(Activity)	(PM10 EF)	(Conversion)
12.8 ton/yr	17,058,389 <del>ton</del>	0.0015 <del>lb</del>	ton
	yr	<del>ton</del>	2,000 <del>lb</del>

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>		<b>PROJECT TITLE:</b> Donlin Gold		<b>BY:</b> E. Memon	
		<b>PROJECT NO:</b> 281-1-2		<b>PAGE:</b> 6	<b>OF:</b> 11
		<b>SUBJECT:</b> Mining Activity Emissions		<b>SHEET:</b> Mining	
				<b>DATE:</b> October 14, 2021	

Calculations for LOM: 20

**Material Hauling (EU ID: 160)**

**Activity Information**

Ore Hauled (from Pit and Stockpile) 19,635,299 t/yr Donlin OPSUM\_P1

21,644,187 ton/yr

654,695 VKT/yr Donlin

406,810 VMT/yr

Waste Hauled\* (from Pit and Stockpile) 136,838,922 t/yr Donlin

150,838,912 ton/yr

7,432,088 VKT/yr Donlin

4,618,097 VMT/yr

Operation 365 days/yr

24 hr/day

Control Type Water/Chemical Application

Control Efficiency 90% Based on AP-42, Figures 13.2.2-2 & 13.2.2-5, 11/06. See note below.

**Truck Hauling Fraction Calculation**

351- Liebherr T282B	7,840,654 t-km	97.0%	Donlin	APP_C4_23
131- Caterpillar 785C	246,129 t-km	3.0%	Donlin	

**Haul Truck Information**

Make and Model	Empty (ton)	Payload (ton)	Total (ton)	
Liebherr T282B	261	400	661	Liebherr, BK-RP LME 1100398-web-08.10
Caterpillar 785C	116	159	275	Caterpillar, AEHQ5320-02 (4-02)

**Emission Factor(s)**

Emission Factor Equation  $E = k(s/12)^a (W/3)^b [(365-P)/365]$  AP-42, Sec. 13.2.2, Eqs. 1a and 2, 11/06

s = Surface material silt content 3.8 % (2)

W = Mean vehicle weight 452.9 ton Average of empty and full weights of fleet.

P = Days/year with ≥0.01 in precip. 129 American Ridge, 2007-08, 2010-12

(2) AP-42, Chapter 13.2-2, Related Information "r13s0202\_dec03.xls" (<http://www.epa.gov/ttn/chieff/ap42/ch13/related/c13s02-2.html>)

	PM2.5	PM10	PM	
k = Size-specific empirical constant	0.15	1.5	4.9	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06
a = Size-specific empirical constant	0.9	0.9	0.7	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06
b = Size-specific empirical constant	0.45	0.45	0.45	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06
E = Size-specific emission factor	0.33	3.29	13.54 lb/VMT	

**Ore Hauling**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	1.5	36.7	6.7
PM10	15.3	367.2	67.0
PM	62.9	1,509.5	275.5

Note:

In section 13.2.2 of AP-42, Figures 13.2.2-2 and 13.2.2-5 provide estimated unpaved road control efficiencies for water application and chemical dust suppressants. These figures provide a range of up to 95 percent control for water application only and a range of up to 91 percent control for chemical application only. Donlin will apply a combination of water (or snow, as applicable) and chemical dust suppressant. In addition, see Section 2.18 of Appendix C and Section 3.7.1 of Appendix D

Conversion(s): 2,000 lb/ton

1.1023 ton/t

1.609 km/mi

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 7	OF: 11	SHEET: Mining
	SUBJECT: Mining Activity Emissions		DATE: October 14, 2021		

Calculations for LOM: 20

Material Hauling (EU ID: 160) - continued

Waste Hauling

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	17.4	416.8	76.1
PM10	173.7	4,168.0	760.7
PM	714.0	17,136.1	3,127.3

Sample Calculations

PM10 - Waste Hauling

	(Activity)	(PM10 EF)	(Conversion)	(Control)
760.7 ton/yr	4,618,097 VMT	3.3 lb	ton	(1 - 0.9)
	yr	VMT	2,000 lb	

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.



<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 8	SHEET: 11 Mining
	SUBJECT: Mining Activity Emissions		DATE: October 14, 2021	

Calculations for LOM: 20

**Maintenance Equipment (EU ID: 121-123)**

**Activity Information**

DOZ Dozer Use 64,028 hr/yr Donlin APP\_C4\_23

GRA Grader Use 45,653 hr/yr Donlin

Eqp. Water Truck Use 13,953 hr/yr Donlin

HT\_ Water Truck Speed 19.56 kph Average haul truck speed HaulDist AirModel

169,623 VMT

Operation 365 days/yr

24 hr/day

**Control and Efficiency**

Dozer Use None 0%

Grader Use None 0%

Water Truck Use Water/Chemical Application 90% Based on AP-42, Figures 13.2.2-2 & 13.2.2-5, 11/06. See note below.

**Dozer Use**

**Emission Factor(s)**

Emission Factor Equation  $TSP (lb/hr) = 5.7 (s)^{1.2} / (M)^{1.3}$  AP-42, Tab. 11.9-1, 07/98, (bulldozing, overburden)

$PM_{15} (lb/hr) = 1 (s)^{1.5} / (M)^{1.4}$  AP-42, Tab. 11.9-1, 07/98, (bulldozing, overburden)

M = Material moisture content 2.5 % Donlin

s = Surface material silt content 3.8 % (2)

<sup>(2)</sup> AP-42, Chapter 13.2-2, Related Information "r13s0202\_dec03.xls" (<http://www.epa.gov/ttn/chieff/ap42/ch13/related/c13s02-2.html>)

**PM Scaling Factors (SF)**

PM2.5 0.105 AP-42, Tab. 11.9-1, 07/98, (applies to TSP EF, footnote e)

PM10 0.75 AP-42, Tab. 11.9-1, 07/98, (applies to PM15 EF, footnote d)

**Estimated Emission Factors**

PM2.5 0.9 lb/hr

PM10 1.54 lb/hr

PM 8.60 lb/hr

**Dozer Use (EU ID: 122)**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	6.60	158.3	28.9
PM10	11.26	270.2	49.3
PM	62.83	1,507.9	275.2

**Sample Calculations**

**PM10 - Dozer Use**

49.3 ton/yr	(Activity)	(PM10 EF)	(Conversion)	(Control)
	64,028 hr/yr	1.5 lb/hr	ton	(1 - 0)
		hr	2,000 lb	

**Grader Use**

**Emission Factor(s)**

Emission Factor Equation  $TSP (lb/VMT) = 0.04 (S)^{2.5}$  AP-42, Tab. 11.9-1, 07/98, (grading)

$PM_{15} (lb/VMT) = 0.051 (S)^2$  AP-42, Tab. 11.9-1, 07/98, (grading)

S = Mean vehicle speed 3 mph Donlin

Note:

In section 13.2.2 of AP-42, Figures 13.2.2-2 and 13.2.2-5 provide estimated unpaved road control efficiencies for water application and chemical dust suppressants. These figures provide a range of up to 95 percent control for water application only and a range of up to 91 percent control for chemical application only. Donlin will apply a combination of water (or snow, as applicable) and chemical dust suppressant. In addition, see Section 2.18 of Appendix C and Section 3.7.1 of Appendix D

Conversion(s): 2,000 lb/ton

1.609 km/mi

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<b>Air Sciences Inc.</b>  <b>AIR EMISSION CALCULATIONS</b>	PROJECT TITLE: Donlin Gold		BY: E. Memon	
	PROJECT NO: 281-1-2		PAGE: 9	SHEET: 11 Mining
	SUBJECT: Mining Activity Emissions		DATE: October 14, 2021	

Calculations for LOM: 20

**Maintenance Equipment (EU ID: 121-123) - continued**

**PM Scaling Factors (SF)**

PM2.5	0.031	AP-42, Tab. 11.9-1, 07/98, (applies to TSP EF, footnote e)
PM10	0.6	AP-42, Tab. 11.9-1, 07/98, (applies to PM15 EF, footnote d)

**Estimated Emission Factors**

PM2.5	0.02 lb/VMT
PM10	0.28 lb/VMT
PM	0.62 lb/VMT

**Grader Use (EU ID: 123)**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.30	7.3	1.3
PM10	4.31	103.3	18.9
PM	9.75	234.0	42.7

**Sample Calculations**

**PM10 - Grader Use**

	(Activity)	(PM10 EF)	(Speed)	(Conversion)	(Control)
18.9 ton/yr	45,653 <del>hr</del>	0.3 <del>lb</del>	3 <del>VMT</del>	ton	(1 - 0)
	<del>yr</del>	<del>VMT</del>	<del>hr</del>	2,000 <del>lb</del>	

**Water Truck Use**

**Truck Specifications**

<b>Make and Model</b>	Empty (ton)	Payload (ton)	Total (ton)	
Caterpillar 785C	116	134	249	Caterpillar, AEHQ5320-02 (4-02)
		32,000 gal		

**Emission Factor(s)**

Emission Factor Equation  $E = k(s/12)^a (W/3)^b [(365-P)/365]$  AP-42, Sec. 13.2.2, Eqs. 1a and 2, 11/06

s = Surface material silt content 3.8 % (1)

<sup>(1)</sup> AP-42, Chapter 13.2-2, Related Information "r13s0202\_dec03.xls" (<http://www.epa.gov/ttn/chieff/ap42/ch13/related/c13s02-2.html>)

W = Mean vehicle weight 183 ton Average of empty and full weights

P = Days/year with ≥0.01 in precip. 129 American Ridge, 2007-08, 2010-12

	PM2.5	PM10	PM	
k = Size-specific empirical constant	0.15	1.5	4.9 lb/VMT	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06
a = Size-specific empirical constant	0.9	0.9	0.7	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06
b = Size-specific empirical constant	0.45	0.45	0.45	AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06
E = Size-specific emission factor	0.22	2.19	9.00 lb/VMT	

**Water Truck Use (EU ID: 121)**

Emissions	(lb/hr)	(lb/day)	(ton/yr)
PM2.5	0.4	10.2	1.9
PM10	4.2	101.7	18.6
PM	17.4	418.3	76.3

**Sample Calculations**

**PM10 - Water Truck Use**

	(Activity)	(PM10 EF)	(Conversion)	(Control)
18.6 ton/yr	169,623 <del>VMT</del>	2.2 <del>lb</del>	ton	(1 - 0.9)
	<del>yr</del>	<del>VMT</del>	2,000 <del>lb</del>	

Conversion(s): 2,000 lb/ton

8.345 lb/gal water

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

Appendix B, Page 180

Air Sciences Inc.  		
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<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>		BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>		PAGE: <div>11</div>	OF: <div>11</div>	SHEET: <div>Mining</div>
	SUBJECT: <div>Mining Activity Emissions</div>		DATE: <div>October 14, 2021</div>		

Calculations for LOM:20

Wind Erosion of Exposed Surfaces (EU ID: 161) - continued

Exposed Stockpile/Waste Rock Facility

Emissions <sup>(1)</sup>	PM2.5			PM10			PM		
	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
WA Waste Rock Facility <sup>(2)</sup>	0.28	6.71	1.22	1.86	44.75	8.17	3.73	89.49	16.33
STF Short-term Stockpile	0.01	0.14	0.03	0.04	0.92	0.17	0.08	1.85	0.34
LTF Long-term Stockpile West	0.01	0.16	0.03	0.04	1.04	0.19	0.09	2.08	0.38
LTF Long-term Stockpile East (& PAG)	0.01	0.27	0.05	0.07	1.79	0.33	0.15	3.58	0.65
OV Overburden Stockpile South	0.003	0.08	0.02	0.02	0.56	0.10	0.05	1.12	0.20

<sup>(1)</sup> AP-42, Sec. 13.2.5, 11/06 (industrial wind erosion), hourly emission calculations provided in Wind\_Calcs

<sup>(2)</sup> Note: For modeling, emissions from this activity are adjusted hourly based on wind speed and modeled using an hourly file.

Sample emission calculations provided on page: 98

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>		BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>		PAGE: <div>1</div>	OF: <div>4</div>	SHEET: <div>Machines</div>
	SUBJECT: <div>Mobile Machinery Tailpipes</div>		DATE: <div>October 14, 2021</div>		

Calculations for LOM:20

Mobile Machinery Tailpipes Emissions Summary (ton/yr)

Machinery Type	Output (hp-hr/yr)	CO	NOx	PM	SO2	VOC
Hydraulic Shovel	11,046,049	31.78	31.78	0.36	0.06	1.73
Front-End Loader	12,683,216	36.49	36.49	0.42	0.07	1.98
Haul Truck	562,694,041	1,618.86	1,618.86	18.50	3.06	87.88
Drill	37,261,674	107.20	98.16	1.17	0.20	5.82
Track Dozer	20,079,105	57.77	34.87	0.51	0.11	3.14
Wheel Dozer	11,963,331	34.42	34.42	0.39	0.07	1.87
Grader	10,220,103	29.40	3.36	0.17	0.06	1.60
Water Truck	6,854,052	19.72	19.72	0.23	0.04	1.07
Hydraulic Excavator	5,703,012	16.41	13.18	0.17	0.03	0.89
Fuel Truck	2,089,431	6.01	6.01	0.07	0.01	0.33
Service Truck	171,440	0.49	0.06	0.003	0.001	0.03
Mobile Crane	116,187	0.33	0.04	0.002	0.001	0.02
Low Boy Truck	1,000,069	2.88	0.33	0.02	0.01	0.16
Tire Handler	1,428,671	4.11	0.47	0.02	0.01	0.22
Light Plant	857,202	0.00	0.00	0.00	0.00	0.00
Total		1,965.87	1,897.75	22.03	3.71	106.72

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

<div style="text-align: center;"> <b>Air Sciences Inc.</b>   <b>AIR EMISSION CALCULATIONS</b> </div>	PROJECT TITLE: Donlin Gold		BY: E. Memon		
	PROJECT NO: 281-1-2		PAGE: 2	OF: 4	SHEET: Machines
	SUBJECT: Mobile Machinery Tailpipes		DATE: October 14, 2021		

Calculations for LOM:

20

Mobile Machinery

Machinery Specifications

Make and Model <sup>(1)</sup>	Type	Engine	Rating (hp) <sup>(1)</sup>	Units <sup>(1)</sup>
Eqp Komatsu PC8000	Hydraulic Shovel	2 X Komatsu SDA16V160	4,020	1
Eqp LeTourneau L2350	Front-End Loader	MTU/DD 16V4000	2,300	2
Eqp Caterpillar 994F	Front-End Loader	Cat 3516B	1,577	1
Eqp Liebherr T282C	Haul Truck	MTU/DD 20V4000	3,755	69
Eqp Caterpillar 785C	Haul Truck	Cat 3512B	1,450	8
Eqp Atlas Copco PV 275	Drill	Cat C32 ACERT	950	5
Eqp Atlas Copco DML	Drill	Cat C27 ACERT	800	14
Eqp Atlas Copco L8	Drill		540	5
Eqp Caterpillar D11T	Track Dozer	Cat C27 ACERT	850	6
Eqp Caterpillar D10T	Track Dozer	Cat C32 ACERT	646	4
Eqp Caterpillar 854G	Wheel Dozer	Cat C32 ACERT	904	6
Eqp Caterpillar 24H	Grader	Cat C13 ACERT	533	3
Eqp Caterpillar 16H	Grader	Cat C18 ACERT	297	7
Eqp Caterpillar 785C	Water Truck	Cat 3512B	1,450	4
Eqp Caterpillar 390DL	Hydraulic Excavator	Cat C18 ATAAC	523	1
Eqp Komatsu PC2000	Hydraulic Excavator		976	2
Eqp Caterpillar 777F	Fuel Truck	Cat C32 ACERT	1,016	2
Eqp QTE Body on Peterbilt Chassis	Service Truck		300	1
Eqp Grove GMK6350 (200T)	Mobile Crane	Benz OM906LA	563	1
Eqp QTE Body on Peterbilt Chassis	Low Boy Truck		300	1
Eqp Caterpillar 988	Tire Handler		501	2
Eqp Terex LT7000	Light Plant		25	10

<sup>(1)</sup> Donlin

Operation

365 day/yr

24 hr/day

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

Air Sciences Inc.

AIR EMISSION CALCULATIONS

PROJECT TITLE:  
Donlin Gold

PROJECT NO:  
281-1-2

SUBJECT:  
Mobile Machinery Tailpipes

BY:  
E. Memon

PAGE:  
3

OF:  
4

SHEET:  
Machines

DATE:  
October 14, 2021

Calculations for LOM: 20

Machinery Operation, Fuel, and Output

Applicable Tier 4 Emission Standards (g/kW-hr)

Make and Model	EF Lookup ID	Operation (hr) <sup>(1)</sup>	Fuel (L/hr) <sup>(1)</sup>	Output (hp-hr) <sup>(2)</sup>	Output (kW-hr)	PM	NOx	NMHC	CO	SO2 <sup>(3)</sup>	Fuel (gal/yr)
Eqp Komatsu PC8000	5	4,088	550	11,046,049	8,237,050	0.04	3.5	0.19	3.5	0.00661	594,024
Eqp LeTourneau L2350	5	10,575	213	11,064,720	8,250,973	0.04	3.5	0.19	3.5	0.00661	595,028
Eqp Caterpillar 994F	5	1,997	165	1,618,496	1,206,914	0.04	3.5	0.19	3.5	0.00661	87,038
Eqp Liebherr T282C	5	406,594	280	559,699,738	417,368,673	0.04	3.5	0.19	3.5	0.00661	30,099,013
Eqp Caterpillar 785C	5	6,740	90	2,994,303	2,232,855	0.04	3.5	0.19	3.5	0.00661	161,025
Eqp Atlas Copco PV 275	5	25,237	75	9,298,087	6,933,593	0.04	3.5	0.19	3.5	0.00661	500,024
Eqp Atlas Copco DML	5	66,272	75	24,416,229	18,207,207	0.04	3.5	0.19	3.5	0.00661	1,313,033
Eqp Atlas Copco L8	4	21,239	34	3,547,359	2,645,269	0.02	0.4	0.19	3.5	0.00661	190,767
Eqp Caterpillar D11T	5	17,374	130	11,095,148	8,273,663	0.04	3.5	0.19	3.5	0.00661	596,665
Eqp Caterpillar D10T	4	18,662	98	8,983,957	6,699,346	0.02	0.4	0.19	3.5	0.00661	483,131
Eqp Caterpillar 854G	5	27,993	87	11,963,331	8,921,068	0.04	3.5	0.19	3.5	0.00661	643,353
Eqp Caterpillar 24H	4	10,034	76	3,745,974	2,793,377	0.02	0.4	0.19	3.5	0.00661	201,448
Eqp Caterpillar 16H	4	35,620	37	6,474,128	4,827,764	0.02	0.4	0.19	3.5	0.00661	348,160
Eqp Caterpillar 785C	5	13,953	100	6,854,052	5,111,074	0.04	3.5	0.19	3.5	0.00661	368,591
Eqp Caterpillar 390DL	4	3,439	75	1,266,989	944,795	0.02	0.4	0.19	3.5	0.00661	68,135
Eqp Komatsu PC2000	5	7,525	120	4,436,022	3,307,946	0.04	3.5	0.19	3.5	0.00661	238,556
Eqp Caterpillar 777F	5	6,544	65	2,089,431	1,558,091	0.04	3.5	0.19	3.5	0.00661	112,363
Eqp QTE Body on Peterbilt Chassis	4	2,181	16	171,440	127,843	0.02	0.4	0.19	3.5	0.00661	9,220
Eqp Grove GMK6350 (200T)	4	1,183	20	116,187	86,641	0.02	0.4	0.19	3.5	0.00661	6,248
Eqp QTE Body on Peterbilt Chassis	4	1,454	140	1,000,069	745,753	0.02	0.4	0.19	3.5	0.00661	53,781
Eqp Caterpillar 988	4	3,635	80	1,428,671	1,065,361	0.02	0.4	0.19	3.5	0.00661	76,830
Eqp Terex LT7000	1	14,542	12	857,202	639,217	0.4	7.5	7.5	6.6	0.00661	46,098

<sup>(1)</sup> Donlin

<sup>(2)</sup> Based on: Fuel heating value of: 130,167 Btu/gal

Donlin

Diesel engine efficiency of: 7,000 Btu/hp-hr

AP-42 Default

<sup>(3)</sup> Not a 40 CFR 1039 standard. Calculated from fuel use and sulfur content, provided on next page.

Tier 4 Emission Standards (g/kW-hr)

40 CFR 1039, Table 1 of § 1039.101, current as of 03/07/13

Engine Rating	Lookup ID	PM	NOx	NMHC	CO
1 ≤ hp < 25.5	1	0.40	7.50	7.50	6.60
25.5 ≤ hp < 75.1	2	0.03	4.70	4.70	5.00
75.1 ≤ hp < 174.3	3	0.02	0.40	0.19	5.00
174.3 ≤ hp < 751	4	0.02	0.40	0.19	3.50
751 < hp	5	0.04	3.50	0.19	3.50

Total Machinery Fuel Consumption

139,274,806 L/yr

36,792,529 gal/yr

Sample Calculations

SO2 Emission Factor

15 lb-S	6.74 lb-Fuel	gal-Fuel	7,000 Btu	1.34102 hp	453.592 g	"
1.00E+06 lb-Fuel	gal-Fuel	130,167 Btu	hp-hr	kW	lb	

\*

2 g SO2

g-S

=

0.00661 g SO2

kW-hr

Conversion(s):

3.78541 L/gal

1.34102 hp/kW

453.592 g/lb

2,000 lb/ton

907,184 g/ton

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.

Appendix B, Page 185

<div>Air Sciences Inc.</div> <div>AIR EMISSION CALCULATIONS</div>	PROJECT TITLE: <div>Donlin Gold</div>		BY: <div>E. Memon</div>		
	PROJECT NO: <div>281-1-2</div>		PAGE: <div>4</div>	OF: <div>4</div>	SHEET: <div>Machines</div>
	SUBJECT: <div>Mobile Machinery Tailpipes</div>		DATE: <div>October 14, 2021</div>		

Calculations for LOM:20

Machine-Specific Emissions

(ton/yr)

Make and Model	PM	NOx	NMHC	CO	SO2 <sup>(1)</sup>
Komatsu PC8000	0.36	31.78	1.73	31.78	0.06
LeTourneau L2350	0.36	31.83	1.73	31.83	0.06
Caterpillar 994F	0.05	4.66	0.25	4.66	0.01
Liebherr T282C	18.40	1,610.25	87.41	1,610.25	3.04
Caterpillar 785C	0.10	8.61	0.47	8.61	0.02
Atlas Copco PV 275	0.31	26.75	1.45	26.75	0.05
Atlas Copco DML	0.80	70.25	3.81	70.25	0.13
Atlas Copco L8	0.06	1.17	0.55	10.21	0.02
Caterpillar D11T	0.36	31.92	1.73	31.92	0.06
Caterpillar D10T	0.15	2.95	1.40	25.85	0.05
Caterpillar 854G	0.39	34.42	1.87	34.42	0.07
Caterpillar 24H	0.06	1.23	0.59	10.78	0.02
Caterpillar 16H	0.11	2.13	1.01	18.63	0.04
Caterpillar 785C	0.23	19.72	1.07	19.72	0.04
Caterpillar 390DL	0.02	0.42	0.20	3.65	0.01
Komatsu PC2000	0.15	12.76	0.69	12.76	0.02
Caterpillar 777F	0.07	6.01	0.33	6.01	0.01
QTE Body on Peterbilt Chassis	0.003	0.06	0.03	0.49	0.001
Grove GMK6350 (200T)	0.002	0.04	0.02	0.33	0.001
QTE Body on Peterbilt Chassis	0.02	0.33	0.16	2.88	0.01
Caterpillar 988	0.02	0.47	0.22	4.11	0.01
Terex LT7000					Set to zero per ADEC 3/16/2015
Total Emissions	22.03	1,897.75	106.72	1,965.87	3.71

<sup>(1)</sup> Based on15 ppm S content and diesel density of6.74 lb/galMSDS - Ultra Low Sulfur Diesel No. 1

Numbers in blue are direct entries. Green text/numbers are lookup codes or results.



## **Appendix C – Best Available Control Technology Review**

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AIR SCIENCES INC.

DENVER • PORTLAND

**Best Available  
Control  
Technology  
Review**

**Donlin Gold  
Project, Alaska**

PREPARED FOR:  
DONLIN GOLD LLC

PROJECT NO. 281-21B-1  
OCTOBER 27, 2021

# TABLE OF CONTENTS

---

List of Abbreviations.....	6
1.0 BACT Applicability .....	8
1.1 Emission Units Subject to BACT.....	9
2.0 BACT Review.....	12
2.1 Main Power Plant [EU ID 1-12].....	12
2.1.1 CO.....	13
2.1.2 NO <sub>x</sub> .....	14
2.1.3 Particulates .....	17
2.1.4 VOC.....	18
2.1.5 Startup Emissions .....	20
2.1.6 GHG.....	20
2.2 Ore Crushing and Transfers [EU ID 38-39, 41-46, 48, 50, 52, 54-56, 58].....	21
2.2.1 Particulates .....	22
2.3 Autoclaves [EU ID 77, 81].....	25
2.3.1 CO.....	26
2.3.2 Particulates .....	26
2.3.3 VOC.....	27
2.3.4 GHG.....	28
2.4 Boilers and Heaters [EU ID 15-20, 24].....	28
2.4.1 CO.....	29
2.4.2 NO <sub>x</sub> .....	30
2.4.3 Particulates .....	32
2.4.4 VOC.....	32
2.4.5 GHG.....	33
2.5 Black Start and Emergency Diesel Engines [EU ID 29-37] .....	34
2.5.1 CO.....	34
2.5.2 NO <sub>x</sub> and VOC.....	35
2.5.3 Particulates .....	36
2.5.4 GHG.....	37
2.6 Small Diesel Engines [EU ID 13-14] .....	38
2.6.1 CO.....	38

2.6.2 NO <sub>x</sub> .....	39
2.6.3 Particulates .....	40
2.6.4 VOC.....	40
2.6.5 GHG.....	41
2.7 Carbon Regeneration Kiln [EU ID 88] .....	41
2.7.1 CO .....	42
2.7.2 NO <sub>x</sub> .....	43
2.7.3 Particulates .....	43
2.7.4 VOC.....	44
2.8 Induction Melting Furnace [EU ID 100] .....	44
2.8.1 Particulates .....	44
2.9 Pressure Oxidation Hot Cure [EU ID 85-87] .....	45
2.9.1 Particulates .....	45
2.10 Electrowinning Cells [EU ID 91-94] .....	45
2.10.1 Particulates .....	46
2.11 Retort [EU ID 97].....	46
2.11.1 Particulates .....	46
2.12 Laboratories [EU ID 103-104, 106, 108-109] .....	47
2.12.1 Particulates .....	47
2.13 Reagent Handling for Water Treatment [EU ID 111] .....	47
2.13.1 Particulates .....	47
2.14 Mill Reagents Handling [EU ID 59, 61, 63, 65, 67, 69, 71, 73, 75] .....	48
2.14.1 Particulates .....	49
2.15 Fuel Tanks [EU ID 126-142, 150-152, 156].....	50
2.15.1 VOC.....	50
2.16 Incinerators [EU ID 27-28] .....	51
2.16.1 CO .....	51
2.16.2 NO <sub>x</sub> .....	52
2.16.3 Particulates .....	53
2.16.4 GHG .....	54
2.17 Acidulation Tanks and Neutralization Tanks [EU ID 124-125] .....	55
2.18 Fugitive Dust from Unpaved Roads [EU ID 158-160] .....	55
2.19 Fugitive Dust from Material Loading and Unloading [EU ID 115-120].....	58

2.20 Fugitive Dust from Wind Erosion [EU ID 161] .....	58
2.21 Fugitive Dust from Drilling and Blasting [EU ID 113-114] .....	59
2.22 Fugitive Combustion Emissions from Blasting [EU ID 114] .....	60
2.23 Title V Insignificant Emission Units [EU ID 21-23, 25-26, 143-149, 153-155, 157] .....	60
2.23.1 Combustion Emissions from Ancillary Fuel Burning Equipment .....	62
2.23.2 VOC from Tanks .....	62
3.0 References .....	64

## Tables

Table 1-1. Facility-Wide PTE of NSR Pollutants .....	9
Table 2-1. CO Control Options for Large Engines (Gas-Fired) .....	13
Table 2-2. CO Control Options for Large Engines (Oil-Fired) .....	13
Table 2-3. NO <sub>x</sub> Control Options for Large Engines (Gas-Fired) .....	14
Table 2-4. NO <sub>x</sub> Control Options for Large Engines (Oil-Fired) .....	15
Table 2-5. PM Control Options for Large Engines (Gas-Fired) .....	17
Table 2-6. PM Control Options for Large Engines (Oil-Fired) .....	17
Table 2-7. VOC Control Options for Large Engines (Gas-Fired) .....	19
Table 2-8. VOC Control Options for Large Engines (Oil-Fired) .....	19
Table 2-9. Startup Emissions .....	20
Table 2-10. PM Control Options for Crushing Circuit Sources .....	23
Table 2-11. Proposed BACT for Ore Crushing Particulate Emission Sources .....	24
Table 2-12. Particulate Control Options for Autoclaves .....	27
Table 2-13. CO Control Options for Commercial Boilers .....	30
Table 2-14. NO <sub>x</sub> Control Options for Commercial Boilers .....	31
Table 2-15. Particulate Matter Control Options for Commercial Boilers .....	32
Table 2-16. VOC Control Options for Commercial Boilers .....	33
Table 2-17. CO Control Options for Emergency Diesel Engines .....	34
Table 2-18. NO <sub>x</sub> and VOC Control Options for Emergency Diesel Engines .....	35
Table 2-19. PM Control Options for Emergency Diesel Engines .....	37
Table 2-20. CO Control Options for Small Diesel Engines .....	38
Table 2-21. NO <sub>x</sub> Control Options for Small Diesel Engines .....	39
Table 2-22. PM Control Options for Small Diesel Engines .....	40

Table 2-23. VOC Control Options for Small Diesel Engines .....	40
Table 2-24. Existing Gold Mining Operations in Alaska .....	42
Table 2-25. Particulate Control Options for Furnaces.....	44
Table 2-26. Particulate Control Options for Reagent Transfers .....	48
Table 2-27. VOC Control Options for Fuel Tanks .....	51
Table 2-28. CO Control Options for Waste and Sewage Sludge Incinerators.....	52
Table 2-29. NO <sub>x</sub> Control Options for Waste and Sewage Sludge Incinerators.....	53
Table 2-30. Particulate Control Options for Waste and Sewage Sludge Incinerators .....	53
Table 2-31. Particulate Control Options for Unpaved Roads.....	56
Table 2-32. Particulate Control Options for Unpaved Roads at or above 90 Percent Efficiency ..	57
Table 2-33. Particulate Control Options for Material Loading and Unloading .....	58
Table 2-34. Particulate Control Options for Wind Erosion.....	59
Table 2-35. Title V Insignificant Emission Units .....	61
Table 2-36. Ancillary Fuel Burning Equipment per Unit Emissions (ton/yr, per unit) .....	62

## **Attachments**

Attachment C1 – BACT Summary

Attachment C2 – RBLC Search Downloads

Attachment C3 – BACT Cost Calculations

# LIST OF ABBREVIATIONS

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AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
Air Permit	Air Quality Control Construction Permit No. AQ0934CPT01 issued June 30, 2017
ANFO	Ammonium Nitrate and Fuel Oil
BACT	Best Available Control Technology
Btu	British Thermal Unit
°C	Degrees Celsius
CCS	Carbon Capture and Sequestration
CFR	Code of Federal Regulations
CH <sub>4</sub>	Methane
CO	Carbon Monoxide
CO <sub>2</sub>	Carbon Dioxide
CO <sub>2</sub> e	Carbon Dioxide Equivalent
Donlin Gold	Donlin Gold LLC
dscf	Dry Standard Cubic Foot
dscfm	Dry Standard Cubic Feet per Minute
dscm	Dry Standard Cubic Meter
EPA	U.S. Environmental Protection Agency
ESP	Electrostatic Precipitator
EW	Electrowinning
°F	Degrees Fahrenheit
g	Gram
GC	Gyratory Crusher
GHG	Greenhouse Gas
gr	Grain
H <sub>2</sub> S	Hydrogen Sulfide
hp	Horsepower
hr	Hour
in. W.C.	Inches of Water Column
kg	Kilogram
kW	Kilowatt

LAER	Lowest Achievable Emission Rate
lb	Pound
mg	Milligram
mm	Millimeter
MMBtu	Million British Thermal Units
mph	Miles per Hour
MW	Megawatt
NG	Natural Gas
NO <sub>x</sub>	Oxides of Nitrogen
NSCR	Non-selective catalytic reduction
NSPS	New Source Performance Standards
NSR	New Source Review
O <sub>2</sub>	Oxygen
O <sub>3</sub>	Ozone
PAX	Xanthate
Pb	Lead
PM	Particulate Matter
PM <sub>2.5</sub>	Particulate Matter Less than 2.5 Microns in Diameter
PM <sub>10</sub>	Particulate Matter Less than 10 Microns in Diameter
POX	Pressure Oxidation
ppm	Parts Per Million
ppmvd	Parts Per Million, Volumetric Dry
Project	Donlin Gold project
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
RACT	Reasonably Available Control Technology
RBLC	RACT/BACT/LAER Clearinghouse
SAG	Semi-Autogenous Grinding
scf	Standard Cubic Foot
SCR	Selective Catalytic Reduction
SNCR	Selective Non-Catalytic Reduction
SO <sub>2</sub>	Sulfur Dioxide
ULSD	Ultra-Low-Sulfur Diesel
VOC	Volatile Organic Compound



## 1.0 BACT APPLICABILITY

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Donlin Gold LLC (Donlin Gold) is proposing to construct and operate the Donlin Gold mine: a hard rock, open pit, gold mine (Project). The Project is located in southwest Alaska, approximately 280 miles west of Anchorage. Donlin Gold is an Alaskan operated company that is owned by Barrick Gold U.S. Inc., a subsidiary of Barrick Gold Corporation, and NovaGold Resources Alaska Inc., a subsidiary of NovaGold Resources, Inc.

With regards to air pollutant emissions, the Project is a major stationary source subject to the Prevention of Significant Deterioration (PSD) regulations of 40 Code of Federal Regulations (CFR) 52.21, adopted by reference in 18 Alaska Administrative Code (AAC) 50.040(h). In accordance with the PSD regulations under 40 CFR 51.21(j)(2), Donlin Gold has conducted a Best Available Control Technology (BACT) review to determine the BACT controls and emission limits for each regulated New Source Review (NSR) pollutant with the potential to emit in significant amounts from the Project's air emission sources.

Table 1-1 provides the facility-wide total potential emissions for each NSR pollutant compared to the significant level. As shown by Table 1-1, a BACT review is required for carbon monoxide (CO), oxides of nitrogen (NO<sub>x</sub>), particulate matter (PM), particulate matter less than 10 microns in diameter (PM<sub>10</sub>), particulate matter less than 2.5 microns in diameter (PM<sub>2.5</sub>), ozone (O<sub>3</sub>),<sup>1</sup> and greenhouse gases (GHG).

The Alaska Department of Environmental Conservation (ADEC) issued Air Quality Control Construction Permit No. AQ0934CPT01 for the Project on June 30, 2017 (Air Permit). The following BACT review validates and remains consistent with the BACT controls and emission limits currently established in the Air Permit.

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<sup>1</sup> "Volatile organic compounds (VOC) and nitrogen oxides are precursors to O<sub>3</sub> in all attainment and unclassifiable areas." 40 CFR §52.21(b)(50)(i)(b)(1)

**Table 1-1. Facility-Wide PTE of NSR Pollutants**

NSR Pollutant	Facility-Wide PTE (ton/yr)*	Significant Level (ton/yr)**	BACT Required
CO	1,256	100	Yes
NO <sub>x</sub>	1,230	40	Yes
PM <sub>2.5</sub>	643	10	Yes
PM <sub>10</sub>	660	15	Yes
PM	693	25	Yes
SO <sub>2</sub>	23	40	No
O <sub>3</sub>	1,168 VOC 1,230 NO <sub>x</sub>	40 (VOC or NO <sub>x</sub> )	Yes
Pb	0.043	0.6	No
Fluorides	0	3	No
H <sub>2</sub> S	2.8	10	No
Total Reduced Sulfur	2.8	10	No
CO <sub>2e</sub>	1,731,120	75,000	Yes
GHG***	1,726,426	--	--

\* The Facility-Wide PTE includes stationary source non-fugitive emissions. "The fugitive emissions of a stationary source shall not be included in determining for any of the purposes of this section whether it is a major stationary source, unless the source belongs to one of the following categories of stationary sources..." 40 CFR §52.21(b)(1)(iii). The Project does not belong to a listed category.

\*\* 40 CFR §52.21(b)(23)(i) and (b)(49)(iv)(a)

\*\*\* GHG is a regulated pollutant per 40 CFR §52.21(b)(49)(iv)(a) and is subject to BACT review if the facility is a major stationary source and if the CO<sub>2e</sub> potential emissions exceed 75,000 tons per year (ton/yr).

## 1.1 Emission Units Subject to BACT

Pollutants emitted in significant amounts requiring a BACT review are CO, NO<sub>x</sub>, PM, PM<sub>10</sub>, PM<sub>2.5</sub>, O<sub>3</sub> (VOC), and GHG. The emission units that emit one or more of these pollutants are identified in the list below, along with the pollutants emitted requiring a BACT review. This list is divided between the larger emission units requiring permitting under a Title V operating permit after startup, per 18 Alaska Administrative Code (AAC) 50.326, and the smaller, insignificant emission units that do not require permitting under Title V. The BACT reviews provided in Section 2.0 are more comprehensive for the larger Title V emission units. In addition, BACT reviews are provided for fugitive sources (unpaved roads, material loading and unloading, wind erosion, drilling, and blasting) per guidance received from the ADEC (ADEC 2015).

Emission units subject to Title V permitting:

- Main Power Plant – CO, NO<sub>x</sub>, Particulates,<sup>2</sup> VOC, GHG
- Ore Crushing – Particulates
- Autoclaves – CO, Particulates, VOC, GHG
- Boilers and Heaters – CO, NO<sub>x</sub>, Particulates, VOC, GHG
- Black Start and Emergency Diesel Engines – CO, NO<sub>x</sub>, Particulates, VOC, GHG
- Small Diesel Engines – CO, NO<sub>x</sub>, Particulates, VOC, GHG
- Carbon Regeneration Kiln – CO, NO<sub>x</sub>, Particulates, VOC
- Induction Melting Furnace – Particulates
- Pressure Oxidation Hot Cure – Particulates
- Electrowinning Cells – Particulates
- Retort – Particulates
- Laboratories – Particulates
- Reagent Handling for Water Treatment – Particulates
- Mill Reagents Handling – Particulates
- Fuel Tanks – VOC
- Incinerators – CO, NO<sub>x</sub>, Particulates, GHG
- Acidulation Tanks and Neutralization Tanks – GHG

Fugitive emission sources:

- Fugitive Dust from Unpaved Roads – Particulates
- Fugitive Dust from Material Loading and Unloading – Particulates
- Fugitive Dust from Wind Erosion – Particulates

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<sup>2</sup> Particulates include PM, PM<sub>10</sub>, and PM<sub>2.5</sub>.

- Fugitive Dust from Drilling and Blasting – Particulates
- Fugitive Combustion Emissions from Blasting – CO, NO<sub>x</sub>, GHG

Title V insignificant emission units:

- Portable Building Heaters – CO, NO<sub>x</sub>, Particulates, VOC, GHG
- Building Heaters – CO, NO<sub>x</sub>, Particulates, VOC, GHG
- SO<sub>2</sub> Burners – CO, NO<sub>x</sub>, Particulates, VOC, GHG
- Air Handler Heaters – CO, NO<sub>x</sub>, Particulates, VOC, GHG
- Tanks ≤10,000 gallons – VOC

A complete list of each individual emission unit and its identifier are provided in Appendix A of the PSD Construction Permit Application Report.

## 2.0 BACT REVIEW

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This section provides a BACT review for each emission unit and pollutant described in Section 1.0. The BACT review process requires determination of BACT on a case-by-case basis and consideration of the unique aspects of each emission unit. The following sections contain the required review and BACT determination using the guidelines from Chapter B of the U.S. Environmental Protection Agency (EPA) guidance document, *New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting, Draft* (EPA 1990). The review was conducted using the following five steps:

1. Identification of all possible control technologies
2. Elimination of technologically infeasible technologies
3. Ranking the technologies by control effectiveness
4. Evaluation of the most effective control technology considering economic, energy, and environmental impacts
5. Selection of BACT

The proposed BACT determinations provided herein for the Project sources are compared to the applicable New Source Performance Standards (NSPS). “[C]omparing control options to an NSPS is to determine whether the control option would result in an emissions level less stringent than the NSPS. If so, the option is unacceptable” (EPA 1990). For many of the Project sources, the top (most effective) control option is selected as BACT. This eliminates the need for providing “cost and other detailed information in regard to other control options” (EPA 1990).

Each of the following sections provides a BACT review for a specific process at the Project. A summary of the results for each step of the BACT review for each source is provided in Attachment C1. The search results downloaded from the EPA RACT/BACT/LAER Clearinghouse (RBLC) (EPA 2021) and used for Step 1 are provided in Attachment C2. Control technology cost-effectiveness calculations used for Step 4 are provided in Attachment C3.

### 2.1 Main Power Plant [EU ID 1-12]

Electric power for the mine will be generated from a dual-fuel (natural gas [NG] and ultra-low-sulfur diesel [ULSD]) reciprocating-engine onsite power plant with a steam turbine utilizing waste heat recovered from the engines (combined cycle power plant). The combined cycle power plant will consist of 12 Wärtsilä Model 18V50DF engines, each rated at approximately 17 megawatts (MW), for a total of 205 MW (gross) from the engines and an additional 15 MW (gross) from the steam turbine. The total gross power output from the plant will be 220 MW.

The power plant will emit CO, NO<sub>x</sub>, SO<sub>2</sub>, particulates, VOC, and GHG. The following sections provide a BACT review for each of these pollutants (except SO<sub>2</sub>) for each fuel type.

### 2.1.1 CO

Possible CO emission control technologies for large engines were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process codes 17.100 to 17.190, Large Internal Combustion Engines (>500 horsepower [hp]). The search results for gas-fired and oil-fired engines are summarized in Table 2-1 and Table 2-2, respectively.

**Table 2-1. CO Control Options for Large Engines (Gas-Fired)**

Control Technology	Number of Determinations	Emission Limit (g/hp-hr)
Oxidation catalyst	22*	0.08 to 1.0
NSCR	1	0.30
NSPS JJJJ	5	2.8 to 4.4
Good combustion practices	15	3.3 to 5.2
No control specified	22	0.13 to 5.0

\* Includes the Project's BACT determination of oxidation catalyst (0.09 g/hp-hr) from its air permit issued in 2017.

**Table 2-2. CO Control Options for Large Engines (Oil-Fired)**

Control Technology	Number of Determinations	Emission Limit (g/hp-hr)
Oxidation catalyst	3*	0.13 to 3.3
NSPS IIII	23	0.16 to 2.6
Good combustion practices	74	0.31 to 3.7
No control specified	47	0.13 to 23.2**

\* Includes the Project's BACT determination of oxidation catalyst (0.13 g/hp-hr) from its air permit issued in 2017.

\*\* Listed as 7.3 lb/MMBtu in the RBLC and converted to g/hp-hr assuming 7,000 Btu/hp-hr.

Control options for the 18V50DF Wärtsilä engines for both NG firing and oil firing modes are as follows:

- Good combustion practices. Complete and efficient combustion reduces the formation of incomplete combustion by-products such as CO.
- Oxidation catalyst. An oxidation catalyst is an add-on control technology that oxidizes incomplete combustion by-products.

- Non-selective catalytic reduction (NSCR) is an effective NO<sub>x</sub>-reduction technology for rich-burn, spark-ignited stationary gas engines. The catalyst promotes the low temperature (approximately 850°F) reduction of NO<sub>x</sub> into nitrogen, the oxidation of CO into carbon dioxide (CO<sub>2</sub>), and the oxidation of VOCs (MECA 2015).

NSCR catalyst efficiency is directly related to the air/fuel mixture and temperature of the exhaust. Efficient operation of the catalyst typically requires the engine exhaust gases contain no more than 0.5% oxygen (O<sub>2</sub>) (MECA 2015). To obtain the proper exhaust gas O<sub>2</sub> across the operating range, an air/fuel ratio controller is installed that measures the oxygen concentration in the exhaust and adjusts the inlet air/fuel ratio to meet the proper 0.5% O<sub>2</sub> exhaust requirement for varying engine load conditions, engine speed conditions, and ambient conditions (MECA 2015). This control technology is not applicable to the lean-burn combustion technology of the Wärtsilä engines.

Donlin Gold proposes to select the top control option of an oxidation catalyst (combined with good combustion practices) as BACT to reduce CO emissions from both NG and ULSD firing. The resulting BACT CO emission rates are 0.12 g/kW-hr (0.09 g/hp-hr) for NG firing and 0.18 g/kW-hr (0.13 g/hp-hr) for ULSD firing. The total capital cost for installing one oxidation catalyst and one selective catalytic reduction (SCR) system on each of the 12 engines is \$20 million (Wärtsilä 2013c). The SCR system is discussed in Section 2.1.2.

The BACT emission rates are below the applicable NSPS:

- NSPS JJJJ for NG firing mode – 2 g/hp-hr [§ 60.4233(e) and Table 1 to NSPS JJJJ]
- NSPS IIII for ULSD firing mode – No limit established for CO emissions

The oxidation catalyst will reduce CO emissions and will result in minimal energy and environmental impacts. The oxidation catalyst requires no consumables and does not produce waste effluents or by-products (other than catalyst replacement/recycling every few years). Back pressure from the catalyst system is expected to be minimal and thus will have a minimal effect on engine efficiency.

## 2.1.2 NO<sub>x</sub>

Possible NO<sub>x</sub> emission control technologies for large engines were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process codes 17.100 to 17.190, Large Internal Combustion Engines (>500 hp). The search results for gas-fired and oil-fired engines are summarized in Table 2-3 and Table 2-4, respectively.

**Table 2-3. NO<sub>x</sub> Control Options for Large Engines (Gas-Fired)**

Control Technology	Number of Determinations	Emission Limit (g/hp-hr)
SCR	8*	0.05 to 0.5
NSCR	2	0.2 to 0.5
NSPS JJJJ	5	0.5 to 2.0
Good combustion practices	20	0.08 to 2.0
No control specified	34	0.7 to 2.0

\* Includes the Project's BACT determination of SCR (0.06 g/hp-hr) from its air permit issued in 2017.

**Table 2-4. NO<sub>x</sub> Control Options for Large Engines (Oil-Fired)**

Control Technology	Number of Determinations	Emission Limit (g/hp-hr)
SCR	3*	0.4 to 2.1
NSPS IIII	21	0.5 to 8.9
Good combustion practices	76	0.3 to 19.4
No control specified	67	0.5 to 7.3

\* Includes the Project's BACT determination of SCR (0.40 g/hp-hr) from its air permit issued in 2017.

Control options for the 18V50DF Wärtsilä engines for both gas and liquid fuel firing modes are as follows:

#### Gas firing

- Lean-burn combustion technology. In the lean-burn process, NG and air are pre-mixed before being introduced into the cylinders. This low fuel/air ratio – lean-burn – reduces NO<sub>x</sub> emissions due to a lower combustion temperature (Wärtsilä 2013a).
- Selective Catalytic Reduction. SCR is an add-on control that converts NO<sub>x</sub> to nitrogen and water vapor by reacting the NO<sub>x</sub> with ammonia or urea in the presence of a catalyst.

#### Liquid fuel firing

- Low NO<sub>x</sub> combustion. This process entails the following elements for suppressing the combustion peak temperatures to reduce NO<sub>x</sub> formation: late fuel injection start, high compression ratio, optimized combustion chamber, optimized fuel injection rate profile, early inlet valve closing (Miller concept), and high boost pressure (Wärtsilä 2013b).
- SCR. See description above.



Theoretically, up to 40 percent reduction in NO<sub>x</sub> emissions can be achieved by application of direct water injection at a rate of 50 to 60 percent of the fuel consumption (Nystén 2011). Very high-quality water is required to achieve this magnitude of NO<sub>x</sub> reduction and avoid damaging the engine. Water injection is not a viable control option for the Wärtsilä Model 18V50DF engines because Wärtsilä currently does not offer this technology for these engines (Nystén 2011).

As discussed in Section 2.1.1, NSCR is not applicable to the lean-burn combustion technology of the Wärtsilä engines.

Donlin Gold proposes to select the top control option of SCR (combined with good combustion practices) as BACT to reduce NO<sub>x</sub> emissions from both NG and ULSD firing. The resulting BACT NO<sub>x</sub> emission rates are 0.08 g/kW-hr (0.06 g/hp-hr) for NG firing and 0.53 g/kW-hr (0.40 g/hp-hr) for ULSD firing. The total capital cost for installing one oxidation catalyst and one SCR system on each of the 12 engines is \$20 million (Wärtsilä 2013c). The oxidation catalyst system is discussed in Section 2.1.1.

The BACT emission rates are below the applicable NSPS:

- NSPS JJJJ for gas firing mode – 1 g/hp-hr [§ 60.4233(e) and Table 1 to NSPS JJJJ]
- NSPS IIII for ULSD firing mode – 2.597 g/kW-hr (1.933 g/hp-hr) [§ 60.4204(c)(3)]

The SCR system will reduce NO<sub>x</sub> emissions, but it will also result in the following energy and environmental impacts:

- SCR systems add exhaust back pressure,<sup>3</sup> reducing plant electrical efficiency. Thus, additional fuel (energy) is required to produce the same amount of electricity.
- The SCR catalyst loses activity over time and must be periodically replaced. This results in energy impacts from the recycling of the catalyst metals and a waste stream from the disposal of the non-recyclable materials.
- SCR systems emit ammonia from the inherent ammonia slip of the system. The ammonia slip is expected to be less than or equal to 9 parts per million (ppm) (Wärtsilä 2011).

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<sup>3</sup> The pressure drop for SCR duct work is 3 inches of water column (in. W.C.), and the pressure drop for each SCR catalyst layer is 1 in. W.C. (EPA 2002).

### 2.1.3 Particulates

Possible PM emission control technologies for large engines were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process codes 17.100 to 17.190, Large Internal Combustion Engines (>500 hp). The search results for gas-fired and oil-fired engines are summarized in Table 2-5 and Table 2-6, respectively.

**Table 2-5. PM Control Options for Large Engines (Gas-Fired)**

Control Technology	Number of Determinations*	Emission Limit (g/hp-hr)
Coalescing Filter	3	0.23***
NSPS JJJJ	2	0.15 to 0.23
Good combustion practices	20**	0.0003 to 0.24
Clean fuels	4	0.038 to 0.34
No control specified	15	0.0001 to 0.2

\* Separate determinations for different types of PM (PM, PM<sub>10</sub>, PM<sub>2.5</sub>, filterable, etc.) for the same engine were counted as one determination.

\*\* Includes the Project's BACT determination of good combustion practices and clean fuels (0.10 g/hp-hr) from its air permit issued in 2017.

\*\*\* Listed as 1.2 lb/hr and 16.5 MMBtu/hr in the RBLC, which is 0.073 lb/MMBtu. This was converted to g/hp-hr assuming 7,000 Btu/hp-hr.

**Table 2-6. PM Control Options for Large Engines (Oil-Fired)**

Control Technology	Number of Determinations	Emission Limit (g/hp-hr)
Particulate Filter	2	0.15
NSPS IIII	15	0.025 to 0.24
Good combustion practices	78*	0.015 to 0.32
Clean fuels	14	0.03 to 0.30
No control specified	47	0.02 to 0.37

\* Includes the Project's BACT determination of good combustion practices and clean fuels (0.22 g/hp-hr) from its air permit issued in 2017.

Control options identified for the 18V50DF Wärtsilä engines for both gas and liquid fuel firing modes are filters, NSPS-certified engine, clean fuels, good combustion practices, or unspecified. Additional possible add-on control technologies include an electrostatic precipitator (ESP) and a wet scrubber. However, these controls are ineffective at capturing the very fine particulates generated from NG and ULSD combustion. Therefore, they are not considered viable control options.

The coalescing filter determinations in Table 2-5 are for three small landfill gas-fired engines (16.5 MMBtu/hr each). However, the emission limits for these engines are significantly higher than the Project's BACT emission limit of 0.13 g/kW-hr (0.097 g/hp-hr) for gas firing. The particulate filter determinations in Table 2-6 are for two 1,341 hp emergency generators with a per cylinder displacement of <10 liters and subject to the Tier 2 standard for filterable particulate of 0.2 g/kW-hr (0.149 g/hp-hr). This emission limit is higher than the Project's BACT emission limit for filterable particulate of 0.15 g/kW-hr (0.11 g/hp-hr)<sup>4</sup> for oil firing.

Donlin Gold proposes to select clean fuels and good combustion practices as BACT for particulates. The resulting BACT particulate (PM, PM<sub>10</sub>, and PM<sub>2.5</sub>) emission rates are 0.13 g/kW-hr (0.10 g/hp-hr) for NG firing, 0.15 g/kW-hr (0.11 g/hp-hr) for front-half particulate, and 0.29 g/kW-hr (0.22 g/hp-hr) for total front-half and condensable particulate for ULSD firing. Natural gas is the cleanest fossil fuel available with regard to particulate emissions. The ULSD used will be fuel oil No. 1 grade, which has negligible ash content, thus resulting in low particulate emissions.

The BACT emission rates comply with the applicable NSPS:

- NSPS JJJJ for gas firing mode – No limit established for PM emissions
- NSPS IIII for ULSD firing mode – 0.15 g/kW-hr (0.11 g/hp-hr) [§ 60.4204(c)(4)]

There are no significant energy or environmental impacts associated with the use of clean fuels for particulate control.

## **2.1.4 VOC**

Possible VOC emission control technologies for large engines were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process codes 17.100 to 17.190, Large Internal Combustion Engines (>500 hp). The search results for gas-fired and oil-fired engines are summarized in Table 2-7 and Table 2-8, respectively.

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<sup>4</sup> NSPS IIII limit for particulates (front half only) [40 CFR §60.4204(c)(4)].

**Table 2-7. VOC Control Options for Large Engines (Gas-Fired)**

<b>Control Technology</b>	<b>Number of Determinations</b>	<b>Emission Limit (g/hp-hr)</b>
Oxidation catalyst	22*	0.07 to 0.50
NSCR	1	0.20
NSPS JJJJ	4	1.0
Good combustion practices	4	1.0
No control specified	20	0.07** to 5.8

\* Includes the Project's BACT determination of oxidation (0.07 g/hp-hr) from its air permit issued in 2017.

\*\* Listed as 20 ppmvd at 3% O<sub>2</sub> in the RBLC and converted to g/hp-hr assuming 8,710 dscf/MMBtu and 7,000 Btu/hp-hr.

**Table 2-8. VOC Control Options for Large Engines (Oil-Fired)**

<b>Control Technology</b>	<b>Number of Determinations</b>	<b>Emission Limit (g/hp-hr)</b>
Oxidation catalyst	2*	0.16 to 0.18
NSPS IIII	17	0.03 to 4.8
Good combustion practices	56	0.011 to 4.8
No control specified	42	0.01 to 4.8

\* Includes the Project's BACT determination of oxidation (0.16 g/hp-hr) from its air permit issued in 2017.

Control options for the 18V50DF Wärtsilä engines for both gas and liquid fuel firing modes are as follows:

- Good combustion practices
- Oxidation catalyst

Donlin Gold proposes to select the top control option of an oxidation catalyst (combined with good combustion practices) as BACT to reduce VOC emissions from both NG and ULSD firing. The resulting BACT VOC (as CH<sub>4</sub> [methane]) emission rates are 0.09 g/kW-hr (0.07 g/hp-hr) for NG firing and 0.21 g/kW-hr (0.16 g/hp-hr) for ULSD firing. The cost, energy, and environmental impacts of this control option are discussed in Section 2.1.1.

The proposed BACT emission rates are below the applicable NSPS:

- NSPS JJJJ for gas firing mode – 0.7 g/hp-hr [§ 60.4233(e) and Table 1 to NSPS JJJJ]

- NSPS IIII for ULSD firing mode – No limit established for VOC emissions

### 2.1.5 Startup Emissions

Upon engine startup, there is a short period before the emission control system (SCR and oxidation catalysts described in the previous sections) reaches its full emission abatement efficiency, and this period must be considered in evaluating the effectiveness of a control. The startup period varies for “warm” startup and “cold” startup. A warm startup is defined as a start where the temperature of the emission control system is at a minimum temperature of 270 degrees Celsius (°C) at the time of the start. Typically, this condition is fulfilled if the engine is started within four to eight hours after the engine is stopped. A cold startup is defined as a start where the temperature of the emission control system is not at a minimum temperature of 270°C at the time of the start.

For warm start conditions, the engine will typically reach steady-state conditions and the emission control system will reach its full abatement efficiency within 15 minutes of the start. For cold start conditions, the engine will reach steady-state conditions and the emission control system will typically reach its full abatement efficiency within 30 minutes of the start.

The estimated cumulative flue gas emissions expressed as kilograms (kg) per a start period (30 minutes) of one Wärtsilä 18V50DF engine are given in Table 2-9 for warm and cold startups.

**Table 2-9. Startup Emissions**

Pollutant	Gas (kg/start)		Oil (kg/start)	
	Cold	Warm	Cold	Warm
CO	10	2	8	4
NO <sub>x</sub>	10	5	70	30
VOC (as CH <sub>4</sub> )	7	2.5	6	4
PM, PM <sub>10</sub> , PM <sub>2.5</sub>	1.5	1.2	3.5	3.5

(Wärtsilä 2011)

### 2.1.6 GHG

Possible GHG emission control technologies for large engines were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process codes 17.100 to 17.190, Large Internal Combustion Engines (>500 hp). The search results for gas-fired and oil-fired engines consisted of good combustion practices (or no control specified). The combustion efficiency in terms of g/hp-hr of CO<sub>2</sub> ranged from 157 to 601 for gas-fired engines, and from 364 to 618 for oil-fired engines.

A possible add-on control option for GHG is carbon capture and sequestration (CCS). Carbon sequestration is a geo-engineering technique used to remove the CO<sub>2</sub> from an exhaust gas stream and store it permanently in underground reservoirs (typically depleted oil or gas reservoirs) or other geological features. The technology captures CO<sub>2</sub> before it enters the atmosphere, compresses the CO<sub>2</sub> to a near liquid state, and transports it via pipeline to a site where it is injected deep underground. The deep geological formations that receive and hold CO<sub>2</sub> must be far below freshwater aquifers and below an impermeable rock cap or seal so that CO<sub>2</sub> cannot contaminate potable groundwater or escape to the atmosphere. Alternative sequestration techniques include converting CO<sub>2</sub> to baking soda or algae-based carbon capture. The long-term storage of CO<sub>2</sub> is a relatively new concept and has mostly been demonstrated on a pilot-scale. Transport and storage challenges include a lack of existing infrastructure (e.g., pipelines) and sites for secure, long-term CO<sub>2</sub> storage.

CCS is an emerging technology that has had limited successful application on an industrial scale, particularly for NG- and oil-fired power plants. There are currently no CCS systems commercially available for full-scale power plants in the United States. For BACT purposes, it is considered an innovative control option. “Innovative controls that have not been demonstrated on any source type similar to the proposed source need not be considered in the BACT analysis” (EPA 1990). Furthermore, CCS has not been demonstrated as available for the proposed remote Project location.

Donlin Gold proposes new energy efficient Wärtsilä 18V50DF engines operated in combined cycle as BACT for GHG. The power plant will recover the waste heat from the engines to enhance power output efficiency. The heat rate of the combined cycle plant will be 6,953 Btu/kW-hr (gross) for NG firing and 7,366 Btu/kW-hr (gross) for ULSD firing. This results in a GHG emissions of 882,130 ton/yr for NG firing and 1,229,630 ton/yr for ULSD firing. There are no adverse energy or environmental impacts from energy efficient combustion practices.

## **2.2 Ore Crushing and Transfers [EU ID 38-39, 41-46, 48, 50, 52, 54-56, 58]**

The Project ore crushing circuit includes run-of-mine ore gyratory crushing, coarse ore transfers, and recycle pebble crushing. Particulate emissions are generated by the crushing and handling of the ore.

Mined ore will be loaded through a dump pocket (with a rock breaker) to the gyratory crusher (GC). The GC discharges through a surge pocket and apron feeder to a conveyor system. The run-of-mine ore discharge and crushing emission sources are as follows:

- GC dump pocket and rock breaker
- Gyratory crusher

- Surge pocket
- Apron feeder
- GC discharge conveyor

Ore will be carried by conveyor to the coarse ore stockpile. The coarse ore stockpile will be reclaimed by four apron feeders and transferred to the semi-autogenous grinding (SAG) mill feed conveyor. Coarse ore transfer emission sources are as follows:

- Stockpile feed conveyor
- Coarse ore reclaim apron feeders 1 to 4
- SAG mill feed conveyor

The SAG mill feed conveyor transfers ore to the SAG mill. The SAG mill is a wet process and does not generate particulate emissions. Material discharged from the SAG mill will be washed and screened, and the oversize material will be sent to the pebble crushers. After crushing, the ore will be discharged to the pebble discharge conveyor, which transfers to the SAG mill feed conveyor. The pebble crushers and transfer emission sources are as follows:

- Pebble crushers
- Pebble discharge conveyor

The BACT review for particulate emissions from the sources described above is provided in the following section.

### **2.2.1 Particulates**

Possible particulate emission control technologies for ore crushing operations were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process name description containing the keywords “crush” or “conveyor,” and under the process codes 80 to 90.999, Metallurgical Industry and Mineral Products. The search results are summarized in Table 2-10. For determinations that included more than one emission limit (i.e., separate emission limits for PM, PM<sub>10</sub>, and PM<sub>2.5</sub>), only the PM limit is shown in Table 2-10 to avoid duplicate control determinations.

**Table 2-10. PM Control Options for Crushing Circuit Sources**

<b>Control Technology</b>	<b>Number of Determinations</b>	<b>Emission Limit (gr/dscf)</b>	<b>Emission Limit (lb/ton)</b>
<i><b>Crushers</b></i>			
Dust collector <sup>1</sup>	12 <sup>2</sup>	0.002 to 0.010	0.0007
Water sprays	1	No data	No data
Enclosure	1 <sup>3</sup>	0.0005	No data
<i><b>Conveyors</b></i>			
Dust collector <sup>1</sup>	19	0.0005 to 0.005	0.0002
Enclosure	1	No data	0.00004
Wet scrubber	3	0.0025 to 0.0079	No data
No control specified	1	No data	0.00002

<sup>1</sup> Dust collector, fabric filter, or cartridge filter

<sup>2</sup> Includes the Project's BACT determination of dust collector (0.01 gr/dscf) from its air permit issued in 2017.

<sup>3</sup> Includes the Project's BACT determination of enclosure (0.005 gr/dscf) from its air permit issued in 2017.

An additional possible control option for crushers and conveyors not found in the RBLC search is an ESP. Control effectiveness rankings for the possible control technologies, from highest to lowest, are (1) dust collector, (2) ESP, (3) wet scrubber, (4) enclosure, and (5) water sprays or dust suppressant.<sup>5</sup>

Proposed BACT for the ore crushing particulate emission sources are listed in Table 2-11.

<sup>5</sup> EPA (1995) gives control efficiencies for all these emission control technologies except enclosures, which are addressed in AP-42 Section 13.2.4.3. Using AP-42 Section 13.2.4.3, Equation 1, and comparing the result with the average monitored wind speed at Donlin (8 miles per hour [mph]) versus the same calculation using the minimum wind speed for this equation (1.3 mph to account for the wind break created by the enclosure), the control efficiency is 91 percent.



**Table 2-11. Proposed BACT for Ore Crushing Particulate Emission Sources**

<b>Emission Source</b>	<b>Proposed BACT</b>	<b>BACT PM Emission Rate</b>
<i><b>Run-of-Mine Ore Discharge and Crushing</b></i>		
GC dump pocket and rock breaker	Enclosure	0.00048 lb/ton
Gyratory crusher Surge pocket Apron feeder	Dust collector	0.01 gr/ft <sup>3</sup>
GC discharge conveyor	Enclosure	0.00048 lb/ton
<i><b>Coarse Ore Transfer</b></i>		
Stockpile feed conveyor	Enclosure	0.00048 lb/ton
Coarse ore reclaim apron feeders 1 to 4	Dust collector	0.01 gr/ft <sup>3</sup>
SAG mill feed conveyor	Enclosure	0.00048 lb/ton
<i><b>Pebble Crushers</b></i>		
Pebble crushers	Dust collector	0.01 gr/ft <sup>3</sup>
Pebble discharge conveyor	Enclosure	0.00048 lb/ton

The top particulate emission control technology for crushers and conveyors is a dust collector. As shown in Table 2-11, dust collectors are proposed as BACT for all crushers and several transfer points. For the transfer points where a dust capture and control system are not feasible (as described below), an enclosure is proposed as BACT.

At the GC dump pocket, there will be an enclosure with openings (entry ways) to allow haul trucks to enter and dump ore into the GC dump pocket. When a haul truck is in position to unload its ore, the truck and enclosure together form a partial enclosure that surrounds the dump pocket. This enclosure reduces particulate emissions by blocking cross winds that can cause windblown dust and by forming a partial containment around the emission point. Because of the openings required for the trucks, add-on control options (dust collector, ESP, or wet scrubber) are ineffective due to the inability to fully enclose and capture the fugitive emissions from this source. Therefore, an enclosure is considered the top control option and proposed as BACT.

Fugitive dust capture and control systems are also considered infeasible for the GC discharge conveyor, stockpile feed conveyor, SAG mill feed conveyor, and pebble discharge conveyor. These conveyor transfer points have low emissions (0.00048 lb/ton of PM) and are too far from the dust collectors discussed above to be tied into these systems without excessive ducting. In case of the stockpile feed conveyor, the transfer point is both elevated and movable providing

further dust capture problems. Therefore, an enclosure is proposed as BACT for these transfer points.

The proposed BACT for the run-of-mine ore discharge and crushing emission sources includes a single dust collector for the GC, surge pocket, and apron feeder; and enclosures for the GC dump pocket (with a rock breaker), and the GC discharge conveyor. The capital cost for the dust collector is \$229,662 (AMEC 2013). The capital cost of the enclosures is negligible. Other costs include electricity for the dust collector fan and maintenance costs. Environmental impacts from the dust collector include disposal of waste generated by the dust collector (i.e., worn-out or broken bags).

The proposed BACT for the coarse ore transfer emission sources includes a dust collector for each apron feeder and enclosures for the stockpile feed conveyor and SAG mill feed conveyor. The capital cost is \$94,952 for each dust collector, or \$379,808 for all four dust collectors (AMEC 2013). The cost for the enclosures is negligible. Energy costs and environmental impacts of dust collectors are discussed above.

The proposed BACT for the pebble crushers emission sources consists of a dust collector for the crushers and an enclosure for the pebble discharge conveyor. The capital cost for the dust collector is \$258,353 (AMEC 2013). The capital cost of the enclosures is negligible. Energy costs and environmental impacts of dust collectors and enclosures are discussed above.

The BACT emission rates for the dust collectors of 0.01 gr/dscf are below the applicable NSPS LL emission standard of 0.05 grams per dry standard cubic meter (0.02 gr/dscf) [§ 60.382(a)(1)]. For process fugitive sources, the NSPS LL limit is 10 percent opacity. The enclosures proposed as BACT for the process fugitive sources shown in Table 2-11 are expected to control opacity from dust emissions to well below 10 percent opacity. The proposed BACT emission rate for these fugitive sources is only 0.00048 lb/ton.

## **2.3 Autoclaves [EU ID 77, 81]**

Concentrate POX will be carried out within the autoclave circuit. This circuit includes two autoclaves operating in parallel. POX refers to the oxidation of gold-bearing sulfide minerals to metal sulfates using a combination of heat, acid, and oxygen sparging in a specifically designed pressure vessel (i.e., autoclave). The oxidation of the sulfide minerals effectively releases the gold locked within the mineral matrix, rendering it amenable to leaching by cyanidation.

Each autoclave will have a design processing rate of 210 ton/hr of ore concentrate and will emit CO, particulates, VOC, SO<sub>2</sub>, H<sub>2</sub>S, and GHG. The following sections provide a BACT review for each of these pollutants except SO<sub>2</sub> and H<sub>2</sub>S.

The RBLC was searched for all determinations in the last 10 years under the process name description containing the keyword “autoclave.” The RBLC contains one determination for an ore autoclaving process, which is the Project’s BACT determination from its permit issued in 2017. The only other determination found was for an autoclave used for pitch impregnation. This determination is not applicable to the Project’s autoclaves.

### **2.3.1 CO**

As discussed above, the only RBLC determinations for ore autoclaves is from the Project. There are, however, two similar ore autoclaving processes in Nevada:

- Barrick Goldstrike Mines, Inc. (six autoclaves)
- Newmont Mining Corporation – Twin Creeks Mine (two autoclaves)

None of these autoclaves employ any control for CO emissions. The previous determination listed for the Project in the RBLC is the use of good operating practices.

Possible add-on control options for CO include thermal and catalytic oxidation. The level of control that may be achieved by thermal and catalytic oxidation systems is unknown as there are no applications of these controls on ore autoclaves. In addition, because there are no commercial installations of these controls on this source type, they are not considered viable control options.

Donlin Gold proposes good operating practices for CO emissions. The resulting BACT CO emission rate is 88 pounds per hour (lb/hr) per autoclave.

These sources are not subject to an emission limit for CO under NSPS.

### **2.3.2 Particulates**

The only RBLC determinations for ore autoclaves is from the Project (see Section 2.3). There are, however, two similar ore autoclaving processes in Nevada:

- Barrick Goldstrike Mines, Inc. (six autoclaves)
- Newmont Mining Corporation – Twin Creeks Mine (two autoclaves)

The particulate controls for these autoclaves are provided in Table 2-12.

**Table 2-12. Particulate Control Options for Autoclaves**

Facility/Source	Controls	Emission Limit (lb/hr)
<i>Barrick Goldstrike</i> (NDEP 2020a)		
Autoclave 1	Venturi scrubber	2.28 (per autoclave)
Autoclaves 2-3	Venturi scrubber	7 (per autoclave)
Autoclaves 4-6	Primary and secondary venturi scrubbers	2 (combined for all three autoclaves)
<i>Newmont Twin Creeks</i> (NDEP 2020b)		
Autoclaves 1-2	Primary and secondary venturi scrubbers	8.4 (per autoclave)
<i>Donlin Gold</i>		
Autoclaves 1-2	Venturi scrubber	0.22

Other possible add-on control technologies for particulates include a dust collector and ESP. Because of the high moisture content in the autoclave exhaust, dust collectors are not technically feasible due to plugging. A wet ESP may be technically feasible but is not expected to provide better control efficiency than venturi wet scrubbers.

Donlin Gold proposes to select the top control option of a venturi scrubber on each autoclave stack as BACT to reduce particulate emissions. The resulting BACT particulate (PM, PM<sub>10</sub>, and PM<sub>2.5</sub>) emission rate is 0.22 lb/hr per autoclave.

The capital cost for both venturi scrubbers is \$355,200 (CGS 2011). Other costs include electricity for the scrubber water pumps and maintenance costs. Environmental impacts from the scrubbers include managing the scrubber effluent water.

These sources are not subject to an emission limit for particulates under NSPS.

### 2.3.3 VOC

The only RBLC determinations for ore autoclaves is from the Project (see Section 2.3). There are, however, two similar ore autoclaving processes in Nevada:

- Barrick Goldstrike Mines, Inc. (six autoclaves)
- Newmont Mining Corporation – Twin Creeks Mine (two autoclaves)

These autoclaves employ carbon adsorption for mercury control, which also controls for VOC emissions.

Possible add-on control options for VOC include thermal and catalytic oxidation, and carbon adsorption. The level of control that may be achieved by thermal and catalytic oxidation systems is unknown as there are no applications of these controls on ore autoclaves. In addition, because there are no commercial installations of these controls on this source type, they are not considered viable control options.

Donlin Gold proposes to select the top control option of a carbon adsorber on each autoclave stack as BACT to reduce VOC emissions. The resulting BACT VOC emission rate is 0.04 lb/hr per autoclave.

The capital cost for both carbon adsorbers with carbon is \$919,200 (Hatch Ltd. 2011). Other costs include electricity for the adsorber fans, spent carbon replacement and disposal costs, and maintenance costs. Environmental impacts from the adsorbers include the disposal and/or recycling of the spent carbon.

These sources are not subject to an emission limit for VOC under NSPS.

### **2.3.4 GHG**

Based on a mass balance analysis, the autoclaves will have a PTE of 37,659 ton/yr of GHG emissions from the oxidation of carbonaceous matter in the ore concentrate. As discussed in Section 2.1.6, the possible add-on control option for CO<sub>2</sub> is CCS. CCS is an emerging technology that has had limited successful application on an industrial scale. There are currently no CCS systems commercially available in the United States. For BACT purposes, it is considered an innovative control option. “Innovative controls that have not been demonstrated on any source type similar to the proposed source need not be considered in the BACT analysis” (EPA 1990). Furthermore, CCS has not been demonstrated as available for the proposed remote Project location.

Donlin Gold proposes good operating practices for GHG emissions.

## **2.4 Boilers and Heaters [EU ID 15-20, 24]**

The Project will include three boilers and three heaters that will be fueled by NG or ULSD, and 19 air handler heaters that will be fired by NG only. The boilers and heaters will primarily burn NG; they will burn ULSD during periods when NG is unavailable. The boilers and heaters and their design heat input rates are as follows:

- POX boilers (2 units) – 29.29 MMBtu/hr, each
- Oxygen plant boiler – 20.66 MMBtu/hr
- Carbon elution heater – 16 MMBtu/hr

- Power plant auxiliary heaters (2 units) – 16.5 MMBtu/hr, each
- Air handler heaters (19 units) – 5 MMBtu/hr, each

During autoclave heat-up, high-pressure steam will be supplied to autoclaves by the POX boilers. High-pressure steam is not required for normal operation. The POX boilers produce steam, which is injected directly into the autoclaves along with oxygen, to promote the oxidation reaction. The oxygen plant boiler will produce steam for the regeneration of the oxygen plant's molecular sieves. The carbon elution heater will provide heat for the carbon stripping circuit. The power plant auxiliary heaters will provide space heating for the power plant buildings and auxiliary heat for the Wärtsilä engines during cold startups. The air handler heaters will provide heat for buildings. These sources will emit CO, NO<sub>x</sub>, SO<sub>2</sub>, particulates, VOC, and GHG. The following sections provide a BACT review for each of these pollutants except SO<sub>2</sub>.

The POX boilers are defined as process heaters<sup>6</sup> and are thus exempt from NSPS Dc. The air handler heaters are also not subject to NSPS Dc because they do not heat "any heat transfer medium" (40 CFR §60.41c) across a physical barrier (i.e., heat exchanger). The oxygen plant boiler, carbon elution heater, and power plant auxiliary heaters are subject to NSPS Dc, but they are not subject to a limit under NSPS for any pollutants that require a BACT review.

The annual emissions discussed in this section for each pollutant are based on the worst-case scenario, i.e., NG or ULSD combustion, except for the air handlers, which are only fueled by NG.

### 2.4.1 CO

Possible CO emission control technologies for the boilers and heaters were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under process code 13, Commercial/Institutional-Size Boilers/Furnaces (<100 million Btu/hr), subcategories 13.31 Gaseous Fuel & Gaseous Fuel Mixtures and 13.22, Distillate Fuel Oil. The results of the RBLC search are summarized in Table 2-13.

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<sup>6</sup> "Process heater means a device that is primarily used to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst." [40 CFR §60.41c] In this case, the POX boilers produce steam (i.e., "heat a material"), which is injected directly into the autoclaves along with oxygen, to promote the oxidation reaction.

**Table 2-13. CO Control Options for Commercial Boilers**

<b>Control Technology</b>	<b>Number of Determinations</b>		<b>Emission Limit (lb/MMBtu)</b>	
	Gas-fired	Oil-fired	Gas-fired	Oil-fired
Oxidation catalyst	5		0.0035 to 0.28	
Good combustion practices	137	3	0.0075 to 0.11	0.036 to 0.084
No control specified	30	1	0.036 to 0.15	0.036

A possible control option for boilers and heaters is an oxidation catalyst. However, because there is only one BACT determination in the RBLC for this add-on control option, and it is for a much larger 60 MMBtu/hr non-dual-fueled boiler, it can be inferred that it is not cost-effective for small, NG- and ULSD-fired external combustion units. Potential annual CO emissions from the Project's boilers and heaters based on 8,760 hours of operations are between 1.8 and 10.6 ton/yr per unit. The estimated equipment cost for an oxidation catalyst system is \$95,000 to \$254,000 per unit.<sup>7</sup> At this equipment cost, the total annual cost is estimated at \$57,000 to \$152,000 per year per unit.<sup>8</sup> This yields a cost-effectiveness of \$14,000 to \$32,000 per ton of CO removed.<sup>9</sup> See Attachment C3 for control cost calculations. At this cost, an oxidation catalyst is not considered cost-effective.

Donlin Gold proposes to use good combustion practices as BACT control for CO emissions from the boilers and heaters. The resulting BACT CO emission rate for the Project's boilers and heaters is 0.0824 lb/MMBtu for NG firing and 0.0384 lb/MMBtu for ULSD firing.

Capital costs, energy costs, and environmental impacts of using good combustion practices are minimal. As discussed at the beginning of this section, these sources are not subject to an emission limit for CO under NSPS.

## 2.4.2 NO<sub>x</sub>

Possible NO<sub>x</sub> emission control technologies for the boilers and heaters were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under process code 13, Commercial/Institutional-Size Boilers/Furnaces (<100 million Btu/hr), subcategories 13.31

<sup>7</sup> These costs are based on Section 3.2, Chapter 2, Figure 2.6 of the EPA Control Cost Manual (EPA 2002) for an exhaust flow rate from the Donlin boilers and heaters of 850 to 5,000 dry standard cubic feet per minute (dscfm). The 1999-dollar values from this figure were converted to 2021 dollars by multiplying by 1.59.

<sup>8</sup> Equipment costs were converted to total annual costs using the example provided in Section 3.2, Chapter 2, Tables 2.9 and 2.10, of the EPA Control Cost Manual (EPA 2002), except that a 20-year equipment life (instead of 10) was used in the calculation.

<sup>9</sup> Cost calculations were performed for the primary fuel scenario of NG firing.

Gaseous Fuel & Gaseous Fuel Mixtures and 13.22, Distillate Fuel Oil. The results of the RBLC search are summarized in Table 2-14.

**Table 2-14. NO<sub>x</sub> Control Options for Commercial Boilers**

<b>Control Technology</b>	<b>Number of Determinations</b>		<b>Emission Limit (lb/MMBtu)</b>	
	Gas-fired	Oil-fired	Gas-fired	Oil-fired
SCR	9		0.006 to 0.15	
Low-NO <sub>x</sub> burner	123	2	0.0011 to 0.18	0.023 to 0.09
Good combustion practices	18	2	0.0075 to 0.18	No data
No control specified	25	2	0.006 to 0.18	0.14 to 0.21

As shown in Table 2-14, there are nine determinations for SCR. These determinations are for large boilers with ratings between 36 and 150 MMBtu/hr. For the Project's boilers and heaters, SCR is not cost-effective. Potential annual NO<sub>x</sub> emissions from the Project's boilers and heaters based on 8,760 hours of operations are between 2.1 and 19.7 ton/yr per unit. The estimated total capital investment for an SCR system is \$398,000 to 1,047,000 per unit, and the total annualized costs are estimated to be \$46,000 to 126,000 per year per unit.<sup>10</sup> The resulting cost-effectiveness ranges from \$12,000 to \$25,000 per ton of NO<sub>x</sub> removed. See Attachment C3 for control cost calculations. At this cost, SCR is not considered cost-effective.

Boilers equipped with Low-NO<sub>x</sub> burners that are compatible with dual-fuel operation and meet the project specifications are not available for the dual-fueled POX and oxygen plant boilers, or the carbon elution heater. Low-NO<sub>x</sub> burners are also not available for the air handler heaters. Therefore, low-NO<sub>x</sub> burners are not technically feasible for these boilers and heaters.

Donlin Gold proposes to use good combustion practices as BACT controls for NO<sub>x</sub> emissions from the POX and oxygen plant boilers, carbon elution heater, and air handler heaters. The resulting BACT NO<sub>x</sub> emission rate for the Project's boilers is 0.098 lb/MMBtu for NG firing and 0.154 lb/MMBtu for ULSD firing.

The power plant auxiliary heaters are available with low-NO<sub>x</sub> burners. Donlin Gold proposes to use low-NO<sub>x</sub> burners as BACT control for NO<sub>x</sub> emissions from these units. The resulting BACT NO<sub>x</sub> emission rate for these heaters is 0.098 lb/MMBtu for NG firing and 0.154 lb/MMBtu for ULSD firing.

<sup>10</sup> This cost is based on Section 4.2, Chapter 2 of the EPA Control Cost Manual (EPA 2002). Cost calculations were performed for the primary fuel scenario of NG firing and adjusted to 2021 dollars.



Capital costs, energy costs, and environmental impacts of using good combustion practices are minimal. The capital cost for installing a low-NO<sub>x</sub> burner on the power plant auxiliary heaters is expected to be approximately \$16,000. The energy costs and environmental impact of using low-NO<sub>x</sub> burners are minimal. As discussed at the beginning of this section, these sources are not subject to an emission limit for NO<sub>x</sub> under NSPS.

### 2.4.3 Particulates

Possible particulate matter emission control technologies for the boilers and heaters were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under process code 13, Commercial/Institutional-Size Boilers/Furnaces (<100 million Btu/hr), subcategories 13.31 Gaseous Fuel & Gaseous Fuel Mixtures and 13.22, Distillate Fuel Oil. The results of the RBLC search are summarized in Table 2-15.

**Table 2-15. Particulate Matter Control Options for Commercial Boilers**

<b>Control Technology</b>	<b>Number of Determinations</b>		<b>Emission Limit (lb/MMBtu)</b>	
	Gas-fired	Oil-fired	Gas-fired	Oil-fired
Good combustion practices	109	7	0.0005 to 0.018	0.02 to 1.8
Clean fuels		1		0.015
No control specified	47	5	0.0003 to 0.01	0.0016 to 0.030

Additional possible add-on control technologies for particulates include a dust collector and ESP. However, these controls, like a wet scrubber, are ineffective at capturing the very fine particulates generated from ULSD and NG combustion. Therefore, they are not considered viable control options.

Donlin Gold proposes to use good combustion practices and clean fuels as BACT controls for particulate emissions from the boilers and heaters. The resulting BACT particulate emission rate for the Project's boilers and heaters is 0.0075 lb/MMBtu for NG firing and 0.0254 lb/MMBtu for ULSD firing.

Capital costs, energy costs, and environmental impacts of using good combustion practices and clean fuel are minimal. As discussed at the beginning of this section, these sources are not subject to an emission limit for PM under NSPS.

### 2.4.4 VOC

Possible VOC emission control technologies for the boilers and heaters were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under process code 13, Commercial/Institutional-Size Boilers/Furnaces (<100 million Btu/hr), subcategories 13.31

Gaseous Fuel & Gaseous Fuel Mixtures and 13.22, Distillate Fuel Oil. The results of the RBLC search are summarized in Table 2-16.

**Table 2-16. VOC Control Options for Commercial Boilers**

<b>Control Technology</b>	<b>Number of Determinations</b>		<b>Emission Limit (lb/MMBtu)</b>	
	Gas-fired	Oil-fired	Gas-fired	Oil-fired
Oxidation catalyst	3		0.005	
Thermal oxidizer	2		No data	
Good combustion practices	129	2	0.0014 to 0.14	No data
No control specified	22	2	0.0015 to 0.008	0.0018 to 0.0041

Possible control options for boilers and heaters include thermal oxidation and oxidation catalysts. However, for the same reasons described in Section 2.4.1, thermal and oxidation catalysts are not cost-effective control technologies for VOC emissions from the Project's boilers and heaters.

Donlin Gold proposes to use good combustion practices as BACT control for VOC emissions from the boilers and heaters. The resulting BACT VOC emission rate for the Project boilers and heaters is 0.0054 lb/MMBtu for NG firing and 0.00154 lb/MMBtu for ULSD firing.

Capital costs, energy costs, and environmental impacts of using good combustion practices are minimal. As discussed at the beginning of this section, these sources are not subject to an emission limit for VOC under NSPS.

## 2.4.5 GHG

As discussed in Section 2.1.6, the possible add-on control option for GHG is CCS. CCS is an emerging technology that has had limited successful application on an industrial scale. There are currently no CCS systems commercially available in the United States. For BACT purposes, it is considered an innovative control option. "Innovative controls that have not been demonstrated on any source type similar to the proposed source need not be considered in the BACT analysis" (EPA 1990). Furthermore, CCS has not been demonstrated as available for the proposed remote Project location.

Donlin Gold proposes good combustion practices as BACT control for GHG emissions. Potential annual GHG emissions from the boilers and heaters are 176,347 ton/yr combined.

## 2.5 Black Start and Emergency Diesel Engines [EU ID 29-37]

The Project will include several compression ignition (diesel) engines for emergency use. These include generators for emergency power generation as well as fire pumps. The Project will also include two black start generators, which are diesel generators whose purpose is to restore the Wärtsilä power plant operations in the event of a plant shutdown. All these engines are limited-use engines and will emit CO, NO<sub>x</sub>, SO<sub>2</sub>, particulates, VOC, and GHG.

The emergency and black start diesel engines include the following:

- Black start generators (two units, 600 kW each)
- Camp emergency generators (four units, 1,500 kW each)
- Mine site tank farm fire pump (252 hp)
- Mine site mill fire pump (252 hp)
- Camp site fire pump (252 hp)

### 2.5.1 CO

Possible CO emission control technologies for internal combustion engines were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process code 17, Internal Combustion Engines. The search results were filtered to include only diesel-fired engines with limited use (i.e., only those determinations with keywords “emergency,” “fire,” “backup,” or “standby” in the process name description were included). The RBLC search results are summarized in Table 2-17.

**Table 2-17. CO Control Options for Emergency Diesel Engines**

Control Technology	Number of Determinations	Emission Limit (g/hp-hr)
Good combustion practices	111*	0.6 to 5.0
NSPS IIII	39	0.21 to 5.5
No control specified	64	0.017 to 5.0

\* Includes two BACT determinations of good combustion practices from the Project (black start and emergency generators, 4.38 g/kw-hr [3.27 g/hp-hr]; fire pump engines, 4.38 g/kw-hr [3.27 g/hp-hr]) from its air permit issued in 2017.

The BACT determinations from the RBLC include the use of good combustion practices, purchasing engines certified to meet NSPS IIII, or no specified add-on control.

In addition to the controls found in the RBLC search, catalytic oxidation is a possible CO control technology that can be applied to diesel engines. Because of the limited operating hours of the Project's emergency and startup diesel engines<sup>11</sup> discussed in this section, add-on control options are not viable. Annual CO emissions from each engine are less than 4 ton/yr.

Donlin Gold proposes to select the use of good combustion practices and engines certified to meet NSPS IIII as BACT for CO emissions from its emergency and black start diesel engines. The resulting BACT/NSPS IIII emission rates are listed below.<sup>12</sup>

- Black start generators and camp emergency generators: 4.38 g/kW-hr (3.27 g/hp-hr)  
[40 CFR §60.4205(b), §60.4202(a)(2), § 89.112(a) Table 1, emergency generators >560 kW]
- Fire pump engines: 4.38 g/kW-hr (3.27 g/hp-hr)  
[40 CFR §60.4205(c), NSPS IIII Table 4, fire pump engines 130 ≤ kW < 225]

There are no significant energy or environmental impacts associated with good combustion practices and purchasing engines certified to meet NSPS IIII.

## 2.5.2 NO<sub>x</sub> and VOC

Possible NO<sub>x</sub> and VOC emission control technologies for internal combustion engines were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process code 17, Internal Combustion Engines. The search results were filtered to include only diesel-fired engines with limited use (i.e., only those determinations with keywords "emergency," "fire," "backup," or "standby" in the process name description were included). The RBLC search results are summarized in Table 2-18.

**Table 2-18. NO<sub>x</sub> and VOC Control Options for Emergency Diesel Engines**

Control Technology	Number of Determinations	Emission Limit (g/hp-hr)
Good combustion practices	183*	0.0037 to 18.9
NSPS IIII	138	0.017 to 12.0
No control specified	67	0.013 to 9.3

\* Includes two BACT determinations of good combustion practices for NO<sub>x</sub> + VOC emissions from the Project (black start and emergency generators, 8 g/kw-hr [6 g/hp-hr]; fire pump engines, 5.0 g/kw-hr [3.7 g/hp-hr]) from its air permit issued in 2017.

<sup>11</sup> "The EPA believes that 500 hours is an appropriate default assumption for estimating the number of hours that an emergency generator could be expected to operate under worst-case conditions" (Seitz 1995).

<sup>12</sup> The NSPS IIII emission limits have been increase by 1.25 per ADEC to include the not-to-exceed limit per § 60.4205(e) and 60.4212(c) and (d).

The BACT determinations from the RBLC include the use of good combustion practices, purchasing engines certified to meet NSPS IIII, or no specified add-on control.

In addition to the controls found in the RBLC search, SCR and catalytic oxidation are possible NO<sub>x</sub> and VOC emission control technologies that can be applied to diesel engines. Because of the limited operating hours of the Project's emergency and startup diesel engines discussed in this section, add-on control options are not viable. Annual NO<sub>x</sub> and VOC emissions from each engine are less than 7 ton/yr per pollutant.

Donlin Gold proposes to select the use of clean fuels, good combustion practices, and engines certified to meet NSPS IIII as BACT for NO<sub>x</sub> and VOC emissions from its emergency and black start diesel engines. The resulting BACT/NSPS IIII emission rates are listed below.<sup>13</sup>

- Black start generators and camp emergency generators: 8.0 g/kW-hr (6.0 g/hp-hr)  
[40 CFR §60.4205(b), §60.4202(a)(2), § 89.112(a) Table 1, emergency generators >560 kW]
- Fire pump engines: 5.0 g/kW-hr (3.7 g/hp-hr)  
[40 CFR §60.4205(c), NSPS IIII Table 4, fire pump engines 130 ≤ kW < 225]

There are no significant energy or environmental impacts associated with clean fuels, good combustion practices, and purchasing engines certified to meet NSPS IIII.

### 2.5.3 Particulates

Possible PM emission control technologies for internal combustion engines were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process code 17, Internal Combustion Engines. The search results were filtered to include only diesel-fired engines with limited use (i.e., only those determinations with keywords "emergency," "fire," and "backup" in the process name description were included). The RBLC search results are summarized in Table 2-19.

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<sup>13</sup> The NSPS IIII emission limits have been increased by 1.25 per ADEC to include the not-to-exceed limit per §60.4205(e) and 60.4212(c) and (d).

**Table 2-19. PM Control Options for Emergency Diesel Engines**

<b>Control Technology</b>	<b>Number of Determinations*</b>	<b>Emission Limit (g/hp-hr)</b>
Particulate Filter	4	0.24 to 1.3
Good combustion practices	110**	0.02 to 17
NSPS IIII	30	0.033 to 1.1
No control specified	80	0.02 to 0.43

\* Separate determinations for different types of PM (PM, PM<sub>10</sub>, PM<sub>2.5</sub>, filterable, etc.) for the same engine were counted as one determination.

\*\* Includes two BACT determinations of good combustion practices from the Project (black start and emergency generators, 0.25 g/kw-hr [0.19 g/hp-hr]; fire pump engines, 0.19 g/kw-hr [0.14 g/hp-hr]) from its air permit issued in 2017.

The BACT determinations from the RBLC include the use of particulate filters, good combustion practices, purchasing engines certified to meet NSPS IIII, or no specified add-on control.

Donlin Gold proposes to select the use of clean fuels, good combustion practices, and engines certified to meet NSPS IIII as BACT for PM emissions from its emergency and black start diesel engines. The resulting BACT/NSPS IIII emission rates are listed below.<sup>14</sup> These limits are lower than the BACT limits for particulate filters shown in Table 2-19.

- Black start generators and camp emergency generators: 0.25 g/kW-hr (0.19 g/hp-hr)  
[40 CFR §60.4205(b), §60.4202(a)(2), § 89.112(a) Table 1, emergency generators >560 kW]
- Fire pump engines: 0.25 g/kW-hr (0.19 g/hp-hr)  
[40 CFR §60.4205(c), NSPS IIII Table 4, fire pump engines 130 ≤ kW < 225]

There are no significant energy or environmental impacts associated with clean fuels, good combustion practices, and purchasing engines certified to meet NSPS IIII.

## **2.5.4 GHG**

As discussed in Section 2.1.6, the possible add-on control option for GHG is CCS. CCS is an emerging technology that has had limited successful application on an industrial scale. There are currently no CCS systems commercially available in the United States. For BACT purposes, it is considered an innovative control option. “Innovative controls that have not been demonstrated on any source type similar to the proposed source need not be considered in the

<sup>14</sup> The NSPS IIII emission limits have been increase by 1.25 per ADEC to include the not-to-exceed limit per § 60.4205(e) and 60.4212(c) and (d).

BACT analysis” (EPA 1990). Furthermore, CCS has not been demonstrated as available for the proposed remote Project location.

Donlin Gold proposes good combustion practices as BACT control for GHG emissions. Potential annual GHG emissions from the emergency and black start diesel engines are less than 2,997 ton/yr combined.

## 2.6 Small Diesel Engines [EU ID 13-14]

Small diesel engines will be installed at the Project’s airport for electric power generation. There will be two generators, each rated for 200 kW of electric power generating capacity.

### 2.6.1 CO

Possible CO emission control technologies for small diesel engines were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process code 17.21, Small Internal Combustion Engines (<500 hp) subcategory Fuel Oil (ASTM #1, 2, includes kerosene, aviation, diesel fuel). The RBLC search results are summarized in Table 2-20.

**Table 2-20. CO Control Options for Small Diesel Engines**

Control Technology	Number of Determinations	Emission Limit (g/hp-hr)
Good combustion practices	78	0.67 to 5.0
NSPS IIII	22	1.6 to 5.5
No control specified	35	0.60 to 5.0

The BACT determinations from the RBLC include the use of good combustion practices, purchasing engines certified to meet NSPS IIII, or no specified add-on control.

In addition to the controls found in the RBLC search, catalytic oxidation is a possible CO emission control technologies that can be applied to diesel engines. However, because there are no BACT determinations in the RBLC for add-on control options, it can be inferred that they are not cost-effective for small diesel generators. Potential CO emissions per engine based on 8,760 hours of operations are 8 ton/yr.

Donlin Gold proposes to select good combustion practices and purchase engines certified to meet NSPS IIII as BACT for CO for its small diesel engines. The resulting BACT/NSPS IIII

emission rate is 4.38 g/kW-hr (3.27 g/hp-hr).<sup>15</sup> [40 CFR §60.4204(b), §60.4201(a), §1039.101 Table 1]

There are no significant energy or environmental impacts associated with good combustion practices and purchasing engines certified to meet NSPS IIII.

## 2.6.2 NO<sub>x</sub>

Possible NO<sub>x</sub> emission control technologies for small diesel engines were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process code 17.21, Small Internal Combustion Engines (<500 hp) subcategory Fuel Oil (ASTM #1, 2, includes kerosene, aviation, diesel fuel). The RBLC search results are summarized in Table 2-21.

**Table 2-21. NO<sub>x</sub> Control Options for Small Diesel Engines**

Control Technology	Number of Determinations	Emission Limit (g/hp-hr)
Good combustion practices	74	0.4 to 26
NSPS IIII	20	0.4 to 7.5
No control specified	40	1.8 to 9.3

The BACT determinations from the RBLC include the use of good combustion practices, purchasing engines certified to meet NSPS IIII, or no specified add-on control.

In addition to the controls found in the RBLC search, SCR is possible NO<sub>x</sub> emission control technology that can be applied to diesel engines. However, because there are no BACT determinations in the RBLC for add-on control options, it can be inferred that they are not cost-effective for small diesel generators. Potential NO<sub>x</sub> emissions per engine based on 8,760 hours of operations are less than 1 ton/yr.

Donlin Gold proposes to select clean fuels, good combustion practices and purchase engines certified to meet NSPS IIII as BACT for NO<sub>x</sub> for its small diesel engines. The resulting BACT/NSPS IIII emission rate is 0.50 g/kW-hr (0.37 g/hp-hr). [40 CFR §60.4204(b), §60.4201(a), §1039.101 Table 1]

There are no significant energy or environmental impacts associated with good combustion practices and purchasing engines certified to meet NSPS IIII.

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<sup>15</sup> The NSPS IIII emission limits have been increased by 1.25 per ADEC to include the not-to-exceed limit per § 60.4204(d) and 60.4212(b).



### 2.6.3 Particulates

Possible PM emission control technologies for small diesel engines were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process code 17.21, Small Internal Combustion Engines (<500 hp) subcategory Fuel Oil (ASTM #1, 2, includes kerosene, aviation, diesel fuel). The RBLC search results are summarized in Table 2-22.

**Table 2-22. PM Control Options for Small Diesel Engines**

<b>Control Technology</b>	<b>Number of Determinations</b>	<b>Emission Limit (g/hp-hr)</b>
Good combustion practices	165	0.02 to 20
NSPS IIII	40	0.20 to 1.2
No control specified	89	0.02 to 0.40

The BACT determinations from the RBLC include the use of good combustion practices, purchasing engines certified to meet NSPS IIII, or no specified add-on control.

Donlin Gold proposes to select clean fuels, good combustion practices and purchase engines certified to meet NSPS IIII as BACT for PM for its small diesel engines. The resulting BACT/NSPS IIII emission rate is 0.03 g/kW-hr (0.02 g/hp-hr). [40 CFR §60.4204(b), §60.4201(a), §1039.101 Table 1]

There are no significant energy or environmental impacts associated with good combustion practices and purchasing engines certified to meet NSPS IIII.

### 2.6.4 VOC

Possible VOC emission control technologies for small diesel engines were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process code 17.21, Small Internal Combustion Engines (<500 hp) subcategory Fuel Oil (ASTM #1, 2, includes kerosene, aviation, diesel fuel). The RBLC search results are summarized in Table 2-23.

**Table 2-23. VOC Control Options for Small Diesel Engines**

<b>Control Technology</b>	<b>Number of Determinations</b>	<b>Emission Limit (g/hp-hr)</b>
Good combustion practices	66	0.067 to 5.0
NSPS IIII	16	0.12 to 7.5
No control specified	33	0.13 to 1.5

The BACT determinations from the RBLC include the use of good combustion practices, purchasing engines certified to meet NSPS IIII, or no specified add-on control.

In addition to the controls found in the RBLC search, catalytic oxidation is a possible VOC emission control technology that can be applied to diesel engines. However, because there are no BACT determinations in the RBLC for add-on control options, it can be inferred that they are not cost-effective for small diesel generators. Potential VOC emissions per engine based on 8,760 hours of operations are less than 1 ton/yr.

Donlin Gold proposes to select clean fuels, good combustion practices and purchase engines certified to meet NSPS IIII as BACT for VOC for its small diesel engines. The resulting BACT/NSPS IIII emission rate is 0.24 g/kW-hr (0.18 g/hp-hr). [40 CFR §60.4204(b), §60.4201(a), §1039.101 Table 1]

There are no significant energy or environmental impacts associated with good combustion practices and purchasing engines certified to meet NSPS IIII.

## **2.6.5 GHG**

As discussed in Section 2.1.6, the possible add-on control option for GHG is CCS. CCS is an emerging technology that has had limited successful application on an industrial scale. There are currently no CCS systems commercially available in the United States. For BACT purposes, it is considered an innovative control option. “Innovative controls that have not been demonstrated on any source type similar to the proposed source need not be considered in the BACT analysis” (EPA 1990). Furthermore, CCS has not been demonstrated as available for the proposed remote Project location.

Donlin Gold proposes good combustion practices as BACT control for GHG emissions. Potential annual GHG emissions from the small diesel engines are less than 2,682 ton/yr combined.

## **2.7 Carbon Regeneration Kiln [EU ID 88]**

Activated carbon is used in the gold recovery process. After use, this carbon sent to the carbon regeneration kiln where it is heated (with electricity) to be reactivated for reuse in the process.

The carbon regeneration kiln has a design process rate of 1.65 tons per hour (ton/hr) of carbon and will emit CO, NO<sub>x</sub>, particulates, and VOC. The following sections provide a BACT review for these pollutants.

The only determination for a carbon regeneration kiln in the RBLC is for the Project. The RBLC was searched for all determinations in the last 10 years under the process name description containing the keyword “kiln.” The only determinations found (other than for the Project) were

for mineral processing (lime, cement, gypsum, clay, and ceramic) kilns and wood drying kilns. These determinations are not applicable to the Project's carbon regeneration kiln. The majority of the mineral processing kiln determinations are for lime and cement kilns. These kilns tend to be significantly larger (9 to 390 ton/hr) (EPA 2021), operate at higher temperatures (1,000 to 1,450°C), and produce large quantities of CO<sub>2</sub>. In these kilns, the raw materials are heated by direct contact with fuel combustion gases. Wood drying kilns are used to dry wood products (e.g., lumber and paper). These kilns operate at much lower temperatures of approximately 100°C.

In addition to the RBLC search, existing gold mining operations in Alaska with minor or Title V permits were searched for carbon regeneration emission sources and controls. The results of this search are listed in Table 2-24.

**Table 2-24. Existing Gold Mining Operations in Alaska**

Facility	Control Technology for Carbon Regeneration Kiln
Fort Knox Mine	No emission controls are listed for the carbon regeneration kiln in the Title V permit.
Kensington Mine	Kensington Mine produces concentrate for export. The minor permit does not mention carbon regeneration sources.
Pogo Mine	The carbon regeneration kiln is equipped with a wet scrubber.

The search of existing Alaska gold mines revealed only one carbon regeneration kiln with an add-on emission control technology: the Pogo Mine operates a wet scrubber for particulate emission control on its carbon regeneration kiln.

### 2.7.1 CO

As discussed above, the only determination for a carbon regeneration kiln in the RBLC is for the Project (good operating practices, 0.88 lb/hr), and an additional search of Alaska gold mines did not find any existing controls for CO emissions from carbon regeneration kilns. Possible add-on control options for CO include thermal and catalytic oxidation. Potential annual CO emissions from the carbon regeneration kiln based on 8,760 hours of operations are 4 ton/yr. Because of this low emission level, add-on CO control would not be cost-effective.<sup>16</sup> Therefore, Donlin Gold proposes to select good operating practices as BACT for CO. The resulting BACT emission rate is 0.88 lb/hr.

<sup>16</sup> See cost information provided in Section 2.4.1. The carbon regeneration kiln exhaust flow rate of 2,400 scfm and the CO emissions are within the range discussed in Section 2.4.1.

Capital costs, energy costs, and environmental impacts of using good operating practices are minimal. This source is not subject to an emission limit for CO under NSPS.

### **2.7.2 NO<sub>x</sub>**

As discussed above, the only determination for a carbon regeneration kiln in the RBLC is for the Project (good operating practices, 0.02 lb/hr), and an additional search of Alaska gold mines did not find any existing controls for NO<sub>x</sub> emissions from carbon regeneration kilns. Possible add-on control options for NO<sub>x</sub> include SCR. Potential annual NO<sub>x</sub> emissions from the carbon regeneration kiln based on 8,760 hours of operations are 0.08 ton/yr. Because of this low emission level, add-on NO<sub>x</sub> control would not be cost-effective.<sup>17</sup> Therefore, Donlin Gold proposes to select good operating practices as BACT for NO<sub>x</sub>. The resulting BACT emission rate is 0.02 lb/hr.

Capital costs, energy costs, and environmental impacts of using good operating practices are minimal. This source is not subject to an emission limit for NO<sub>x</sub> under NSPS.

### **2.7.3 Particulates**

As discussed above, the only determination for a carbon regeneration kiln in the RBLC is for the Project (wet off-gas cooler, 0.44 lb/hr). An additional search of Alaska gold mines revealed a single carbon regeneration kiln with a wet scrubber to control particulate emissions. Other possible add-on control options for particulates include a dust collector and ESP. Potential annual particulate emissions from the carbon regeneration kiln based on 8,760 hours of operations are 1.9 ton/yr. Because of this low emission level, the above-mentioned add-on particulate controls would not be cost-effective. However, Donlin Gold proposes to employ a wet off-gas cooler on the kiln exhaust. Similar to a wet scrubber, this wet off-gas cooler will control particulate emissions. This cooler is necessary to reduce the exhaust gas temperature prior to entering the carbon bed for mercury control. Therefore, Donlin Gold proposes to select a wet off-gas cooler as BACT for particulates (PM, PM<sub>10</sub>, and PM<sub>2.5</sub>). The resulting BACT emission rate is 0.44 lb/hr.

The capital cost for the wet off-gas cooler is \$826,736 (AMEC 2013). Other costs include electricity for the scrubber water pumps and maintenance costs. Environmental impacts from the scrubbers include managing the scrubber effluent water.

This source is not subject to an emission limit for particulates under NSPS.

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<sup>17</sup> See cost information provided in Section 2.4.2. The carbon regeneration kiln exhaust flow rate of 2,400 scfm is within the range discussed in Section 2.4.2, and NO<sub>x</sub> emissions are lower.

## 2.7.4 VOC

As discussed above, only determination for a carbon regeneration kiln in the RBLC is for the Project (good operating practices, 0.44 lb/hr), and an additional search of Alaska gold mines did not find any existing controls for VOC emissions from carbon regeneration kilns. Possible add-on control options for VOC include thermal and catalytic oxidation. Potential annual VOC emissions from the carbon regeneration kiln based on 8,760 hours of operations are 1.9 ton/yr. Because of this low emission level, add-on VOC control would not be cost-effective.<sup>18</sup> Therefore, Donlin Gold proposes to select good operating practices as BACT for VOC. The resulting BACT emission rate is 0.44 lb/hr.

Capital costs, energy costs, and environmental impacts of using good operating practices are minimal. This source is not subject to an emission limit for VOC under NSPS.

## 2.8 Induction Melting Furnace [EU ID 100]

The Project will include an induction melting furnace for gold refining. The induction melting furnace will emit particulate emissions. The following section provides a BACT review for particulates.

### 2.8.1 Particulates

Possible particulate emission control technologies for the induction melting furnace were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years with process name containing the keyword “furnace” and the primary fuel as electricity under process codes 80, Metallurgical Industry, and 90, Mineral Products. The results of the RBLC search are summarized in Table 2-25.

**Table 2-25. Particulate Control Options for Furnaces**

Control Technology	Number of Determinations	Emission Limit (gr/dscf)
Dust collector	17*	0.0018 to 0.0052

\* Includes the Project’s BACT determination of dust collector (0.005 gr/dscf) from its air permit issued in 2017.

Additional possible add-on control technologies not found in the RBLC search for particulate emissions from furnaces are an ESP, a wet scrubber, and an enclosure. However, these controls are less effective at controlling particulate emissions than a dust collector (EPA 1995).

Donlin Gold proposes to select the top control option of a dust collector as BACT to reduce particulate emissions from the induction melting furnace. The resulting BACT particulate (PM,

<sup>18</sup> See cost information provided in Section 2.4.1 for CO emissions.

PM<sub>10</sub>, and PM<sub>2.5</sub>) emission rate is 0.005 gr/scf. At this BACT emission rate, potential annual emissions of particulates based on 8,760 hours of operations are only 4.2 ton/yr.

The capital cost for the dust collector and associated ducting is \$106,936 (AMEC 2013). Other costs include electricity for the dust collector fan and maintenance costs. Environmental impacts from the dust collector include disposal of waste generated by the dust collector (i.e., worn-out or broken bags).

This source is not subject to an emission limit for particulates under NSPS.

## **2.9 Pressure Oxidation Hot Cure [EU ID 85-87]**

After autoclaving, the oxidized ore concentrate slurry enters the three POX hot cure tanks. The POX hot cure tanks have a steam vent that can emit particulates. The following section provides a BACT review for particulates.

### **2.9.1 Particulates**

The only determination for ore hot curing in the RBLC is for the Project's POX hot cure tanks (good operating practices, 0.4 lb/hr). The RBLC was searched for all determinations in the last 10 years under the process name description containing the keywords "cure" or "curing." Results other than the Project's POX hot cure tanks included curing operations for painting, rubber tire processing, core production (for a metal casting facility), carbon fiber production, and glass fiber production. These determinations are not applicable to the Project's POX hot cure process.

Possible add-on control technologies for particulates include a dust collector, ESP, and wet scrubber. Because of the high moisture content in the hot cure exhaust, dust collectors are not technically feasible due to plugging.

Potential annual particulate emissions from the POX hot cure tanks based on 8,760 hours of operations are 1.8 ton/yr. Because of this low emission level, add-on particulate control technologies would not be cost-effective. Therefore, Donlin Gold proposes to select good operating practices as BACT for particulates (PM, PM<sub>10</sub>, and PM<sub>2.5</sub>). The resulting BACT emission rate is 0.4 lb/hr.

Capital costs, energy costs, and environmental impacts of good operating practices are minimal. This source is not subject to an emission limit for particulates under NSPS.

## **2.10 Electrowinning Cells [EU ID 91-94]**

The Project will include electrowinning (EW) cells, where precious metals are precipitated out of precious-metal-bearing (pregnant) solution through electrolysis. The EW cells will primarily be a source of mercury emissions. However, test data from similar sources have shown that

small amounts of particulates may be emitted. The following section provides a BACT review for particulates.

### **2.10.1 Particulates**

The RBLC was searched for all determinations in the last 10 years with process names containing the keyword “electrowinning.” The only result found was for the Project (good operating practices, 0.19 lb/hr).

Possible particulate control technologies for EW cells are a dust collector, ESP, and wet scrubber. Because the high moisture content in the EW cells’ exhaust would lead to plugging, dust collectors are not technically feasible.

Potential annual particulate emissions from the EW cells based on 8,760 hours of operations are 0.8 ton/yr. Because of this low emission level, the above-mentioned add-on particulate controls would not be cost-effective. Therefore, Donlin Gold proposes to use best operating practices as BACT for particulates (PM, PM<sub>10</sub>, and PM<sub>2.5</sub>). The resulting BACT emissions are 0.19 lb/hr.

Capital costs, energy costs, and environmental impacts of good operating practices are minimal. These sources are not subject to an emission limit for particulates under NSPS.

## **2.11 Retort [EU ID 97]**

The Project will include a mercury retort, where precious-metal-bearing sludge recovered in the EW process will be heated to recover mercury prior to melting in the induction melting furnace. The retort will primarily be a source of mercury emissions. However, test data from similar sources have shown that small amounts of particulates may be emitted. The following section provides a BACT review for particulates.

### **2.11.1 Particulates**

The only determination for a mercury retort in the RBLC is for the Project’s retort (good operating practices, 0.03 lb/hr). The RBLC was searched for all determinations in the last 10 years under the process name description containing the keyword “retort.” The only determination found besides the Project’s retort was for a wood dryer and retort furnace. This determination is not applicable to the Project’s mercury retort.

Possible particulate control technologies for a retort are a dust collector, ESP, and wet scrubber. Potential annual particulate emissions from the retort based on 8,760 hours of operations are 0.1 ton/yr. Because of this low emission level, the above-mentioned add-on particulate controls would not be cost-effective. Therefore, Donlin Gold proposes to use best operating practices as BACT for particulates (PM, PM<sub>10</sub>, and PM<sub>2.5</sub>). The resulting BACT emissions are 0.03 lb/hr.

Capital costs, energy costs, and environmental impacts of good operating practices are minimal. This source is not subject to an emission limit for particulates under NSPS.

## **2.12 Laboratories [EU ID 103-104, 106, 108-109]**

Laboratory facilities will be located within the process plant building. The facilities will include a sample receiving and preparation laboratory, an assay laboratory, and a metallurgical laboratory. The laboratory processes will emit small amounts of particulates. The following section provides a BACT review for particulates.

### **2.12.1 Particulates**

The particulate emissions generated by the laboratory processes will be collected by fume hoods. Possible control technologies for fume hood exhaust, ranked in order of highest to lowest control effectiveness, are a dust collector, ESP, and wet scrubber (EPA 1995). Donlin Gold proposes to select the top control option, a dust collector, as BACT control technology to control particulate (PM, PM<sub>10</sub>, and PM<sub>2.5</sub>) emissions from each laboratory. The resulting BACT emissions are as follows:

- Sample receiving and preparation laboratory – 0.009 gr/scf
- Assay laboratory – 0.004 gr/scf
- Metallurgical laboratory – 0.009 gr/scf

The capital cost for each dust collector is expected to be similar to the furnace dust collector cost of approximately \$100,000 per unit. Other costs include electricity for the dust collector fan and maintenance costs. Environmental impacts from the dust collector include disposal of waste generated by the dust collector (i.e., worn-out or broken bags).

This source is not subject to an emission limit for particulates under NSPS.

## **2.13 Reagent Handling for Water Treatment [EU ID 111]**

The operations water treatment plant will include a water conditioning circuit. Transfers of water conditioning reagents will generate particulate emissions. The following section provides a BACT review for particulates.

### **2.13.1 Particulates**

Possible particulate emission control technologies for reagent (such as lime) transfers were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process code 90.019, Lime/Limestone Handling/Kilns/Storage/Manufacturing. Determinations for crushers, silos, fuel tanks, and fuel-fired sources were excluded from the BACT review. The results of the RBLC search are summarized in Table 2-26.



**Table 2-26. Particulate Control Options for Reagent Transfers**

<b>Control Technology</b>	<b>Number of Determinations*</b>	<b>Emission Limit (gr/dscf)</b>
Dust collector	17**	0.002 to 0.020
Wet scrubber	1***	0.020
Enclosure	1	No data
Water sprays / High moisture	2	No data
No control specified	7	0.014

\* Separate determinations for different types of PM (PM, PM<sub>10</sub>, PM<sub>2.5</sub>, filterable, etc.) for the same emission source were counted as one determination.

\*\* Includes two BACT determinations for dust collectors for the Project (reagent handling for water treatment, 0.02 gr/dscf; mill reagents handling, 0.02 gr/dscf) from its air permit issued in 2017.

\*\*\* This is the Project's BACT determination of wet scrubber (0.02 gr/dscf) for mill reagents slaking from its air permit issued in 2017.

An additional possible control option not found in the RBLC search is an ESP. The possible control technologies, in order of control effectiveness, are a dust collector, ESP, wet scrubber, enclosure, and water sprays (EPA 1995).

Donlin Gold proposes to select the top control option, a dust collector, as BACT control technology to control particulate emissions from reagent transfers. The resulting BACT particulate (PM, PM<sub>10</sub>, and PM<sub>2.5</sub>) emission rate is 0.02 gr/scf. At this BACT emission rate, potential annual emissions of particulates based on 8,760 hours of operations are only 1.1 ton/yr.

The estimated capital cost for the dust collector is approximately \$20,000 (AMEC 2011). Other costs include electricity for the dust collector fan and maintenance costs. Environmental impacts from the dust collector include disposal of waste generated by the dust collector (i.e., worn-out or broken bags).

These sources are not subject to an emission limit for particulates under NSPS.

## **2.14 Mill Reagents Handling [EU ID 59, 61, 63, 65, 67, 69, 71, 73, 75]**

The mill process requires various reagents. These reagents include lime, flocculant, caustic soda, copper sulfate, xanthate (PAX), and soda ash. The handling of these dry chemicals generates particulate emissions. The following section provides a BACT review for particulates from the following sources:

- Lime handling and slaking – hopper, silo, and slaker
- Flocculant handling and mixing

- Caustic soda handling and mixing
- Copper sulfate handling and mixing
- PAX handling and mixing
- Soda ash handling and mixing

### 2.14.1 Particulates

Section 2.13.1 identifies the possible emission control technologies for lime transfers. These same control technologies are applicable to the reagent handling reviewed in this section. The possible control technologies, in order of control effectiveness, are a dust collector, ESP, wet scrubber, enclosure, and water sprays (EPA 1995).

Donlin Gold proposes to select the top control option, dust collectors, as BACT control technology to control particulate emissions from the following sources: lime hopper and silo, flocculant handling and mixing, caustic soda handling and mixing, copper sulfate handling and mixing, PAX handling and mixing, and soda ash handling and mixing.

For the lime slaker, a dust collector is not considered technically feasible due to the presence of moisture from slaking and the potential of dust collector clogging. An ESP was also determined to be inappropriate for this application, and, at any rate, it would not be expected to provide better control than a wet scrubber. Therefore, Donlin Gold proposes to select a wet scrubber as BACT for the lime slaker.

The resulting BACT particulate (PM, PM<sub>10</sub>, and PM<sub>2.5</sub>) emission rate for each of the sources reviewed in this section is 0.02 gr/scf. At this BACT emission rate, potential annual emissions of particulates based on 8,760 hours of operation are less than 2.3 ton/yr per source.

The capital cost for the dust collectors and wet scrubber are as follows:

- Lime handling –
  - Hopper – Dust collector 15-FIL-535: \$20,000 (AMEC 2011)
  - Silo – Dust collector 15-DCL-700: \$31,737 (AMEC 2013)
  - Slaker – Wet scrubber 15-SBW-550: \$190,341 (AMEC 2013)
- Flocculant handling and mixing – Dust collector 15-DCL-XFL: \$43,412 (AMEC 2013)
- Caustic soda handling and mixing – Dust collector 15-DCL-100: \$39,577 (AMEC 2013)

- Copper sulfate handling and mixing – Dust collector 15-DCL-105: \$43,412 (AMEC 2013)
- PAX handling and mixing – Dust collector 15-DCL-110: \$43,412 (AMEC 2013)
- Soda ash handling and mixing –
  - Handling – Dust collector 15-DCL-520: \$36,357 (AMEC 2013)
  - Mixing tank – Dust collector 15-DCL-115: \$43,412 (AMEC 2013)

Other costs for the dust collectors include electricity for the dust collector fan and maintenance costs. Environmental impacts from the dust collectors include disposal of waste generated by the dust collectors (i.e., worn-out or broken bags).

Other costs for the wet scrubber include electricity for the scrubber water pumps and maintenance costs. Environmental impacts from the scrubbers include managing the scrubber effluent water.

These sources are not subject to an emission limit for particulates under NSPS.

## **2.15 Fuel Tanks [EU ID 126-142, 150-152, 156]**

The Project will include 21 fuel tanks that are significant under Title V. There will be:

- Fifteen 2,500,000-gallon ULSD tanks at the tank farm
- Two 33,000-gallon ULSD tanks at the power plant
- Two 25,000-gallon ULSD tanks at the fuel station
- One 25,000-gallon ULSD tank for the generators at the camp
- One 5,000-gallon aviation gasoline tank at the airport

These fuel tanks will have VOC emissions. The following section provides a BACT review for VOC emissions from these tanks. Fuel tanks with a capacity of 10,000 gallons or less, with lids or other closure, and that store liquid with a vapor pressure not greater than 80 millimeters (mm) of mercury at 21°C are insignificant under Title V and are discussed in Section 2.23.

### **2.15.1 VOC**

Possible VOC emission control technologies for the fuel tanks were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under process codes 42.005 Petroleum Liquid Storage in Fixed Roof Tanks and 42.006 Petroleum Liquid Storage in Floating Roof Tanks. The results of the RBLC search are summarized in Table 2-27.

**Table 2-27. VOC Control Options for Fuel Tanks**

<b>Control Technology</b>	<b>Number of Determinations</b>
Floating roof	72
Submerged fill	38
Capture and recover/control	24
Fixed roof	4
NSPS	1
No control specified	16

Potential annual VOC emissions from all the fuel tanks combined are 1.7 ton/yr. Because of this low emission level, expensive add-on controls such as a floating roof or capture and recover/control system for VOC control would not be cost-effective. Therefore, Donlin Gold proposes to select submerged fill tanks as BACT for VOC emissions.

There are no significant capital, energy, or environmental impacts associated with the use of submerged fill tanks for VOC control.

## **2.16 Incinerators [EU ID 27-28]**

The Project will include two incinerators:

- Camp waste incinerator
- Sewage sludge incinerator

The camp waste incinerator and sewage sludge incinerator will be used to dispose of the trash and human waste, respectively, generated by an estimated 600 mine employees living in the camp. The incinerators will emit CO, NO<sub>x</sub>, particulates, SO<sub>2</sub>, Pb, and GHG.<sup>19</sup> The following sections provide a BACT review for each of these pollutants except SO<sub>2</sub> and Pb.

### **2.16.1 CO**

Possible CO emission control technologies for the incinerators were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under process codes 24.4 and 24.5, Waste Disposal, subcategories Municipal Waste Combustion and Wastewater Treatment Sludge Incineration. The results of the RBLC search are summarized in Table 2-28.

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<sup>19</sup> Incinerators emit trace amounts of organics, which are hazardous air pollutants regulated under NSPS per Section 129 of the Clean Air Act.

**Table 2-28. CO Control Options for Waste and Sewage Sludge Incinerators**

<b>Control Technology</b>	<b>Number of Determinations</b>	<b>Emission Limit (ppmvd @ 7% O<sub>2</sub>)</b>
Oxidation Catalyst	1	75
Good combustion practices	2*	13 to 52
No control specified	3	13

\* These two BACT determinations of good combustion practices are for the Project's camp waste incinerator (13 ppmvd @ 7% O<sub>2</sub>) and sewage sludge incinerator (52 ppmvd @ 7% O<sub>2</sub>) from its air permit issued in 2017.

The emissions control system for the Project's incinerators has not been determined at this time. However, Donlin Gold will purchase incinerators that meet the control and emission standards required by NSPS CCCC and LLLL. Per these emission standards, potential annual CO emissions based on the maximum daily throughput and 365 operating days per year (day/yr) are 0.4 ton/yr for the camp waste incinerator and less than 0.01 ton/yr for the sewage sludge incinerator. Because of the low emission level, any additional CO control would not be cost-effective. Therefore, Donlin Gold proposes to select incinerators that meet the NSPS limits as BACT for CO emissions. The resulting BACT/NSPS emission rates are as follows:

- Camp waste incinerator – 17 ppmvd @ 7% O<sub>2</sub> [40 CFR 60 Subpart CCCC Table 5]<sup>20</sup>
- Sewage sludge incinerator – 52 ppmvd @ 7% O<sub>2</sub> [40 CFR 60 Subpart LLLL Table 2]

Capital costs, energy costs, and environmental impacts will depend on the controls required to meet the NSPS emission limits.

### **2.16.2 NO<sub>x</sub>**

Possible NO<sub>x</sub> emission control technologies for the incinerators were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under process codes 24.4 and 24.5, Waste Disposal, subcategories Municipal Waste Combustion and Wastewater Treatment Sludge Incineration. The results of the RBLC search are summarized in Table 2-29.

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<sup>20</sup> The previous Donlin BACT emission limit (13 ppmvd @ 7% O<sub>2</sub>) was based on Table 8 of 40CFR 60 Subpart CCCC for small, remote incinerators. Because the Donlin incinerator may exceed the small, remote incinerator maximum combustion rate of 3 tons per day (ton/day), the emission limit is revised to the Table 5 limit for larger incinerators.

**Table 2-29. NO<sub>x</sub> Control Options for Waste and Sewage Sludge Incinerators**

Control Technology	Number of Determinations	Emission Limit (ppmvd @ 7% O <sub>2</sub> )
SCR	1	45
Selective Non-Catalytic Reduction (SNCR)	2	110
Good combustion practices	2*	170 to 210
No control specified	3	170

\* These two BACT determinations of good combustion practices are for the Project's camp waste incinerator (170 ppmvd @ 7% O<sub>2</sub>) and sewage sludge incinerator (210 ppmvd @ 7% O<sub>2</sub>) from its air permit issued in 2017.

An additional possible control option not found in the RBLC search for NO<sub>x</sub> emissions from incinerators is a low-NO<sub>x</sub> burner with flue gas recirculation.

The emissions control system for the Project's incinerators has not been determined at this time. However, Donlin Gold proposes to purchase incinerators that meet the control and emission standards required by NSPS CCCC and LLLL. Per these emission standards, potential annual NO<sub>x</sub> emissions based on maximum daily throughput and 365 day/yr are 0.8 ton/yr for the camp waste incinerator and less than 0.06 ton/yr for the sewage sludge incinerator. Because of the low emission level, any additional NO<sub>x</sub> control would not be cost-effective. Therefore, Donlin Gold proposes to select incinerators that meet the NSPS limits as BACT for NO<sub>x</sub> emissions. The resulting BACT/NSPS emission rates are as follows:

- Camp waste incinerator – 23 ppmvd @ 7% O<sub>2</sub> [40 CFR 60 Subpart CCCC Table 5]<sup>21</sup>
- Sewage sludge incinerator – 210 ppmvd @ 7% O<sub>2</sub> [40 CFR 60 Subpart LLLL Table 2]

Capital costs, energy costs, and environmental impacts will depend on the controls required to meet the NSPS emission limits.

### 2.16.3 Particulates

Possible particulate emission control technologies for the incinerators were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under process codes 24.4 and 24.5, Waste Disposal, subcategories Municipal Waste Combustion and Wastewater Treatment Sludge Incineration. The results of the RBLC search are summarized in Table 2-30.

**Table 2-30. Particulate Control Options for Waste and Sewage Sludge Incinerators**

<sup>21</sup> The previous Donlin BACT emission limit (170 ppmvd @ 7% O<sub>2</sub>) was based on Table 8 of 40CFR 60 Subpart CCCC for small, remote incinerators. Because the Donlin incinerator may exceed the small, remote incinerator maximum combustion rate of 3 ton/day, the emission limit is revised to the Table 5 limit for larger incinerators.

Control Technology	Number of Determinations	Emission Limit (mg/dscm @ 7% O <sub>2</sub> )
Dust collector	1	24
Scrubber	1	No data
Good Combustion Practices	2*	60 to 270
No control specified	2	270

\* These two BACT determinations of good combustion practices are for the Project's camp waste incinerator (270 mg/dscm @ 7% O<sub>2</sub>) and sewage sludge incinerator (60 mg/dscm @ 7% O<sub>2</sub>) from its air permit issued in 2017.

The emissions control system for the Project's incinerators has not been determined at this time. However, Donlin Gold proposes to purchase incinerators that meet the control and emission standards required by NSPS CCCC and LLLL. Per these emission standards, potential annual particulate emissions based on maximum daily throughput and 365 day/yr are 0.3 ton/yr for the camp waste incinerator and 0.009 ton/yr for the sewage sludge incinerator. Because of the low emission level, any additional particulate control would not be cost-effective. Therefore, Donlin Gold proposes to select incinerators that meet the NSPS limits as BACT for particulate emissions. The resulting BACT/NSPS emission rates are as follows:

- Camp waste incinerator – 18 mg/dscm @ 7% O<sub>2</sub> [40 CFR 60 Subpart CCCC Table 5]<sup>22</sup>
- Sewage sludge incinerator – 60 mg/dscm @ 7% O<sub>2</sub> [40 CFR 60 Subpart LLLL Table 2]

Capital cost, energy cost, and environmental impact will depend on the controls required to meet the NSPS emission limits.

## 2.16.4 GHG

As discussed in Section 2.1.6, the possible add-on control option for GHG is CCS. CCS is an emerging technology that has had limited successful application on an industrial scale. There are currently no CCS systems commercially available in the United States. For BACT purposes, it is considered an innovative control option. "Innovative controls that have not been demonstrated on any source type similar to the proposed source need not be considered in the BACT analysis" (EPA 1990). Furthermore, CCS has not been demonstrated as available for the proposed remote Project location.

<sup>22</sup> The previous Donlin BACT emission limit (270 ppmvd @ 7% O<sub>2</sub>) was based on Table 8 of 40CFR 60 Subpart CCCC for small, remote incinerators. Because the Donlin incinerator may exceed the small, remote incinerator maximum combustion rate of 3 ton/day, the emission limit is revised to the Table 5 limit for larger incinerators.

Donlin Gold proposes good combustion practices as BACT control for GHG emissions. The potential annual, combined GHG emissions from the camp waste and sewage sludge incinerators are 3,936 ton/yr.

## **2.17 Acidulation Tanks and Neutralization Tanks [EU ID 124-125]**

The Project will include several tanks associated with the POX process that are sources of GHG emissions:

- Acidulation tanks
- Neutralization tanks

In the acidulation tanks, acidic solution will be added to the concentrate slurry to reduce its carbonate gangue component. In the neutralization tanks, lime slurry will be added to the concentrate slurry in the presence of oxygen to bring the pH to approximately 9 before it is pumped to the carbon-in-leach circuit. In both processes, CO<sub>2</sub> is produced and emitted.

The acidulation and neutralization tanks will have the potential to emit 273,175 tons of CO<sub>2</sub> per year, combined. As discussed in Section 2.1.6, the possible add-on control option for GHG is CCS. CCS is an emerging technology that has had limited successful application on an industrial scale. There are currently no CCS systems commercially available in the United States. For BACT purposes, it is considered an innovative control option. “Innovative controls that have not been demonstrated on any source type similar to the proposed source need not be considered in the BACT analysis” (EPA 1990). Furthermore, CCS has not been demonstrated as available for the proposed remote Project location.

Donlin Gold proposes good operating practices for GHG emissions from the acidulation and neutralization tanks. Capital costs, energy costs, and environmental impacts of using good combustion practices are minimal.

## **2.18 Fugitive Dust from Unpaved Roads [EU ID 158-160]**

The Project will produce fugitive particulate emissions from travel on unpaved haul roads and access roads. Unpaved road emissions come from ore and waste hauling, road graders, maintenance vehicles, and other haul road travel.

Possible particulate emission control technologies for unpaved roads were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process code 99.150, Unpaved Roads. The results of the RBLC search are summarized in Table 2-31.



**Table 2-31. Particulate Control Options for Unpaved Roads**

<b>Control Technology</b>	<b>Number of Determinations*</b>	<b>Control Efficiency (%)</b>
Chemical and water	5**	70 to 90
Water	2	85 to 90
Speed reduction	1	No data
Paving	2	No data
No control specified	1	No data

\* Separate determinations for different types of PM (PM, PM<sub>10</sub>, PM<sub>2.5</sub>, filterable, etc.) for the same emission source were counted as one determination.

\*\* Includes the Project's BACT determination of chemical dust suppressant and watering (90%) from its air permit issued in 2017.

Donlin Gold proposes the use of best practical methods (BPMs), as described in the Donlin Gold Fugitive Dust Control Plan (FDCP) provided in Appendix E, as BACT for unpaved roads. The BPMs include: chemical dust suppressants and water application. Donlin Gold expects to achieve 90 percent or greater control efficiency for particulate emissions from unpaved roads using these methods. These BPMs combined with achieving 90 percent control represent the top BACT control option. Total potential annual particulate emissions from haul road and access road travel at the Project are approximately 3,500 ton/yr.

Costs for using chemical dust suppressants and water are the capital and operating costs of the equipment (chemical and water application trucks), as well as the cost of the chemical dust suppressant, which is approximately \$600 per thousand gallons. Energy and environmental costs from the use of chemical and water suppression include air pollutant emissions from operation of the application trucks and possible impacts to vegetation from chemical dust suppressant usage.

As shown in Table 2-31, chemical dust suppressants and water application can achieve 90 percent control of fugitive dust from unpaved roads. This level of control (90 percent) is the most common control efficiency found in the RBLC for unpaved roads. A list of all RBLC determinations (1970 to date) that specify a control efficiency of 90 percent or greater is provided in Table 2-32.

**Table 2-32. Particulate Control Options for Unpaved Roads at or above 90 Percent Efficiency**

<b>RBLC ID</b>	<b>Permit Issuance Date</b>	<b>Control Methos</b>	<b>Control Efficiency (%)</b>
AK-0084	6/30/2017	Chemical Suppressant and Water	90
AR-0094	11/5/2008	Chemical Suppressant and Water	90
AR-0124	8/3/2015	Water	90
CO-0043	9/25/2000	Chemical Suppressant and Water	85-90
IN-0034	11/30/1993	Chemical Suppressant	90
LA-0209	6/28/2006	Water and Speed Reduction	95.5
LA-0239	5/24/2010	Chemical Suppressant, Water, and Speed Reduction	90
MO-0048	8/20/1997	Chemical Suppressant	90
NV-0045	12/11/2006	Chemical Suppressant	98
NV-0045	12/11/2006	Chemical Suppressant	98
NV-0047	2/26/2008	Chemical Suppressant and Water	90
OH-0111	11/26/1986	Not specified	90
OH-0126	4/8/1987	Surface Treatment and Speed Reduction	90
OH-0131	5/28/1987	Surface Treatment and Speed Reduction	90
TX-0032	11/5/1981	Water and compaction	90
UT-0021	6/2/1980	Chemical Suppressant and Water	90
VA-0074	4/23/1987	Water	90

The EPA source documents for control efficiency referenced in AP-42, Section 13.2.2, Unpaved Roads, as well as additional applicable studies, were reviewed by Air Sciences. This review (described in Air Sciences' memorandum (Air Sciences 2015b)) indicated that the studies showed that chemical suppressants alone could achieve 90 percent, or more, control efficiency. The Air Sciences memorandum also provides examples of other agencies that have adopted a 90-percent-control-efficiency level with chemical dust suppressants application on unpaved roads as part of their air quality program.

The Air Sciences memorandum was reviewed by Greg Muleski of SACI, LLC. SACI provides consulting services on the characterization and control of air pollution sources, and Mr. Muleski had previously been a co-author of several EPA studies that are supporting documents for AP-

42. The conclusion of the review was that chemical unpaved road dust suppressants can reasonably achieve over 90 percent average control efficiency (SACI 2015).

Based on the BACT determinations, and the Air Sciences and SACI reviews, a 90 percent control level for unpaved road dust is considered technologically feasible. Therefore, Donlin Gold has proposed control measures for achieving 90 percent dust control as BACT.

## 2.19 Fugitive Dust from Material Loading and Unloading [EU ID 115-120]

Material loading and unloading activities generate fugitive particulate emissions from the handling of materials (e.g., loading of haul trucks via a shovel, truck dumping, etc.). Possible particulate emission control technologies for material loading and unloading were obtained from the RBLC. The RBLC was searched for all determinations in the last 10 years under the process code 99.190, Other Fugitive Dust Sources. The results were filtered to include only material transfer emission sources. The results of the RBLC search are summarized in Table 2-33.

**Table 2-33. Particulate Control Options for Material Loading and Unloading**

Control Technology	Number of Determinations*	Control Efficiency (%)
Baghouse	6	99
Water spray	4**	90 to 99
Enclosure	1	No data
No control specified	4	No data

\* Separate determinations for different types of PM (PM, PM<sub>10</sub>, PM<sub>2.5</sub>, filterable, etc.) for the same emission source were counted as one determination.

\*\* Includes the Project's BACT determination of water sprays (90%) from its air permit issued in 2017.

The material loading and unloading sources at the Project are mobile sources; therefore, add-on controls are not feasible. Donlin Gold proposes the use of BPMs, as described in its FDCP, as BACT for material loading and unloading emissions. The BPMs include natural precipitation and material moisture, avoiding activities during adverse winds, and watering work areas. Total potential particulate emissions from material loading and unloading are approximately 530 ton/yr. Capital costs, energy costs, and environmental impacts of using BPMs are minimal.

## 2.20 Fugitive Dust from Wind Erosion [EU ID 161]

Wind erosion can generate dust emissions from exposed and active mining areas such as the tailings impoundment beach, waste rock dump, run-of-mine ore and overburden stockpiles, and the haul and access roads.

The RBLC was searched for all determinations in the last 10 years under the process code 99.190, Other Fugitive Dust Sources. The search results were filtered to include only wind erosion emission sources. The results of the RBLC search are presented in Table 2-34.

**Table 2-34. Particulate Control Options for Wind Erosion**

<b>Control Technology</b>	<b>Number of Determinations*</b>	<b>Control Efficiency (%)</b>
Water spray	1**	90
Enclosure	1	No data

\* Separate determinations for different types of PM (PM, PM<sub>10</sub>, PM<sub>2.5</sub>, filterable, etc.) for the same emission source were counted as one determination.

\*\* Includes the Project's BACT determination of water sprays (90%) from its air permit issued in 2017.

Due to the large, exposed areas that are potentially subject to wind erosion, add-on controls are not feasible for wind erosion sources at the Project. Donlin Gold therefore proposes to use BPMs, as described in the FDCP, as BACT for wind erosion from exposed areas. The BPMs for wind erosion include natural precipitation and material moisture, phased surface disturbance, dozer maintenance of waste facility surfaces, and chemical application. In addition, the coarse ore stockpile wind erosion emissions will be controlled by a cover over the stockpile. Haul road wind erosion emissions will be controlled by water and chemical application as discussed in Section 2.18.

The total potential particulate emissions from wind erosion at the Project are approximately 32 ton/yr.

Capital costs, energy costs, and environmental impacts of the BPMs listed above are minimal except for water and chemical dust suppression costs, which are discussed in Section 2.18, and the capital cost of an enclosure for the coarse ore stockpile.

## **2.21 Fugitive Dust from Drilling and Blasting [EU ID 113-114]**

The Project will produce particulate emissions from drilling and blasting operations. Blasting breaks the overburden, waste rock, and ore into sizes that can be hauled and/or crushed. Holes are drilled into rock to allow placement of explosive materials for blasting operations.

The RBLC was searched for all determinations in the last 10 years under the process code 99.190, Other Fugitive Dust Sources. The search results were filtered to include only drilling and blasting emission sources. The results of the RBLC search returned two determinations. One result was for drilling at an oil and gas facility which did not specify a control. The other result was for drilling and blasting operations at the Project with a control of best practical methods.

Donlin Gold proposes to use BPMs, as described in the FDCP, as BACT for particulate emissions from drilling and blasting. The BPMs for drilling and blasting include natural precipitation and material moisture, avoiding activities during adverse winds, and using blast-hole-stemming and wet or shrouded drilling when practical.

Total potential particulate emissions from drilling and blasting are approximately 272 ton/yr. Capital costs, energy costs, and environmental impacts of using BPMs are minimal.

## **2.22 Fugitive Combustion Emissions from Blasting [EU ID 114]**

The Project will produce fugitive combustion emissions from blasting operations. Blasting generates CO, NO<sub>x</sub>, and GHG from explosives combustion.

The RBLC was searched for all determinations in the last 10 years under the process code 99.190, Other Fugitive Dust Sources. The search results were filtered to include only blasting emission sources. The only result was for blasting operations at the Project, and the specified control was good combustion practices.

Donlin Gold proposes to select good combustion practices as BACT for fugitive combustion emissions from blasting for all pollutants. Total potential particulate emissions from blasting are approximately 1,921 ton/yr for CO, 52 ton/yr for NO<sub>x</sub>, and 11,740 ton/yr for GHG. Capital costs, energy costs, and environmental impacts of using good combustion practices are minimal.

## **2.23 Title V Insignificant Emission Units [EU ID 21-23, 25-26, 143-149, 153-155, 157]**

The Project will include ancillary equipment that will not require a Title V operating permit under 18 AAC 50.326 because it is categorized as “insignificant.” This equipment and a description of the “insignificant” categorization are provided in Table 2-35. Note that the fire pump engines associated with the fire pump tanks discussed in this section are discussed in Section 2.5.

**Table 2-35. Title V Insignificant Emission Units**

<b>Emission Unit</b>	<b>Units</b>	<b>Title V Insignificant Category</b>
Portable building heaters (0.86 MMBtu/hr, each)	20	A combustion emission unit with a rated capacity less than 1.7 MMBtu per hour (MMBtu/hr) using kerosene, No. 1 fuel oil, or No. 2 fuel oil; emission units under this paragraph do not include internal combustion engines. [18 AAC 50.326(g)(7)]
Auxiliary SO <sub>2</sub> burner (2 MMBtu/hr)	1	An emission unit with an actual emission rate, per pollutant, of less than the insignificant emission rates. [18 AAC 50.326(e)]
Building heaters (0.175 MMBtu/hr, each)	138	A combustion emission unit with a rated capacity less than 4 MMBtu/hr exclusively using NG, butane, propane, or liquefied petroleum gas; emission units under this paragraph do not include internal combustion engines. [18 AAC 50.326(g)(5)]
Air handlers (2.5 MMBtu/hr, each)	7	
SO <sub>2</sub> burner (2 MMBtu/hr)	1	
ANFO mixing plant tank (10,000 gallons, diesel)	1	Operation, loading, and unloading of volatile liquid storage with 10,000-gallon capacity or less, with lids or other closure and storing liquid with a vapor pressure not greater than 80 mm of mercury at 21°C. [18 AAC 50.326(g)(3)]
Mine site mill fire pump tank (270 gallons, diesel)	1	
Tank farm fire pump tank (270 gallons, diesel)	1	
Camp fire pump tank (270 gallons, diesel)	1	
Jet fuel tanks (9,900 gallons each, jet fuel)	2	
Airport generator tank (9,900 gallons, diesel)	1	
POX boilers tank (5,000 gallons, diesel)	1	
Oxygen plant boiler tank (5,000 gallons, diesel)	1	
Carbon elution heater tank (5,000 gallons, diesel)	1	
Auxiliary SO <sub>2</sub> burner tank (500 gallons, diesel)	1	

### 2.23.1 Combustion Emissions from Ancillary Fuel Burning Equipment

As shown in Table 2-35, the ancillary fuel burning equipment at the Project includes NG-fired building heaters and air handler heaters. In addition, there is an NG-fired SO<sub>2</sub> burner and a ULSD-fired auxiliary SO<sub>2</sub> burner, which produce SO<sub>2</sub> for the cyanide destruction process. The heat input rates for the ancillary fuel burning equipment range from 0.175 to 2.5 MMBtu/hr per unit. These sources are categorized as “insignificant” per 18 AAC 50.326(e) or (g) because of their small size and/or low level of emissions.

The potential emissions of each source, based on 8,760 hours of operation, are provided in Table 2-36.

**Table 2-36. Ancillary Fuel Burning Equipment per Unit Emissions (ton/yr, per unit)**

Source	CO	NO <sub>x</sub>	PM*	VOC	CO <sub>2</sub>
Portable building heaters, each	0.15	0.58	0.095	0.01	614
Building heaters, each	0.03	0.07	0.006	0.004	90
Air handler heaters (2.5 MMBtu/hr), each	0.90	1.07	0.08	0.06	1,281
SO <sub>2</sub> burner (2 MMBtu/hr)	0.72	0.86	0.07	0.05	1,025
Auxiliary SO <sub>2</sub> burner (2 MMBtu/hr)	0.34	1.35	0.22	0.02	1,428

\* PM – Total particulates

The possible control options for fuel burning equipment are discussed in Section 2.4, Boilers and Heaters. However, because of the low emission levels shown in Table 2-36, no control options, other than good combustion practices and use of clean fuels, would be cost-effective. Therefore, Donlin Gold proposes to select good operating practices and clean fuels as BACT for CO, NO<sub>x</sub>, particulate, VOC, and GHG emissions.

Capital costs, energy costs, and environmental impacts of using good operating practices and clean fuels are minimal. These sources are not subject to emission limits under NSPS.

### 2.23.2 VOC from Tanks

Possible VOC emission control technologies for the fuel tanks are discussed in Section 2.15, Fuel Tanks.

Potential annual VOC emissions from all the insignificant fuel tanks described in this section are less than 0.2 ton/yr combined. Because of this low emission level, expensive add-on controls such as a floating roof or capture and recover/control system for VOC control would not be cost-effective. Therefore, Donlin Gold proposes to select submerged fill tanks as BACT for VOC emissions.

There are no significant capital, energy, or environmental impacts associated with the use of submerged fill tanks for VOC control.

These tanks are not subject to an emission limit for VOC under NSPS.



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## **Attachment C1 – BACT Summary**

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Table C1-1 provides a summary of the BACT steps for each source described in this report.

**Table C1-1. BACT Summary**

Source/Pollutant	Step 1 Possible Control Technologies	Step 2 Infeasible Technologies	Step 3 Ranking Control Technologies	Step 4 Most Effective Control Technology	Step 5 Selection of BACT
<b>Main Power Plant – 12 Wärtsilä Model 18V50DF dual-fuel engines</b>					
CO	Oxidation catalyst, NSCR, Good combustion practices	NSCR	1. Oxidation catalyst 2. Good combustion practices	Oxidation catalyst	Oxidation catalyst 0.09 g/hp-hr (gas) 0.13 g/hp-hr (oil)
NO <sub>x</sub>	SCR, NSCR, Low NO <sub>x</sub> combustion, Lean-burn combustion technology, Good combustion practices, Water injection, Other add-on controls	Water injection, NSCR	1. SCR 2. Other add-on control devices 3. Low NO <sub>x</sub> combustion/Lean- burn combustion technology 4. Good combustion practices	SCR	SCR 0.06 g/hp-hr (gas) 0.40 g/hp-hr (oil)
Particulates	Filter, Wet scrubber, ESP, Clean fuels/Good combustion practices	Filter, Wet scrubber, ESP	1. Clean fuels/Good combustion practices	Clean fuels/Good combustion practices	Clean fuels / Good combustion practices 0.10 g/hp-hr (gas) 0.11 g/hp-hr (oil- filterable) 0.22 g/hp-hr (oil- filterable and condensable)
VOC	Oxidation catalyst, NSCR, Good combustion practices	NSCR	1. Oxidation catalyst 2. Good combustion practices	Oxidation catalyst	Oxidation catalyst 0.07 g/hp-hr (gas) 0.16 g/hp-hr (oil)

Source/Pollutant	Step 1 Possible Control Technologies	Step 2 Infeasible Technologies	Step 3 Ranking Control Technologies	Step 4 Most Effective Control Technology	Step 5 Selection of BACT
GHG/CO <sub>2</sub>	CCS, Energy-efficient combined cycle operation, Good combustion practices	CCS	1. Energy-efficient combined cycle operation 2. Good combustion practices	Energy-efficient combined cycle operation	Energy-efficient combined cycle operation 305 g/hp-hr (gas) 440 g/hp-hr (oil)
<b>Ore Crushing</b> – gyratory crusher, surge pocket, apron feeder, coarse ore reclaim apron feeders 1 to 4, pebble crushers					
Particulates	Dust collector, Wet scrubber, ESP, Enclosure, Water sprays or dust suppressant	None	1. Dust collector 2. ESP 3. Wet scrubber 4. Enclosure 5. Water sprays or dust suppressant	Dust collector	Dust collector 0.01 gr/ft <sup>3</sup>
<b>Ore Crushing</b> – GC dump pocket and rock breaker, GC discharge conveyor, stockpile feed conveyor, SAG mill feed conveyor, pebble discharge conveyor					
Particulates	Dust collector, Wet scrubber, ESP, Enclosure, Water sprays or dust suppressant	Dust collector, Wet scrubber, ESP	1. Enclosure 2. Water sprays or dust suppressant	Enclosure	Enclosure 0.00048 lb/ton
<b>Autoclaves</b> – two units					
CO	Thermal oxidation, Oxidation catalyst, Good operating practices	Thermal oxidation, Oxidation catalyst	1. Good operating practices	Good operating practices	Good operating practices 88.0 lb/hr per unit
Particulates	Dust collector, Wet scrubber, ESP	Dust collector	1. Wet scrubber 2. ESP	Wet scrubber	Wet scrubber 0.22 lb/hr per unit
VOC	Thermal oxidation, Oxidation catalyst, Carbon adsorption	Thermal oxidation, Oxidation catalyst	1. Carbon adsorption	Carbon adsorption	Carbon adsorption 0.04 lb/hr per unit
GHG	CCS, Good operating practices	CCS	1. Good operating practices	Good operating practices	Good operating practices

Source/Pollutant	Step 1 Possible Control Technologies	Step 2 Infeasible Technologies	Step 3 Ranking Control Technologies	Step 4 Most Effective Control Technology	Step 5 Selection of BACT
<b>Boilers and Heaters</b> – POX boilers, oxygen plant boiler, carbon elution heater, air handler heaters, power plant auxiliary heaters					
CO	Oxidation catalyst, Good combustion practices	None	1. Oxidation catalyst 2. Good combustion practices	Good combustion practices (Oxidation catalyst is not cost- effective)	Good combustion practices 0.082 lb/MMBtu (NG) 0.038 lb/MMBtu (ULSD)
NO <sub>x</sub> (POX and oxygen plant boilers, carbon elution heater, air handler heaters)	SCR, Low-NO <sub>x</sub> burner, Good combustion practices	Low-NO <sub>x</sub> burner	1. SCR 2. Good combustion practices	Good combustion practices (SCR is not cost-effective)	Good combustion practices 0.098 lb/MMBtu (NG) 0.154 lb/MMBtu (ULSD)
NO <sub>x</sub> (power plant auxiliary boilers)	SCR, Low-NO <sub>x</sub> burner, Good combustion practices	None	1. SCR 2. Low-NO <sub>x</sub> burner 3. Good combustion practices	Low-NO <sub>x</sub> burner (SCR is not cost-effective)	Low-NO <sub>x</sub> burner 0.049 lb/MMBtu (NG) 0.154 lb/MMBtu (ULSD)
Particulates	Dust collector, Wet scrubber, ESP, Clean fuels/Good combustion practices	Dust collector, Wet scrubber, ESP	1. Clean fuels/Good combustion practices	Clean fuels/Good combustion practices	Clean fuels / Good combustion practices 0.0075 lb/MMBtu (NG) 0.025 lb/MMBtu (ULSD)
VOC	Oxidation catalyst, thermal oxidizer, Good combustion practices	None	1. Oxidation catalyst 2. Thermal oxidizer 3. Good combustion practices	Good combustion practices (Oxidation catalyst and thermal oxidizer are not cost- effective)	Good combustion practices 0.0054 lb/MMBtu (NG) 0.0015 lb/MMBtu (ULSD)
GHG	CCS, Good combustion practices	CCS	1. Good combustion practices	Good combustion practices	Good combustion practices
<b>Black Start and Emergency Diesel Engines</b> – black start generators (two units, 600 kW each), camp emergency generators (four units, 1,500 kW each), mine site tank farm fire pump (252 hp), mine site mill fire pump (252 hp), camp site fire pump (252 hp)					
CO	Oxidation catalyst, Good combustion practices, NSPS IIII	None	1. Oxidation catalyst 2. Good combustion practices 3. NSPS IIII	Good combustion practices (Oxidation catalyst is not cost- effective)	Good combustion practices / NSPS IIII 3.27 g/hp-hr

Source/Pollutant	Step 1 Possible Control Technologies	Step 2 Infeasible Technologies	Step 3 Ranking Control Technologies	Step 4 Most Effective Control Technology	Step 5 Selection of BACT
NO <sub>x</sub> + VOC	SCR, Oxidation catalyst, Good combustion practices, NSPS IIII	None	1. SCR 2. Oxidation catalyst 3. Good combustion practices 4. NSPS IIII	Good combustion practices (SCR and oxidation catalyst are not cost-effective)	Good combustion practices / NSPS IIII 6.0 g/hp-hr (Black start and Emergency) 3.7 g/hp-hr (Camp fire pump)
Particulates	Particulate filter, Good combustion practices, NSPS IIII	None	1. Particulate filter 2. Clean fuels / Good combustion practices 3. NSPS IIII	Clean fuels/Good combustion practices (particulate filters are not cost effective)	Clean fuels / Good combustion practices / NSPS IIII 0.19 g/hp-hr
GHG	CCS, Good combustion practices	CCS	1. Good combustion practices	Good combustion practices	Good combustion practices
<b>Small Diesel Engines – airport diesel generators (two units, 200 kW each)</b>					
CO	Oxidation catalyst, Good combustion practices, NSPS IIII	None	1. Oxidation catalyst 2. Good combustion practices 3. NSPS IIII	Good combustion practices (Oxidation catalyst is not cost- effective)	Good combustion practices / NSPS IIII 3.27 g/hp-hr
NO <sub>x</sub>	SCR, Good combustion practices, NSPS IIII	None	1. SCR 2. Good combustion practices 3. NSPS IIII	Good combustion practices (SCR is not cost-effective)	Good combustion practices / NSPS IIII 0.37 g/hp-hr
Particulates	Good combustion practices, NSPS IIII	None	1. Clean fuels / Good combustion practices 2. NSPS IIII	Clean fuels/Good combustion practices	Clean fuels/Good combustion practices / NSPS IIII 0.02 g/hp-hr
VOC	Oxidation catalyst, Good combustion practices, NSPS IIII	None	1. Oxidation catalyst 2. Good combustion practices 3. NSPS IIII	Good combustion practices (Oxidation catalyst is not cost- effective)	Good combustion practices / NSPS IIII 0.18 g/hp-hr
GHG	CCS, Good combustion practices	CCS	1. Good combustion practices	Good combustion practices	Good combustion practices

Source/Pollutant	Step 1 Possible Control Technologies	Step 2 Infeasible Technologies	Step 3 Ranking Control Technologies	Step 4 Most Effective Control Technology	Step 5 Selection of BACT
<b>Carbon Regeneration Kiln</b>					
CO	Thermal oxidation, Oxidation catalyst, Good operating practices	None	1. Thermal oxidation and Oxidation catalyst 2. Good operating practices	Good operating practices (Thermal oxidation and Oxidation catalyst are not cost-effective)	Good operating practices 0.88 lb/hr
NO <sub>x</sub>	SCR, Good operating practices	None	1. SCR 2. Good operating practices	Good operating practices (SCR is not cost-effective)	Good operating practices 0.02 lb/hr
Particulates	Dust collector, Wet scrubber, ESP, Wet off- gas cooler	None	1. Dust collector, Wet scrubber, ESP 2. Wet off-gas cooler	Wet off-gas cooler (Dust collector, Wet scrubber, ESP are not cost- effective)	Wet off-gas cooler 0.44 lb/hr
VOC	Thermal oxidation, Oxidation catalyst, Good operating practices	None	1. Thermal oxidation and Oxidation catalyst 2. Good operating practices	Good operating practices (Thermal oxidation, Oxidation catalyst are not cost- effective)	Good operating practices 0.44 lb/hr
<b>Induction Melting Furnace</b>					
Particulates	Dust collector, Wet scrubber, ESP, Enclosure	None	1. Dust collector 2. ESP 3. Wet scrubber 4. Enclosure	Dust collector	Dust collector 0.005 gr/scf
<b>Pressure Oxidation Hot Cure – POX hot cure tanks (3 units)</b>					
Particulates	Dust collector, Wet scrubber, ESP, Good operating practices	Dust collector	1. Wet scrubber, ESP 2. Good operating practices	Good operating practices (Wet scrubber, ESP are not cost- effective)	Good operating practices 0.40 lb/hr
<b>Electrowinning Cells</b>					



Source/Pollutant	Step 1 Possible Control Technologies	Step 2 Infeasible Technologies	Step 3 Ranking Control Technologies	Step 4 Most Effective Control Technology	Step 5 Selection of BACT
Particulates	Dust collector, Wet scrubber, ESP, Good operating practices	Dust collector	1. Wet scrubber, ESP 2. Good operating practices	Good operating practices (Wet scrubber, ESP are not cost-effective)	Good operating practices 0.19 lb/hr
<b>Retort</b>					
Particulates	Dust collector, Wet scrubber, ESP, Good operating practices	None	1. Dust collector, Wet scrubber, ESP 2. Good operating practices	Good operating practices (Dust collector, Wet scrubber, ESP are not cost-effective)	Good operating practices 0.03 lb/hr
<b>Laboratories</b> – sample receiving and preparation laboratory, assay laboratory, and metallurgical laboratory					
Particulates	Dust collector, ESP, Wet scrubber	None	1. Dust collector 2. ESP 3. Wet scrubber	Dust collector	Dust collector 0.009 gr/scf (Sampling) 0.004 gr/scf (Assay) 0.009 gr/scf (Metallurgical)
<b>Reagent Handling for Water Treatment</b> – transfers					
Particulates	Dust collector, Enclosure, Wet scrubber, ESP, Water sprays	None	1. Dust collector 2. ESP 3. Wet scrubber 4. Enclosure 5. Water sprays	Dust collector	Dust collector 0.02 gr/scf
<b>Mill Reagents Handling</b> – lime handling – hopper and silo, flocculant handling and mixing, caustic soda handling and mixing, copper sulfate handling and mixing, PAX handling and mixing, soda ash handling and mixing					
Particulates	Dust collector, Wet scrubber, ESP, Water sprays	None	1. Dust collector 2. ESP 3. Wet scrubber 4. Water sprays	Dust collector	Dust collector 0.02 gr/scf
<b>Mill Reagents Handling</b> – lime handling – lime slaker					

Source/Pollutant	Step 1 Possible Control Technologies	Step 2 Infeasible Technologies	Step 3 Ranking Control Technologies	Step 4 Most Effective Control Technology	Step 5 Selection of BACT
Particulates	Dust collector, Wet scrubber, ESP, Water sprays	Dust collector	1. Wet scrubber or ESP 2. Water sprays	Wet scrubber	Wet scrubber 0.02 gr/scf
<b>Fuel Tanks</b> – tank farm tanks 1 to 15, fuel station tanks 1 and 2, power plant tanks A and B, camp generator tank, aviation gasoline tank					
VOC	Floating roof, Submerged fill, Fixed roof, Capture and recover/control, NSPS, Good operating practices	None	1. Floating roof 2. Submerged fill 3. Fixed roof 4. Capture and recover/control 5. NSPS 6. Good operating practices	Submerged fill (Floating roof not cost-effective)	Submerged fill
<b>Incinerators</b> – camp waste and sewage sludge incinerators					
CO	Thermal oxidation, Oxidation catalyst, Good combustion practices	None	1. Thermal oxidation and Oxidation catalyst 2. Good combustion practices	Controls necessary to meet NSPS	NSPS CCCC and LLLL 17 ppmvd @ 7% O <sub>2</sub> (Camp waste incinerator) 52 ppmvd @ 7% O <sub>2</sub> (Sewage Sludge incinerator)
NO <sub>x</sub>	SCR, SNCR, Low-NO <sub>x</sub> burners and Lean burn with Flue gas recirculation, Good combustion practices	None	1. SCR 2. SNCR, Low-NO <sub>x</sub> burners and Lean burn with Flue gas recirculation 3. Good combustion practices	Controls necessary to meet NSPS	NSPS CCCC and LLLL 23 ppmvd @ 7% O <sub>2</sub> (Camp waste incinerator) 210 ppmvd @ 7% O <sub>2</sub> (Sewage Sludge incinerator)

Source/Pollutant	Step 1 Possible Control Technologies	Step 2 Infeasible Technologies	Step 3 Ranking Control Technologies	Step 4 Most Effective Control Technology	Step 5 Selection of BACT
Particulates	Dust collector, Wet scrubber, ESP, Good combustion practices	None	1. Dust collector, Wet scrubber, ESP 2. Good combustion practices	Controls necessary to meet NSPS	NSPS CCCC and LLLL 18 mg/dscm @ 7% O <sub>2</sub> (Camp waste incinerator) 60 mg/dscm @ 7% O <sub>2</sub> (Sewage Sludge incinerator)
GHG	CCS, Good combustion practices	CCS	1. Good combustion practices	Good combustion practices	Good combustion practices
<b>Acidulation Tanks and Neutralization Tanks</b>					
GHG	CCS, Good operating practices	CCS	1. Good operating practices	Good operating practices	Good operating practices
<b>Fugitive Dust from Unpaved Roads</b>					
Particulates	Chemical and water, Water, Chemical, Speed reduction, Paving, Crushed stone	Paving	1. Chemical and water 2. Chemical 3. Water 4. Speed reduction 5. Crushed stone	Chemical and water	BPMs: Chemical and water application
<b>Fugitive Dust from Material Loading and Unloading</b>					
Particulates	Enclosure, Baghouse, Water spray, Moisture content, Best practical methods	Enclosure, Baghouse, Water spray, Moisture content	1. BPMs	BPMs	BPMs
<b>Fugitive Dust from Wind Erosion</b>					
Particulates	Water spray, Chemical, Enclosure, Moisture content, Wind block, Best practical methods	Water spray, Chemical, Enclosure, Moisture content, Wind block	1. BPMs	BPMs	BPMs
<b>Fugitive Dust from Drilling and Blasting</b>					

Source/Pollutant	Step 1 Possible Control Technologies	Step 2 Infeasible Technologies	Step 3 Ranking Control Technologies	Step 4 Most Effective Control Technology	Step 5 Selection of BACT
Particulates	Best practical methods	None	1. BPMs	BPMs	BPMs
<b>Fugitive Combustion Emissions from Blasting</b>					
CO, NO <sub>x</sub> , VOC, GHG	Good combustion practices	None	1. Good combustion practices	Good combustion practices	Good combustion practices
<b>Title V Insignificant Emission Units – portable building heaters, building heaters, air handlers, SO<sub>2</sub> burner, Auxiliary SO<sub>2</sub> burner</b>					
CO	Oxidation catalyst, Good combustion practices	None	1. Oxidation catalyst 2. Good combustion practices	Good combustion practices (Oxidation catalyst is not cost-effective)	Good combustion practices: 0.038 lb/MMBtu (Portable Building Heaters, Auxiliary SO <sub>2</sub> burner) 0.039 lb/MMBtu (Building Heaters) 0.082 lb/MMBtu (Air Handler Heaters, SO <sub>2</sub> Burner)
NO <sub>x</sub>	SCR, Low-NO <sub>x</sub> burners and Lean burn combustion technology, Good combustion practices	None	1. SCR 2. Low NO <sub>x</sub> -burners and Lean burn combustion technology 3. Good combustion practices	Good combustion practices (Add-on controls are not cost-effective)	Good combustion practices: 0.154 lb/MMBtu (Portable Building Heaters, Auxiliary SO <sub>2</sub> burner) 0.092 lb/MMBtu (Building Heaters) 0.098 lb/MMBtu (Air Handler Heaters, SO <sub>2</sub> Burners)

Source/Pollutant	Step 1 Possible Control Technologies	Step 2 Infeasible Technologies	Step 3 Ranking Control Technologies	Step 4 Most Effective Control Technology	Step 5 Selection of BACT
Particulates	Dust collector, Wet scrubber, ESP, Clean fuels/Good combustion practices	Dust collector, Wet scrubber, ESP	1. Clean fuels/Good combustion practices	Clean fuels/Good combustion practices	Clean fuels/Good combustion practices: 0.025 lb/MMBtu (Portable Building Heaters, Auxiliary SO <sub>2</sub> burner) 0.0075 lb/MMBtu (Building Heaters) 0.0075 lb/MMBtu (Air Handler Heaters, SO <sub>2</sub> Burners)
VOC	Oxidation catalyst, Good combustion practices	None	1. Oxidation catalyst 2. Good combustion practices	Good combustion practices (Oxidation catalyst is not cost-effective)	Good combustion practices: 0.0026 lb/MMBtu (Portable Building Heaters, Auxiliary SO <sub>2</sub> burner) 0.0075 lb/MMBtu (Building Heaters) 0.0054 lb/MMBtu (Air Handler Heaters, SO <sub>2</sub> Burners)
GHG	CCS, Good combustion practices	CCS	1. Good combustion practices	Good combustion practices	Good combustion practices

**Title V Insignificant Emission Units** - ANFO mixing plant tank, mine site mill fire pump tank, tank farm fire pump tank, camp fire pump tank, jet fuel tanks, airport generator tank, POX boilers tank, oxygen plant boiler tank, carbon elution heater tank, auxiliary SO<sub>2</sub> burner tank

Source/Pollutant	Step 1 Possible Control Technologies	Step 2 Infeasible Technologies	Step 3 Ranking Control Technologies	Step 4 Most Effective Control Technology	Step 5 Selection of BACT
VOC	Floating roof, Submerged fill, Fixed roof, Capture and recovery control, NSPS, Leak detection and repair, Good operating practices	None	<ol style="list-style-type: none"> <li>1. Floating roof</li> <li>2. Submerged fill</li> <li>3. Fixed roof</li> <li>4. Capture and recovery control</li> <li>5. NSPS</li> <li>6. Leak detection and repair</li> <li>7. Good operating practices</li> </ol>	Submerged fill (Floating roof not cost-effective)	Submerged fill

SCR – Selective Catalytic Reduction

ESP – Electrostatic Precipitator

CCS – Carbon Capture and Sequestration

NSPS – New Source Performance Standards per 40 CFR 60

NSPS Controls – Emission controls required to meet the NSPS emission limits

SNCR – Selective Non-Catalytic Reduction

## **Attachment C2 – RBLC Search Downloads**

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## Table of Contents

### **RBLC Search Downloads**

#### BACT Determinations for:

Large Internal Combustion Engines (> 500 HP) – CO (Gas-Fired).....	C2-3
Large Internal Combustion Engines (> 500 HP) – CO (Oil-Fired).....	C2-6
Large Internal Combustion Engines (> 500 HP) – NO <sub>x</sub> (Gas-Fired).....	C2-14
Large Internal Combustion Engines (> 500 HP) – NO <sub>x</sub> (Oil-Fired).....	C2-18
Large Internal Combustion Engines (> 500 HP) – Particulates (Gas-Fired).....	C2-27
Large Internal Combustion Engines (> 500 HP) – Particulates (Oil-Fired).....	C2-30
Large Internal Combustion Engines (> 500 HP) – VOC (Gas-Fired).....	C2-39
Large Internal Combustion Engines (> 500 HP) – VOC (Oil-Fired).....	C2-42
Large Internal Combustion Engines (> 500 HP) – GHG (Gas-Fired).....	C2-50
Large Internal Combustion Engines (> 500 HP) – GHG (Oil-Fired).....	C2-52
Crusher Circuit Sources – Particulates.....	C2-58
Crusher Circuit Sources (Conveyors) – Particulates.....	C2-59
Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) – CO (Gas-Fired).....	C2-62
Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) – NO <sub>x</sub> (Gas-Fired).....	C2-69
Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) – PM (Gas-Fired).....	C2-78
Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) – VOC (Gas-Fired).....	C2-87
Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) – GHG (Gas-Fired).....	C2-94
Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) – CO (Oil-Fired).....	C2-102
Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) – NO <sub>x</sub> (Oil-Fired).....	C2-103
Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) – PM (Oil-Fired).....	C2-104
Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) – VOC (Oil-Fired).....	C2-105
Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) – GHG (Oil-Fired).....	C2-106
Emergency Diesel Engines – CO (Oil-Fired).....	C2-107
Emergency Diesel Engines –NO <sub>x</sub> and VOC (Oil-Fired).....	C2-118
Emergency Diesel Engines – PM (Oil-Fired).....	C2-140
Small Internal Combustion Engines (< 500 HP) – CO (Oil-Fired).....	C2-154
Small Internal Combustion Engines (< 500 HP) – NO <sub>x</sub> (Oil-Fired).....	C2-161
Small Internal Combustion Engines (< 500 HP) – PM (Oil-Fired).....	C2-168
Small Internal Combustion Engines (< 500 HP) – VOC(Oil-Fired).....	C2-183
Small Internal Combustion Engines (< 500 HP) – GHG (Oil-Fired).....	C2-190
Furnaces – Particulates.....	C2-195
Lime Transfers – Particulates.....	C2-196
Fuel Tanks Greater than 10,000 Gallons – VOC.....	C2-198
Waste and Sewage Sludge Incinerators – CO.....	C2-207
Waste and Sewage Sludge Incinerators – NO <sub>x</sub> .....	C2-208
Waste and Sewage Sludge Incinerators – Particulates.....	C2-209
Waste and Sewage Sludge Incinerators – GHG.....	C2-210
Fugitive Dust from Unpaved Roads – Particulates.....	C2-211
Fugitive Dust from Material Loading and Unloading – Particulates.....	C2-213
Fugitive Dust from Wind Erosion – Particulates.....	C2-215
Fugitive Dust from Drilling and Blasting – Particulates.....	C2-216



**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - CO (Gas-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
AR-0163	06/09/2019 &nbsp;ACT	Lime Injector Burners	17.13	Natural Gas		0	Carbon Monoxide	Combustion of Natural gas and Good Combustion Practices	0.0824 LB/MMBTU		
*FL-0368	02/14/2019 &nbsp;ACT	Emergency Engines	17.13	Natural gas		0	Carbon Monoxide	good combustion practices	4 G/HP-HR		4.00
KY-0110	07/23/2020 &nbsp;ACT	EP 10-05 - Austenitizing Furnace Rolls Emergency Generator	17.13	Natural Gas		636 HP	Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	4 G/HP-HR		4.00
KY-0110	07/23/2020 &nbsp;ACT	EP 10-06 - Tempering Furnace Rolls Emergency Generator	17.13	Natural Gas		636 HP	Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	4 G/HP-HR		4.00
*MI-0440	05/22/2019 &nbsp;ACT	FGENGINES	17.13	natural gas		16500 HP	Carbon Monoxide	Oxidation catalyst	0.3 G/HP-H		0.30
AK-0084	06/30/2017 &nbsp;ACT	Twelve (12) Large ULSD/Natural Gas-Fired Internal Combustion Engines	17.11	Diesel and Natural Gas		143.5 MMBtu/hr	Carbon Monoxide	Oxidation Catalyst and Maintain Good Combustion Practices	0.18 G/KW-HR (ULSD)		0.09
*LA-0346	01/04/2018 &nbsp;ACT	emergency generators (4 units)	17.11	natural gas		13410 hp (each)	Carbon Monoxide	Comply with standards of 40 CFR 60 Subpart JJJJ	4 G/BHP-HR		4.00
*MI-0441	12/21/2018 &nbsp;ACT	EUEMGNG1--A 1500 HP natural gas fueled emergency engine	17.13	Natural gas		1500 HP	Carbon Monoxide	Burn natural gas and be NSPS compliant	4 G/HP-H		4.00
*MI-0441	12/21/2018 &nbsp;ACT	EUEMGNG2	17.13	NATURAL GAS		6000 HP	Carbon Monoxide	Burn natural gas and be NSPS compliant.	4 G/HP-H		4.00
CA-1240	03/17/2017 &nbsp;ACT	Internal Combustion Engine	17.13	Natural gas		881 bhp	Carbon Monoxide	Oxidation catalyst	54 PPMVD		0.38
CA-1241	08/19/2016 &nbsp;ACT	ICE Landfill or digested gas fired	17.14	Digester gas		1573 bhp	Carbon Monoxide	SCR/Oxidation catalyst	36 PPMV		0.26
IN-0246	10/22/2015 &nbsp;ACT	LANDFILL GAS-FIRED ENGINE GENERATOR SETS	17.14	LANDFILL GAS		2233 BHP	Carbon Monoxide	GOOD COMBUSTION PRACTICES	3.3 G/BHP-HR		3.30
*KS-0030	03/31/2016 &nbsp;ACT	Spark ignition RICE emergency AC generators	17.13	Natural gas		450 kW	Carbon Monoxide		4 G/HP-HR		4.00
*KS-0030	03/31/2016 &nbsp;ACT	Spark ignition RICE electricity generating units (EGUs)	17.13	Natural Gas		10 MW	Carbon Monoxide		3.86 LB/H		0.13
ME-0041	03/30/2016 &nbsp;ACT	Engine #1	17.14	landfill gas		16.5 MMBTU/H	Carbon Monoxide		3.5 G/BHP*H		3.50
ME-0041	03/30/2016 &nbsp;ACT	Engine #2	17.14	landfill gas		16.5 MMBTU/H	Carbon Monoxide		3.5 G/BHPH		3.50
ME-0041	03/30/2016 &nbsp;ACT	Engine #3	17.14	landfill gas		16.5 MMBTU/H	Carbon Monoxide		3.5 G/BHPH		3.50
MI-0420	06/03/2016 &nbsp;ACT	EUN_EM_GEN	17.13	Natural gas		225 H/YR	Carbon Monoxide	Good combustion practices and clean burn fuel (pipeline quality natural gas).	9.6 LB/H		4.00
MI-0424	12/05/2016 &nbsp;ACT	EUNENGINE (Emergency engine--natural gas)	17.13	Natural gas		500 H/YR	Carbon Monoxide	Oxidation catalyst and good combustion practices.	0.8 G/HP-H		0.80
MI-0426	03/24/2017 &nbsp;ACT	EUN_EM_GEN (Natural gas emergency engine).	17.13	Natural gas		205 H/YR	Carbon Monoxide	Good combustion practices and clean burn fuel (pipeline quality natural gas).	11 LB/H		4.00
TX-0755	05/21/2015 &nbsp;ACT	Internal Combustion Compressor Engines	17.13	Residue gas equivalent to natural gas		206149 MMBtu/yr	Carbon Monoxide	Ultra Lean-burn engines firing residue gas (with low carbon density) which is equivalent to natural gas, and use of oxidation catalysts	0.083 G/HP HR		0.08
VT-0040	03/04/2016 &nbsp;ACT	Stationary Internal Combustion Engine	17.14	Landfill gas		2535 scfm	Carbon Monoxide	To keep the engine's CO emissions as low as reasonably possible, the build up of siliceous deposits in the engine combustion chambers must be periodically serviced/cleaned. It is anticipated to require annual cleaning, as well as a more extensive on-site in-frame cleaning every 3 years, as well as a more extensive off-site overhaul every 6 years.	3.5 G/B-HP-H		3.50
AL-0301	07/22/2014 &nbsp;ACT	PROPANE FIRED EMERGENCY GENERATOR	17.13	PROPANE		400 KW	Carbon Monoxide		7.5 LB/1000 GAL		

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - CO (Gas-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
FL-0333	07/05/2012 &nbsp;ACT	1.6 MW Caterpillar Model G3520C lean-burn internal combustion engine	17.14	biogas	0		Carbon Monoxide	Engine design and good combustion practices.	24.7 LB/H		5.22
FL-0339	09/15/2014 &nbsp;ACT	12 LFG-fired RICE/generator sets, 1.6 MW each	17.14	Landfill gas	14.96 MMBTU/hr, LHV		Carbon Monoxide	Engine combustion characteristics	3.5 G/BHP-H		3.50
FL-0345	12/18/2013 &nbsp;ACT	Four landfill gas-to-energy engines	17.14	Landfill gas	554 scfm		Carbon Monoxide	Reflects degradation of engines after use. Based on proper combustion in engines.	3.5 G/BHP-H		3.50
IL-0113	12/23/2013 &nbsp;ACT	Engines	17.14	Treated landfill gas	2.6 MW		Carbon Monoxide		2.5 G/HP-H		2.50
IN-0157	03/05/2012 &nbsp;ACT	CATERPILLAR 3520 LANDFILL GAS-FUELED ENGINE/GENERATORS	17.14	LANDFILL GAS	1.6 MW		Carbon Monoxide	GOOD CUMBUSTION PRACTICES	3.3 G/HP-H		3.30
KS-0035	01/24/2014 &nbsp;ACT	spark ignition four stroke lean burn reciprocating internal combustion engine (RICE) electric generating units (EGUs)	17.13	Natural gas	12526 BHP		Carbon Monoxide	selective catalytic reduction (SCR) system and an oxidation catalyst	2.67 LBS PER HOUR		0.10
LA-0257	12/06/2011 &nbsp;ACT	Generator Engines (2)	17.13	Natural Gas	2012 hp		Carbon Monoxide	Comply with 40 CFR 60 Subpart JJJJ	19.51 LB/H		4.40
LA-0311	07/15/2013 &nbsp;ACT	No. 5 Urea Plant Emergency Generator B (33-13, EQT 182)	17.13	Natural Gas	2500 HP		Carbon Monoxide	Good combustion practices; proper equipment design consistent with 40 CFR 60 Subpart JJJJ	27.56 LB/HR		5.00
MI-0396	05/08/2012 &nbsp;ACT	(1) Caterpillar 3516 Generator Engine (&quot;Engine 7&quot;)	17.14	Landfill gas	800 KW		Carbon Monoxide	The engine is a &lsquo;&lsquo;low emissions&lsquo;&lsquo; engine tuned for low NOx which is a trade-off for higher CO emissions. The CO emission limit is the manufacturer's specification for CO when tuned for low NOx.	3.1 G/B-HP-H		3.10
MI-0396	05/08/2012 &nbsp;ACT	(1) Caterpillar 3512 Generator Engine (&quot;Engine 8&quot;)	17.14	Landfill gas	615 KW		Carbon Monoxide	This is a low emissions engine tuned for low NOx which is a trade off for higher CO emissions. The CO emission limit is the manufacturer's specification for CO when tuned for low NOx.	3.03 G/B-HP-H		3.03
MI-0396	05/08/2012 &nbsp;ACT	(2) Landfill Gas Generator Engine (&quot;Engines 9&amp;10&quot;)	17.14	Landfill gas	1600 KW		Carbon Monoxide	This is a &lsquo;&lsquo;low emissions&lsquo;&lsquo; engine tuned for low NOx which is a trade off for higher CO emissions. The CO emission limit is the manufacturer's specification for CO when tuned for low NOx.	3.3 G/B-HP-H		3.30
MI-0411	12/11/2013 &nbsp;ACT	FGENGINES7R-10 (4 CAT engines using landfill gas)	17.14	Landfill gas	1600 KW		Carbon Monoxide		3.3 G/B-HP-H		3.30
MI-0412	12/04/2013 &nbsp;ACT	Emergency Engine--natural gas (EUNGINE)	17.13	natural gas	1000 kW		Carbon Monoxide	Oxidation catalyst and good combustion practices.	0.8 G/HP-H		0.80
MI-0413	05/12/2014 &nbsp;ACT	FG-ENG2007&gt;500 á€“ Two natural gas fired SI engines greater than 500 hp	17.13	natural gas	0		Carbon Monoxide		0		
OK-0148	09/12/2012 &nbsp;ACT	Large Internal Combustion Engines (&gt;500 hp)	17.13	Natural Gas	1775 Horsepower		Carbon Monoxide	Oxidation Catalyst	0.55 GM/HP-HR		0.55
OK-0148	09/12/2012 &nbsp;ACT	Large Internal Combustion Engines (&gt;500 hp)	17.13	Natural Gas	2370 Horsepower		Carbon Monoxide	Oxidation Catalyst	0.55 GM/HP-HR		0.55
OK-0153	03/01/2013 &nbsp;ACT	COMPRESSOR ENGINE 1,775-HP CAT G3606LE	17.13	NATURAL GAS	1775 HP		Carbon Monoxide	EACH ENGINE EQUIPPED W/OXIDATION CATALYST.	0.36 GM/HP-HR		0.36
OK-0153	03/01/2013 &nbsp;ACT	EMERGENCY GENERATORS 2,889-HP CAT G3520C IM	17.13	NATURAL GAS	2889 HP		Carbon Monoxide	OXIDATION CATALYST	0.43 GM/HP-HR		0.43

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - CO (Gas-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
*OR-0052	06/21/2013 &nbsp;ACT	Caterpillar 3520C internal combustion engines which drive electric generators	17.14	landfill gas	2328 MMdscf/year		Carbon Monoxide		3.6 G/HP-HR		3.60
*OR-0052	06/21/2013 &nbsp;ACT	Caterpillar 3516 internal combustion engines which drive electric generators	17.14	landfill gas	1400 MMdscf/year		Carbon Monoxide		2.5 G/BHP-HR		2.50
PA-0297	05/23/2013 &nbsp;ACT	3.11 MW GENERATORS (WAUKESHA) #1 and #2	17.13	Natural Gas	0		Carbon Monoxide	CO Catalyst	0.08 G/BHP-HR		0.08
PA-0301	03/31/2014 &nbsp;ACT	Three Four Stroke Lean Burn Engine - Caterpillar G3608 TA, 2370 BHP	17.13	Natural Gas	0		Carbon Monoxide	Oxidation Catalyst	47 PPMVD		0.33
PA-0301	03/31/2014 &nbsp;ACT	One four stroke lean burn engine, Caterpillar Model G3612 TA, 3550 bhp	17.13	Natural Gas	0		Carbon Monoxide	Oxidation catalyst	47 PPMVD		0.33
PA-0302	04/16/2014 &nbsp;ACT	Spark Ignited 4 stroke Rich Burn Engine (7 units)	17.13	Natural Gas	0		Carbon Monoxide	NSCR	0.3 G/BHP-HR		0.30
TX-0642	12/20/2013 &nbsp;ACT	Emergency Engine	17.13	natural gas	1328 hp		Carbon Monoxide		1.3 G/HP-H		1.30
TX-0680	06/14/2013 &nbsp;ACT	Refrigeration compressor engine	17.13	natural gas	1183 hp		Carbon Monoxide	oxidation catalyst	0.252 G/HP-HR		0.25
TX-0680	06/14/2013 &nbsp;ACT	Recompression compressor engine	17.13	natural gas	1380 hp		Carbon Monoxide	oxidation catalyst	0.252 G/HP-HR		0.25
TX-0692	12/20/2013 &nbsp;ACT	(12) reciprocating internal combustion engines	17.13	natural gas	18 MW		Carbon Monoxide	oxidation catalyst	0.3 G/HP-HR		0.30
VT-0038	07/12/2012 &nbsp;ACT	Landfill gas to energy engines	17.14	landfill gas	1600 kW (each engine)		Carbon Monoxide	Engine design and periodic cleaning/rebuilding of engine to manage the build-up of siloxane in the engine.	3.5 G/B-HP-H		3.50
VT-0038	07/12/2012 &nbsp;ACT	Landfill gas to energy engines - after annual maintenance	17.14	landfill gas	1600 kw (each)		Carbon Monoxide	Engine design and annual maintenance for removal of siloxane build up in the engine.	3.1 G/B-HP-H		3.10
VT-0038	07/12/2012 &nbsp;ACT	Landfill gas to energy engines - new and 6-yr rebuild	17.14	landfill gas	1600 kw (each)		Carbon Monoxide	engine design for new and/or rebuilt engine.	2.75 G/B-HP-H		2.75
CA-1186	08/26/2011 &nbsp;ACT	Internal Combustion Engine	17.14	Landfill Gas	1966 BHP		Carbon Monoxide	Lean-burn engine with air fuel ratio controller	308 PPMVD@15% O2		2.19
CA-1192	06/21/2011 &nbsp;ACT	EMERGENCY IC ENGINE	17.13	NATURAL GAS	550 KW		Carbon Monoxide	EXHAUST VENTED TO A OXIDATION CATALYST SYSTEM, OPERATIONAL LIMIT OF 50 HRS/YR	1 G/HP-H		1.00
FL-0326	08/25/2011 &nbsp;ACT	Landfill Gas-to-Energy	17.14	Landfill gas	4000 scfm		Carbon Monoxide	Lean-burn engine with air-to-fuel controller	3.5 G/B-HP-H		3.50
MI-0397	06/29/2011 &nbsp;ACT	Landfill gas fired generator engines-2	17.14	Landfill gas	260880 MMBTU/yr		Carbon Monoxide	Good combustion practices with an air/fuel ratio controller	3.3 G/B-HP-H		3.30
MI-0398	06/17/2011 &nbsp;ACT	Landfill gas fired generator engine	17.14	Landfill gas	264.38 MMSCF/YR		Carbon Monoxide	Good combustion practices with an air/fuel ratio controller.	3.3 G/B-HP-H		3.30
NJ-0078	05/03/2011 &nbsp;ACT	INTERNAL COMBUSTION ENGINES	17.14	LANDFILL GAS	848820 MMBTU/YR		Carbon Monoxide	OXIDATION CATALYST	1.95 LB/H		
OH-0347	07/05/2011 &nbsp;ACT	2 caterpillar engines 2233 HP	17.14	Landfill gas	2233 HP		Carbon Monoxide	Lean burn technology	27.06 LB/H		5.00
OH-0348	09/14/2011 &nbsp;ACT	Reciprocating Internal Combustion Engines (10)	17.14	Landfill Gas	2233 HP		Carbon Monoxide	Lean burn technology and meeting the requirements of Part 60 Subpart JJJJ	13.53 LB/H		2.75
*PA-0279	12/13/2010 &nbsp;ACT	RIC ENGINES (2)	17.14	Treated Landfil Gas	66876 CF/H		Carbon Monoxide		3 G/B-HP-H		3.00
PA-0287	09/27/2011 &nbsp;ACT	CATERPILLAR G3516B COMPRESSOR ENGINES (2)	17.13	Natural Gas	0		Carbon Monoxide	Oxidation Catalyst - Miratech	0.12 G/B-HP-H		0.12
PA-0287	09/27/2011 &nbsp;ACT	WAUKESHA P9390GSI COMPRESSOR ENGINES (4) (1980 BHP)	17.13	Natural Gas	0		Carbon Monoxide	3-way catalyst, Johnson Matthey	0.26 G/B-HP-H		0.26

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
*AK-0085	08/13/2020 &nbsp;ACT	One (1) Black Start Generator Engine	17.11	ULSD	186.6 gph		Carbon Monoxide	Oxidation Catalyst, Good Combustion Practices, and 500 hour limit per year.	3.3 G/HP-HR		3.30
AR-0161	09/23/2019 &nbsp;ACT	Emergency Engines	17.11	Diesel	0		Carbon Monoxide	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	3.5 G/KW-H		2.61
AR-0163	06/09/2019 &nbsp;ACT	Emergency Engines	17.11	Diesel	0		Carbon Monoxide	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	3.5 G/KW-HR		2.61
IL-0130	12/31/2018 &nbsp;ACT	Emergency Engine	17.11	Ultra-Low Sulfur Diesel	1500 kW		Carbon Monoxide		3.5 G/KW-HR		2.61
IN-0317	06/11/2019 &nbsp;ACT	Emergency generator EU-6006	17.11	Diesel	2800 HP		Carbon Monoxide	Tier II diesel engine	3.5 G/KWH		2.61
IN-0317	06/11/2019 &nbsp;ACT	Emergency fire pump EU-6008	17.11	Diesel	750 HP		Carbon Monoxide	Engine that complies with Table 4 to Subpart IIII of Part 60	3.5 G/KWH		2.61
KY-0110	07/23/2020 &nbsp;ACT	EP 10-02 - North Water System Emergency Generator	17.11	Diesel	2922 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.61 G/HP-HR		2.61
KY-0110	07/23/2020 &nbsp;ACT	EP 10-03 - South Water System Emergency Generator	17.11	Diesel	2922 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.61 G/HP-HR		2.61
KY-0110	07/23/2020 &nbsp;ACT	EP 10-04 - Emergency Fire Water Pump	17.11	Diesel	920 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.61 G/HP-HR		2.61
KY-0110	07/23/2020 &nbsp;ACT	EP 10-07 - Air Separation Plant Emergency Generator	17.11	Diesel	700 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.61 G/HP-HR		2.61
KY-0110	07/23/2020 &nbsp;ACT	EP 10-01 - Caster Emergency Generator	17.11	Diesel	2922 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.61 G/HP-HR		2.61
KY-0115	04/19/2021 &nbsp;ACT	New Pumphouse (XB13) Emergency Generator #1 (EP 08-05)	17.11	Diesel	2922 HP		Carbon Monoxide	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		2.60
KY-0115	04/19/2021 &nbsp;ACT	Tunnel Furnace Emergency Generator (EP 08-06)	17.11	Diesel	2937 HP		Carbon Monoxide	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		2.60
KY-0115	04/19/2021 &nbsp;ACT	Caster B Emergency Generator (EP 08-07)	17.11	Diesel	2937 HP		Carbon Monoxide	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		2.60
KY-0115	04/19/2021 &nbsp;ACT	Air Separation Unit Emergency Generator (EP 08-08)	17.11	Diesel	700 HP		Carbon Monoxide	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		2.60
*LA-0364	01/06/2020 &nbsp;ACT	Emergency Generator Diesel Engines	17.11	Diesel Fuel	550 hp		Carbon Monoxide	Compliance with the limitations imposed by 40 CFR 63 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures designed to maximize combustion efficiency and minimize fuel usage.	0		
*LA-0364	01/06/2020 &nbsp;ACT	Emergency Fire Water Pumps	17.11	Diesel Fuel	550 hp		Carbon Monoxide	Compliance with the limitations imposed by 40 CFR 63 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures designed to maximize combustion efficiency and minimize fuel usage.	0		
*MI-0442	08/21/2019 &nbsp;ACT	FGEMENGINE	17.11	Diesel	1100 KW		Carbon Monoxide		0.15 G/HP-H		0.15
*MI-0445	11/26/2019 &nbsp;ACT	EUENGINE (diesel fuel emergency engine)	17.11	diesel fuel	22.68 MMBTU/H		Carbon Monoxide	Good Combustion Practices and meeting NSPS Subpart IIII requirements	3.5 G/KW-H		2.61

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
TX-0872	10/31/2019 &nbsp;ACT	Emergency Generators	17.11	ultra low sulfur diesel	0		Carbon Monoxide	Limiting duration and frequency of generator use to 100 hr/yr. Good combustion practices will be used to reduce VOC including maintaining proper air-to-fuel ratio.	0.6 G/KW HR		0.45
TX-0876	02/06/2020 &nbsp;ACT	Emergency generator	17.11	DIESEL	0		Carbon Monoxide	Tier 4 exhaust emission standards specified in 40 CFR Â§ 1039.101, limited to 100 hours per year of non-emergency operation	0		
TX-0882	01/17/2020 &nbsp;ACT	EMERGENCY ENGINES	17.12	DIESEL	0		Carbon Monoxide	GOOD COMBUSTION PRACTICES, CLEAN FUEL, 100 HR/YR, ULTRA LOW SULFUR FUEL	0.0057 LB/MMBTU		
TX-0888	04/23/2020 &nbsp;ACT	EMERGENCY GENERATORS & FIRE WATER PUMP ENGINES	17.11	Ultra-low Sulfur Diesel	0		Carbon Monoxide	well-designed and properly maintained engines and each limited to 100 hours per year of non-emergency use.	0		
*TX-0904	09/09/2020 &nbsp;ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	0		Carbon Monoxide	100 HOURS OPERATIONS, Tier 4 exhaust emission standards specified in 40 CFR Â§ 1039.101	0		
*TX-0905	09/16/2020 &nbsp;ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	0		Carbon Monoxide	limited to 100 hours per year of non-emergency operation	0		
*TX-0915	03/17/2021 &nbsp;ACT	DIESEL GENERATOR	17.11	DIESEL	0		Carbon Monoxide	LIMITED 500 HR/YR OPERATION	2.61 G/HPHR		2.61
VA-0332	06/24/2019 &nbsp;ACT	Emergency Diesel Generator - 300 kW	17.11	Ultra Low Sulfur Diesel	500 H/YR		Carbon Monoxide	good combustion practices, high efficiency design, and the use of ultra low sulfur diesel (\$15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	2.6 G/HP-H		2.60
AK-0084	06/30/2017 &nbsp;ACT	Black Start and Emergency Internal Combustion Engines	17.11	Diesel	1500 kWe		Carbon Monoxide	Good Combustion Practices	4.38 G/KW-HR		3.27
AK-0084	06/30/2017 &nbsp;ACT	Twelve (12) Large ULSD/Natural Gas-Fired Internal Combustion Engines	17.11	Diesel and Natural Gas	143.5 MMBtu/hr		Carbon Monoxide	Oxidation Catalyst and Maintain Good Combustion Practices	0.18 G/KW-HR (ULSD)		0.13
*AL-0318	12/18/2017 &nbsp;ACT	250 Hp Emergency CI, Diesel-fired RICE	17.11	Diesel	0		Carbon Monoxide		0		
*FL-0363	12/04/2017 &nbsp;ACT	Two 3300 kW emergency generators	17.11	ULSD	0		Carbon Monoxide	Certified engine	3.5 GRAMS PER KWH		2.61
*FL-0367	07/27/2018 &nbsp;ACT	1,500 kW Emergency Diesel Generator	17.11	ULSD	14.82 MMBtu/hour		Carbon Monoxide	Operate and maintain the engine according to the manufacturer's written instructions	3.5 G/KW-HOUR		2.61
IL-0129	07/30/2018 &nbsp;ACT	Emergency Engines	17.11	Ultra-low sulfur diesel	0		Carbon Monoxide		0		
*LA-0312	06/30/2017 &nbsp;ACT	DFP1-13 - Diesel Fire Pump Engine (EQT0013)	17.11	Diesel	650 horsepower		Carbon Monoxide	Compliance with NSPS Subpart IIII	0.9 LB/HR		0.63
*LA-0312	06/30/2017 &nbsp;ACT	DEG1-13 - Diesel Fired Emergency Generator Engine (EQT0012)	17.11	Diesel	1474 horsepower		Carbon Monoxide	Compliance with NSPS Subpart IIII	0.51 LB/HR		0.16
LA-0331	09/21/2018 &nbsp;ACT	Firewater Pumps	17.11	Diesel Fuel	634 kW		Carbon Monoxide	Good Combustion and Operating Practices.	3.7 G/HP-H		3.70
LA-0331	09/21/2018 &nbsp;ACT	Large Emergency Engines (>50kW)	17.11	Diesel Fuel	5364 HP		Carbon Monoxide	Good Combustion and Operating Practices.	3.5 G/KW-H		2.61
*MA-0043	06/21/2017 &nbsp;ACT	Cold Start Engine	17.11	ULSD	19.04 MMBTU/HR		Carbon Monoxide		2.2 LB/HR		0.37
MI-0425	05/09/2017 &nbsp;ACT	EUEMRGRICE1 in FGRICE (Emergency diesel generator engine)	17.11	Diesel	500 H/YR		Carbon Monoxide	Good design and combustion practices.	3.5 G/KW-H		2.61
MI-0425	05/09/2017 &nbsp;ACT	EUEMRGRICE2 in FGRICE (Emergency Diesel Generator Engine)	17.11	Diesel	500 H/YR		Carbon Monoxide	Good design and combustion practices.	3.5 G/KW-H		2.61

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
MI-0425	05/09/2017 &nbsp;ACT	EUFIREFPUMP in FGRICE (Diesel fire pump engine)	17.11	Diesel	500 H/YR		Carbon Monoxide	Good design and combustion practices.	3.5 G/KW-H		2.61
MI-0433	06/29/2018 &nbsp;ACT	EUEMENGINE (North Plant): Emergency Engine	17.11	Diesel	1341 HP		Carbon Monoxide	Good combustion practices and meeting NSPS Subpart IIII requirements.	3.5 G/KW-H		2.61
MI-0433	06/29/2018 &nbsp;ACT	EUEMENGINE (South Plant): Emergency Engine	17.11	Diesel	1341 HP		Carbon Monoxide	Good combustion practices and meeting NSPS IIII requirements.	3.5 G/KW-H		2.61
MI-0435	07/16/2018 &nbsp;ACT	EUEMENGINE: Emergency engine	17.11	Diesel	2 MW		Carbon Monoxide	State of the art combustion design.	3.5 G/KW-H		2.61
*MI-0441	12/21/2018 &nbsp;ACT	EUEMGD1--A 1500 HP diesel fueled emergency engine	17.11	Diesel	1500 HP		Carbon Monoxide	Good combustion practices and will be NSPS compliant.	3.5 G/KW-H		2.61
*MI-0441	12/21/2018 &nbsp;ACT	EUEMGD2--A 6000 HP diesel fuel fired emergency engine	17.11	Diesel	6000 HP		Carbon Monoxide	Good combustion practices and will be NSPS compliant.	3.5 G/KW-H		2.61
OH-0370	09/07/2017 &nbsp;ACT	Emergency generator (P003)	17.11	Diesel fuel	1529 HP		Carbon Monoxide	State-of-the-art combustion design	8.8 LB/H		2.61
OH-0372	09/27/2017 &nbsp;ACT	Emergency generator (P003)	17.11	Diesel fuel	1529 HP		Carbon Monoxide	State-of-the-art combustion design	8.8 LB/H		2.60
OH-0374	10/23/2017 &nbsp;ACT	Emergency Generators (2 identical, P004 and P005)	17.11	Diesel fuel	2206 HP		Carbon Monoxide	Certified to the meet the emissions standards in 40 CFR 89.112 and 89.113 pursuant to 40 CFR 60.4205(b) and 60.4202(a)(2). Good combustion practices per the manufacturerâ€™s operating manual.	12.69 LB/H		2.60
OH-0375	11/07/2017 &nbsp;ACT	Emergency Diesel Generator Engine (P001)	17.11	Diesel fuel	2206 HP		Carbon Monoxide	Good combustion design	12.64 LB/H		2.60
OH-0375	11/07/2017 &nbsp;ACT	Emergency Diesel Fire Pump Engine (P002)	17.11	Diesel fuel	700 HP		Carbon Monoxide	Good combustion design	4.01 LB/H		2.60
OH-0376	02/09/2018 &nbsp;ACT	Emergency diesel-fired generator (P007)	17.11	Diesel fuel	2682 HP		Carbon Monoxide	Comply with NSPS 40 CFR 60 Subpart IIII	15.4 LB/H		2.60
OH-0378	12/21/2018 &nbsp;ACT	Emergency Diesel-fired Generator Engine (P007)	17.11	Diesel fuel	3353 HP		Carbon Monoxide	certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII, shall employ good combustion practices per the manufacturerâ€™s operating manual	19.25 LB/H		2.60
OH-0378	12/21/2018 &nbsp;ACT	1,000 kW Emergency Generators (P008 - P010)	17.11	Diesel fuel	1341 HP		Carbon Monoxide	certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII, shall employ good combustion practices per the manufacturerâ€™s operating manual	7.7 LB/H		2.60
*PA-0313	07/27/2017 &nbsp;ACT	Emergency Generator	17.11	Diesel	2500 bhp		Carbon Monoxide		3.5 G		
VA-0328	04/26/2018 &nbsp;ACT	Emergency Diesel GEN	17.11	Ultra Low Sulfur Diesel	500 H/YR		Carbon Monoxide	good combustion practices and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	2.6 G/HP H		2.60
*WI-0284	04/24/2018 &nbsp;ACT	Diesel-Fired Emergency Generators	17.11	Diesel Fuel	0		Carbon Monoxide	Good Combustion Practices	0.6 G/KWH		0.45
*WI-0286	04/24/2018 &nbsp;ACT	P42 -Diesel Fired Emergency Generator	17.11	Diesel Fuel	0		Carbon Monoxide	Good Combustion Practices	0.6 G/KWH		0.45
FL-0356	03/09/2016 &nbsp;ACT	Three 3300-kW ULSD emergency generators	17.11	ULSD	0		Carbon Monoxide	Use of clean engine	3.5 G / KW-HR		2.61
IN-0263	03/23/2017 &nbsp;ACT	EMERGENCY GENERATORS (EU014A AND EU-014B)	17.11	DISTILLATE OIL	3600 HP EACH		Carbon Monoxide	GOOD COMBUSTION PRACTICES	2.61 G/HP-H EACH		2.61

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
KY-0109	10/24/2016 &nbsp;   ACT	Emergency Generators #1, #2, & #3 (EU72, EU73, & #3, EU74)	17.11	Diesel	53.6 gal/hr		Carbon Monoxide	The permittee shall prepare and maintain for EU72, EU73, and EU74, within 90 days of startup, a good combustion and operation practices plan (GCOP) that defines, measures and verifies the use of operational and design practices determined as BACT for minimizing CO, VOC, PM, PM10, and PM2.5 emissions. Any revisions requested by the Division shall be made and the plan shall be maintained on site. The permittee shall operate according to the provisions of this plan at all times, including periods of startup, shutdown, and malfunction. The plan shall be incorporated into the plant standard operating procedures (SOP) and shall be made available for the Division's inspection. The plan shall include, but not be limited to: i. A list of combustion optimization practices and a means of verifying the practices have occurred. ii. A list of combustion and operation practices to be used to lower energy consumption and a means of verifying the practices have occurred. iii. A list of the design choices determined to be BACT and verification that designs were implemented in the final construction.	2.6 G/HP-HR (EU72 & EU73)		2.60
LA-0305	06/30/2016 &nbsp;   ACT	Diesel Engines (Emergency)	17.11	Diesel	4023 hp		Carbon Monoxide	Complying with 40 CFR 60 Subpart IIII	0		
LA-0307	03/21/2016 &nbsp;   ACT	Diesel Engines	17.11	Diesel	0		Carbon Monoxide	good combustion practices, Use ultra low sulfur diesel, and comply with 40 CFR 60 Subpart IIII	0		
LA-0309	06/04/2015 &nbsp;   ACT	Emergency Generator Engines	17.11	Diesel	2922 hp (each)		Carbon Monoxide	Complying with 40 CFR 60 Subpart IIII	0		
LA-0313	08/31/2016 &nbsp;   ACT	SCPS Emergency Diesel Generator 1	17.11	Diesel	2584 HP		Carbon Monoxide	Compliance with NESHAP 40 CFR 63 Subpart ZZZZ and NSPS 40 CFR 60 Subpart IIII, and good combustion practices (use of ultra-low sulfur diesel fuel).	14.81 LB/H		2.60
LA-0316	02/17/2017 &nbsp;   ACT	emergency generator engines (6 units)	17.11	diesel	3353 hp		Carbon Monoxide	Complying with 40 CFR 60 Subpart IIII	0		
LA-0317	12/22/2016 &nbsp;   ACT	Emergency Generator Engines (4 units)	17.11	Diesel	0		Carbon Monoxide	complying with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	0		
LA-0317	12/22/2016 &nbsp;   ACT	Firewater pump Engines (4 units)	17.11	diesel	896 hp (each)		Carbon Monoxide	complying with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	0		
LA-0323	01/09/2017 &nbsp;   ACT	Fire Water Diesel Pump No. 3 Engine	17.11	Diesel Fuel	600 hp		Carbon Monoxide	Proper operation and limits on hours operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0		
LA-0323	01/09/2017 &nbsp;   ACT	Fire Water Diesel Pump No. 4 Engine	17.11	Diesel Fuel	600 hp		Carbon Monoxide	Proper operation and limits on hours of operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0		
MI-0421	08/26/2016 &nbsp;   ACT	Emergency Diesel Generator Engine (EUEMRGRICE in FGRICE)	17.11	Diesel	500 H/YR		Carbon Monoxide	Good design and combustion practices.	3.5 G/KW-H		2.61
MI-0421	08/26/2016 &nbsp;   ACT	Dieself fire pump engine (EUFIREPUMP in FGRICE)	17.11	Diesel	500 H/YR		Carbon Monoxide	Good design and combustion practices.	3.5 G/KW-H		2.61

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
MI-0423	01/04/2017 &nbsp;ACT	EUEMENGINE (Diesel fuel emergency engine)	17.11	Diesel Fuel	22.68 MMBTU/H		Carbon Monoxide	Good combustion practices and meeting NSPS Subpart IIII requirements.	3.5 G/KW-H		2.61
NJ-0084	03/10/2016 &nbsp;ACT	Diesel Fired Emergency Generator	17.11	ULSD	44 H/YR		Carbon Monoxide	use of ultra low sulfur diesel oil a clean burning fuel	3.5 LB/H		
NY-0103	02/03/2016 &nbsp;ACT	Black start generator	17.11	ultra low sulfur diesel	3000 KW		Carbon Monoxide	Compliance demonstrated with vendor emission certification and adherence to vendor-specified maintenance recommendations.	2.6 G/BHP-H		2.60
OH-0366	08/25/2015 &nbsp;ACT	Emergency generator (P003)	17.11	Diesel fuel	2346 HP		Carbon Monoxide	State-of-the-art combustion design	13.5 LB/H		2.61
OH-0367	09/23/2016 &nbsp;ACT	Emergency generator (P003)	17.11	Diesel fuel	2947 HP		Carbon Monoxide	State-of-the-art combustion design	16.96 LB/H		2.61
OH-0368	04/19/2017 &nbsp;ACT	Emergency Generator (P009)	17.11	Diesel fuel	5000 HP		Carbon Monoxide	good combustion control and operating practices and engines designed to meet the stands of 40 CFR Part 60, Subpart IIII	28.8 LB/H		2.60
PA-0309	12/23/2015 &nbsp;ACT	2000 kW Emergency Generator	17.11	Ultra-low sulfur Diesel	0		Carbon Monoxide		0.6 GM/HP-HR		0.60
PA-0310	09/02/2016 &nbsp;ACT	Emergency Generator Engines	17.11	ULSD	0		Carbon Monoxide		2.61 G/BHP-HR		2.61
PA-0311	09/01/2015 &nbsp;ACT	Fire Pump Engine	17.11	diesel	0		Carbon Monoxide		1 G/HP-HR		1.00
TX-0728	04/01/2015 &nbsp;ACT	Emergency Diesel Generator	17.11	Diesel	1500 hp		Carbon Monoxide	Minimized hours of operations Tier II engine	0.0126 G/HP HR		2.33
TX-0799	06/08/2016 &nbsp;ACT	Fire pump engines	17.11	diesel	0		Carbon Monoxide	Equipment specifications and good combustion practices. Operation limited to 100 hours per year.	0.0055 LB/HP-HR		2.49
VA-0325	06/17/2016 &nbsp;ACT	DIESEL-FIRED EMERGENCY GENERATOR 3000 kW (1)	17.11	DIESEL FUEL	0		Carbon Monoxide	Good Combustion Practices/Maintenance	3.5 G/KW		
AK-0076	08/20/2012 &nbsp;ACT	Combustion of Diesel by ICEs	17.11	ULSD	1750 kW		Carbon Monoxide		3.5 G/KW-H		2.61
AK-0082	01/23/2015 &nbsp;ACT	Emergency Camp Generators	17.11	Ultra Low Sulfur Diesel	2695 hp		Carbon Monoxide		2.6 GRAMS/HP-H		2.60
AK-0082	01/23/2015 &nbsp;ACT	Fine Water Pumps	17.11	Ultra Low Sulfur Diesel	610 hp		Carbon Monoxide		2.6 GRAMS/HP-H		2.60
AK-0082	01/23/2015 &nbsp;ACT	Bulk Tank Generator Engines	17.11	Ultra Low Sulfur Diesel	891 hp		Carbon Monoxide		2.6 GRAMS/HP-H		2.60
AL-0301	07/22/2014 &nbsp;ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	DIESEL	800 HP		Carbon Monoxide		0.0055 LB/HP-H		2.49
FL-0338	05/30/2012 &nbsp;ACT	Main Propulsion Engines - Development Driller 1	17.11	Diesel	0		Carbon Monoxide	Use of good combustion practices based on the current manufacturer's™s specifications for these engines, and additional enhanced work practice standards including an engine performance management system, positive crankcase ventilation, turbocharger with aftercooler, and high pressure fuel injection with aftercooler.	1.98 G/KW-H		1.48
FL-0338	05/30/2012 &nbsp;ACT	Main Propulsion Engines - C.R. Luigs	17.11	Diesel	5875 hp		Carbon Monoxide	Use of good combustion practices based on the current manufacturer's™s specifications for these engines, and additional enhanced work practice standards including an engine performance management system and the Diesel Engines with Turbochargers measurement system, positive crankcase ventilation, turbocharger and aftercooler, and high pressure fuel injection with aftercooler.	2.42 G/KW-H		1.80



**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
FL-0338	05/30/2012 &nbsp;ACT	Fast Rescue Craft Diesel Engine - C.R. Luigs	17.11	diesel	142 hp		Carbon Monoxide	Use of good combustion practices based on the current manufacturer's™ specifications for these engines and use of low sulfur diesel fuel	0		
FL-0338	05/30/2012 &nbsp;ACT	Emergency Generator Diesel Engine - Development Driller 1	17.11	Diesel	2229 hp		Carbon Monoxide	Use of good combustion practices based on the current manufacturer's™ specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	0.37 T/12MO ROLLING TOTAL		
FL-0338	05/30/2012 &nbsp;ACT	Emergency Generator Diesel Engine - C.R. Luigs	17.11	diesel	2064 hp		Carbon Monoxide	Use of good combustion practices based on the current manufacturer's™ specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	0.34 T/12MO ROLLING TOTAL		
FL-0346	04/22/2014 &nbsp;ACT	Four 3100 kW black start emergency generators	17.11	ULSD	2.32 MMBtu/hr (HHV) per engine		Carbon Monoxide	Good combustion practice	3.5 GRAMS PER KW-HR		2.61
FL-0347	09/16/2014 &nbsp;ACT	Main Propulsion Generator Diesel Engines	17.11	Diesel	9910 hp		Carbon Monoxide	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0.8 G/KW-H		0.60
FL-0347	09/16/2014 &nbsp;ACT	Emergency Diesel Engine	17.11	Diesel	3300 hp		Carbon Monoxide	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0		
IA-0105	10/26/2012 &nbsp;ACT	Emergency Generator	17.11	diesel fuel	142 GAL/H		Carbon Monoxide	good combustion practices	3.5 G/KW-H		2.61
IA-0106	07/12/2013 &nbsp;ACT	Emergency Generators	17.11	diesel fuel	180 GAL/H		Carbon Monoxide	good combustion practices	3.5 G/KW-H		2.61
IL-0114	09/05/2014 &nbsp;ACT	Emergency Generator	17.11	distillate fuel oil	3755 HP		Carbon Monoxide	Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7.	3.5 G/KW-H		2.61
IN-0158	12/03/2012 &nbsp;ACT	TWO (2) EMERGENCY DIESEL GENERATORS	17.11	DIESEL	1006 HP EACH		Carbon Monoxide	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	2.6 G/HP-H		2.60
IN-0158	12/03/2012 &nbsp;ACT	EMERGENCY DIESEL GENERATOR	17.11	DIESEL	2012 HP		Carbon Monoxide	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	2.6 G/HP-H		2.60
IN-0166	06/27/2012 &nbsp;ACT	TWO (2) EMERGENCY GENERATORS	17.11	DIESEL	1341 HORSEPOWER, EACH		Carbon Monoxide	GOOD COMBUSTION PRACTICES AND LIMITED HOURS OF NON-EMERGENCY OPERATION	0		
IN-0166	06/27/2012 &nbsp;ACT	THREE (3) FIREWATER PUMP ENGINES	17.11	DIESEL	575 HORSEPOWER, EACH		Carbon Monoxide	GOOD COMBUSTION PRACTICES AND LIMITED HOURS OF NON-EMERGENCY OPERATION	0		
IN-0173	06/04/2014 &nbsp;ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	NO. 2, DIESEL	3600 BHP		Carbon Monoxide	GOOD COMBUSTION PRACTICES	2.61 G/BHP-H		2.61
IN-0179	09/25/2013 &nbsp;ACT	DIESEL-FIRED EMERGENCY GENERATOR	17.11	NO. 2 FUEL OIL	4690 B-HP		Carbon Monoxide	GOOD COMBUSTION PRACTICES	2.61 G/B-HP-H		2.61
IN-0180	06/04/2014 &nbsp;ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	NO. 2, DIESEL	3600 BHP		Carbon Monoxide	GOOD COMBUSTION PRACTICES	2.61 G/B-HP-H		2.61
*KS-0036	03/18/2013 &nbsp;ACT	Caterpillar C18DITA Diesel Engine Generator	17.11	No. 2 Distillate Fuel Oil	900 BHP		Carbon Monoxide	utilize efficient combustion/design technology	1.8 LB/HR		0.91

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
LA-0296	05/23/2014 &nbsp;ACT	Emergency Diesel Generators (EQTs 622, 671, 773, 850, 994, 995, 996, 1033, 1077, 1105, & 1202)	17.11	Diesel	2682 HP		Carbon Monoxide	Compliance with 40 CFR 60 Subpart IIII; operating the engine in accordance with the engine manufacturer's instructions and/or written procedures (consistent with safe operation) designed to maximize combustion efficiency and minimize fuel usage.	15.43 LB/HR		2.61
*LA-0315	05/23/2014 &nbsp;ACT	Emergency Diesel Generator 1	17.11	Diesel	5364 HP		Carbon Monoxide	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	30.86 LB/H		2.63
*LA-0315	05/23/2014 &nbsp;ACT	Emergency Diesel Generator 2	17.11	Diesel	5364 HP		Carbon Monoxide	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	30.86 LB/H		2.63
*LA-0315	05/23/2014 &nbsp;ACT	Fire Pump Diesel Engine 1	17.11	Diesel	751 HP		Carbon Monoxide	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	4.32 LB/H		2.63
*LA-0315	05/23/2014 &nbsp;ACT	Fire Pump Diesel Engine 2	17.11	Diesel	751 HP		Carbon Monoxide	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	4.32 LB/H		2.63
MA-0039	01/30/2014 &nbsp;ACT	Emergency Engine/Generator	17.11	ULSD	7.4 MMBTU/H		Carbon Monoxide		2.6 GM/BHP-H		2.60
MD-0042	04/08/2014 &nbsp;ACT	EMERGENCY GENERATOR 1	17.11	ULTRA LOW SULFU DIESEL	2250 KW		Carbon Monoxide	USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES AND HOURS OF OPERATION LIMITED TO 100 HOURS PER YEAR	2.6 G/HP-H		2.60
MD-0044	06/09/2014 &nbsp;ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	1550 HP		Carbon Monoxide	GOOD COMBUSTION PRACTICES AND DESIGNED TO MEET EMISSION LIMIT	2.6 G/HP-H		2.60
MI-0406	11/01/2013 &nbsp;ACT	FG-EMGEN7-8; Two (2) 1,000kW diesel-fueled emergency reciprocating internal combustion engines	17.11	Diesel	1000 kW		Carbon Monoxide	Good combustion practices.	2.6 G/B-HP-H		2.60
NJ-0079	07/25/2012 &nbsp;ACT	Emergency Generator	17.11	Ultra Low Sulfur distillate Diesel	100 H/YR		Carbon Monoxide	Use of ULSD oil	1.99 LB/H		
NJ-0080	11/01/2012 &nbsp;ACT	Emergency Generator	17.11	ULSD	200 H/YR		Carbon Monoxide		11.56 LB/H		
NY-0104	08/01/2013 &nbsp;ACT	Emergency generator	17.11	ultra low sulfur diesel	0		Carbon Monoxide	Good combustion practice.	0.45 G/BHP-H		0.45
OH-0352	06/18/2013 &nbsp;ACT	Emergency generator	17.11	diesel	2250 KW		Carbon Monoxide	Purchased certified to the standards in NSPS Subpart IIII	17.35 LB/H		2.61
OH-0355	05/07/2013 &nbsp;ACT	Test Cell 1 for Aircraft Engines and Turbines	17.11	JET FUEL	0		Carbon Monoxide		5.1 LB/MMBTU		16.19
OH-0355	05/07/2013 &nbsp;ACT	Test Cell 2 for Aircraft Engines and Turbines	17.11	JET FUEL	0		Carbon Monoxide		7.3 LB/MMBTU		23.18
OH-0360	11/05/2013 &nbsp;ACT	Emergency generator (P003)	17.11	diesel	1112 KW		Carbon Monoxide	Purchased certified to the standards in NSPS Subpart IIII	8.57 LB/H		2.61
OH-0363	11/05/2014 &nbsp;ACT	Emergency generator (P002)	17.11	Diesel fuel	1100 KW		Carbon Monoxide	Emergency operation only, < 500 hours/year each for maintenance checks and readiness testing designed to meet NSPS Subpart IIII	8.49 LB/H		2.61
OK-0154	07/02/2013 &nbsp;ACT	DIESEL-FIRED EMERGENCY GENERATOR ENGINE	17.11	DIESEL	1341 HP		Carbon Monoxide	COMBUSTION CONTROL.	0.001 LB/HR		
PA-0278	10/10/2012 &nbsp;ACT	Emergency Generator	17.11	Diesel	0		Carbon Monoxide		0.13 G/B-HP-H		0.13
PA-0286	01/31/2013 &nbsp;ACT	EMERGENCY GENERATOR-ENGINE	17.13	Diesel	0		Carbon Monoxide		0.13 GM/B-HP-H		0.13
PA-0291	04/23/2013 &nbsp;ACT	EMERGENCY GENERATOR	17.11	Ultra Low sulfur Distillate	7.8 MMBTU/H		Carbon Monoxide		5.79 LB/H		
*PA-0292	06/01/2012 &nbsp;ACT	DIESEL GENERATOR (2.25 MW EACH) - 5 UNITS	17.11	#2 Oil	0		Carbon Monoxide	CO Oxidation Catalyst	3.5 GRAMS/KW-H		2.61
PR-0009	04/10/2014 &nbsp;ACT	Emergency Diesel Generator	17.11	ULSD Fuel oil # 2	0		Carbon Monoxide		2.6 G/BHP-H		2.60
SC-0113	02/08/2012 &nbsp;ACT	EMERGENCY GENERATORS 1 THRU 8	17.11	DIESEL	757 HP		Carbon Monoxide	ENGINES MUST BE CERTIFIED TO COMPLY WITH NSPS, SUBPART IIII.	3.5 GR/KW-H		2.61

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
VA-0321	03/12/2013 &nbsp;ACT	Emergency diesel generator- 2200 kW	17.11	ultra low sulfur diesel	500 hrs/yr		Carbon Monoxide	good combustion practices	3.5 G/KW-HR		2.61
WV-0025	11/21/2014 &nbsp;ACT	Emergency Generator	17.11	Diesel	2015.7 HP		Carbon Monoxide		0		2.60
WY-0070	08/28/2012 &nbsp;ACT	Diesel Emergency Generator (EP15)	17.11	Ultra Low Sulfur Diesel	839 hp		Carbon Monoxide	EPA Tier 2 rated	0		
CA-1212	10/18/2011 &nbsp;ACT	EMERGENCY IC ENGINE	17.11	DIESEL	2683 HP		Carbon Monoxide		3.5 G/KW-H		2.61
FL-0328	10/27/2011 &nbsp;ACT	Main Propulsion Engines	17.11	Diesel	0		Carbon Monoxide	Use of good combustion practices based on the current manufacturer's specifications for these engines, and additional enhanced work practice standards including an engine performance management system and the Diesel Engines with Turbochargers (DEWT) measurement system.	3.3 G/KW-H		2.46
FL-0328	10/27/2011 &nbsp;ACT	Crane Engines (units 1 and 2)	17.11	Diesel	0		Carbon Monoxide	Use of certified EPA Tier 1 engines and good combustion practices based on the current manufacturer's specifications for this engine.	11.8 TONS PER YEAR		
FL-0328	10/27/2011 &nbsp;ACT	Crane Engines (units 3 and 4)	17.11	Diesel	0		Carbon Monoxide	Use of good combustion practices, based on the current manufacturer's specifications for this engine	4 TONS PER YEAR		
FL-0328	10/27/2011 &nbsp;ACT	Emergency Engine	17.11	Diesel	0		Carbon Monoxide	Use of good combustion practices, based on the current manufacturer's specifications for this engine	0.09 TONS PER YEAR		
FL-0328	10/27/2011 &nbsp;ACT	Emergency Fire Pump Engine	17.11	Diesel	0		Carbon Monoxide	Use of good combustion practices, based on the current manufacturer's specifications for this engine	0.005 TONS PER YEAR		
FL-0332	09/23/2011 &nbsp;ACT	600 HP Emergency Equipment	17.11	Ultra-Low Sulfur Oil	0		Carbon Monoxide	See Pollutant Notes.	2.6 G/HP-H		2.60
LA-0251	04/26/2011 &nbsp;ACT	Large Generator Engines (17 units)	17.11	Diesel	0		Carbon Monoxide	no additional control	0.03 LB/H		3.50
LA-0254	08/16/2011 &nbsp;ACT	EMERGENCY DIESEL GENERATOR	17.11	DIESEL	1250 HP		Carbon Monoxide	ULTRA LOW SULFUR DIESEL AND GOOD COMBUSTION PRACTICES	2.6 G/HP-H		2.60
MI-0402	11/17/2011 &nbsp;ACT	Diesel fuel-fired combustion engine (RICE)	17.11	Diesel	732 HP		Carbon Monoxide	Good combustion practices	0.31 G/HP-H		0.31
*SD-0005	06/29/2010 &nbsp;ACT	Emergency Generator	17.11	Distillate Oil	2000 Kilowatts		Carbon Monoxide				
*SD-0005	06/29/2010 &nbsp;ACT	Fire Water Pump	17.11	Distillate Oil	577 horsepower		Carbon Monoxide				

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - NO<sub>x</sub> (Gas-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
AR-0163	06/09/2019 &nbsp;ACT	Lime Injector Burners	17.13	Natural Gas	0		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners Combustion of clean fuel Good Combustion Practices	0.095 LB/MMBTU		0.30
AR-0163	06/09/2019 &nbsp;ACT	Lime Injector Burners	17.13	Natural Gas	0		Nitrous Oxide (N <sub>2</sub> O)	Good operating practices	0.0002 LB/MMBTU		
*FL-0368	02/14/2019 &nbsp;ACT	Emergency Engines	17.13	Natural gas	0		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices	2 G/HP-HR		2.00
KY-0110	07/23/2020 &nbsp;ACT	EP 10-05 - Austenitizing Furnace Rolls Emergency Generator	17.13	Natural Gas	636 HP		Nitrogen Oxides (NO <sub>x</sub> )	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2 G/HP-HR		2.00
KY-0110	07/23/2020 &nbsp;ACT	EP 10-06 - Tempering Furnace Rolls Emergency Generator	17.13	Natural Gas	636 HP		Nitrogen Oxides (NO <sub>x</sub> )	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2 G/HP-HR		2.00
*MI-0440	05/22/2019 &nbsp;ACT	FGENGINES	17.13	natural gas	16500 HP		Nitrogen Oxides (NO <sub>x</sub> )	Selective catalytic reduction	0.5 G/HP-H		0.50
AK-0084	06/30/2017 &nbsp;ACT	Twelve (12) Large ULSD/Natural Gas-Fired Internal Combustion Engines	17.11	Diesel and Natural Gas	143.5 MMBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )	Selective Catalytic Reduction (SCR) and Good Combustion Practices	0.53 G/KW-HR (ULSD)		0.06
*LA-0346	01/04/2018 &nbsp;ACT	emergency generators (4 units)	17.11	natural gas	13410 hp (each)		Nitrogen Oxides (NO <sub>x</sub> )	Comply with standards of 40 CFR 60 Subpart JJJJ	2 G/BHP-HR		2.00
*MI-0441	12/21/2018 &nbsp;ACT	EUEMGNG1--A 1500 HP natural gas fueled emergency engine	17.13	Natural gas	1500 HP		Nitrogen Oxides (NO <sub>x</sub> )	Burn natural gas and be NSPS compliant.	2 G/HP-H		2.00
*MI-0441	12/21/2018 &nbsp;ACT	EUEMGNG2	17.13	NATURAL GAS	6000 HP		Nitrogen Oxides (NO <sub>x</sub> )	Burn natural gas and be NSPS compliant	2 G/HP-H		2.00
CA-1240	03/17/2017 &nbsp;ACT	Internal Combustion Engine	17.13	Natural gas	881 bhp		Nitrogen Oxides (NO <sub>x</sub> )	SCR catalyst-Urea injection	5 PPMVD		0.06
CA-1241	08/19/2016 &nbsp;ACT	ICE Landfill or digested gas fired	17.14	Digester gas	1573 bhp		Nitrogen Oxides (NO <sub>x</sub> )	SCR/Oxidation catalyst	9 PPMV		0.11
IN-0246	10/22/2015 &nbsp;ACT	LANDFILL GAS-FIRED ENGINE GENERATOR SETS	17.14	LANDFILL GAS	2233 BHP		Nitrogen Oxides (NO <sub>x</sub> )	GOOD COMBUSTION PRACTICES	0.6 G/BHP-HR		0.60
*KS-0030	03/31/2016 &nbsp;ACT	Spark ignition RICE emergency AC generators	17.13	Natural gas	450 kW		Nitrogen Oxides (NO <sub>x</sub> )		2 G/HP-HR		2.00
*KS-0030	03/31/2016 &nbsp;ACT	Spark ignition RICE electricity generating units (EGUs)	17.13	Natural Gas	10 MW		Nitrogen Oxides (NO <sub>x</sub> )		2.13 LB/H		0.07
LA-0292	01/22/2016 &nbsp;ACT	Waukesha 16V-275GL Compressor Engines Nos. 1-12	17.13	Natural Gas	5000 HP		Nitrogen Oxides (NO <sub>x</sub> )	Lean-burn combustion, use of natural gas as fuel, good equipment design, and proper combustion techniques	4.96 LB/HR		0.45
LA-0295	07/12/2016 &nbsp;ACT	Reciprocating Internal Combustion Engines 1 and 2 (1-08, EQT 321 & 2-08, EQT 322)	17.15	NATURAL GAS AND VENT GAS	11265 HP		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices, including good equipment design, use of gaseous fuels for good mixing, and proper combustion techniques (see notes below)	14.67 LB/H		0.59
ME-0041	03/30/2016 &nbsp;ACT	Engine #1	17.14	landfill gas	16.5 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Air/Fuel Ratio Controllers	0.6 G/BHP*H		0.60
ME-0041	03/30/2016 &nbsp;ACT	Engine #2	17.14	landfill gas	16.5 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Air/Fuel Ratio Controllers	0.6 G/BHPH		0.60
ME-0041	03/30/2016 &nbsp;ACT	Engine #3	17.14	landfill gas	16.5 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Air/Fuel Ratio Controller	0.6 G/BHPH		0.60
MI-0420	06/03/2016 &nbsp;ACT	EUN_EM_GEN	17.13	Natural gas	225 H/YR		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> design (turbo charger and after cooler) and good combustion practices.	4.8 LB/H		2.00
MI-0424	12/05/2016 &nbsp;ACT	EUNGENGINE (Emergency engine--natural gas)	17.13	Natural gas	500 H/YR		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices.	2 G/HP-H		2.00
MI-0426	03/24/2017 &nbsp;ACT	EUN_EM_GEN (Natural gas emergency engine).	17.13	Natural gas	205 H/YR		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> design (turbo charger and after cooler) and good combustion practices.	4 LB/H		2.00

Std Units	Limit
g/hp-hr	

Appendix C, Page C2-15

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - NO<sub>x</sub> (Gas-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
MI-0401	12/21/2011 &nbsp;   ACT	Emergency generator	17.13	Natural gas	1200 kW output		Nitrogen Oxides (NO <sub>x</sub> )		0.5 G/HP-H		0.50
MI-0412	12/04/2013 &nbsp;   ACT	Emergency Engine--natural gas (EUNGENGINE)	17.13	natural gas	1000 kW		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices	2 G/HP-H		2.00
OK-0148	09/12/2012 &nbsp;   ACT	Large Internal Combustion Engines (&gt;500 hp)	17.13	Natural Gas	1775 Horsepower		Nitrogen Oxides (NO <sub>x</sub> )	Ultra Lean Burn	0.5 GM/HP-HR		0.50
OK-0148	09/12/2012 &nbsp;   ACT	Large Internal Combustion Engines (&gt;500 hp)	17.13	Natural Gas	2370 Horsepower		Nitrogen Oxides (NO <sub>x</sub> )	Ultra Lean Burn	0.5 GM/HP-HR		0.50
OK-0153	03/01/2013 &nbsp;   ACT	COMPRESSOR ENGINE 1,775-HP CAT G3606LE	17.13	NATURAL GAS	1775 HP		Nitrogen Oxides (NO <sub>x</sub> )		0.5 GM/HP-HR		0.50
OK-0153	03/01/2013 &nbsp;   ACT	EMERGENCY GENERATORS 2,889-HP CAT G3520C IM	17.13	NATURAL GAS	2889 HP		Nitrogen Oxides (NO <sub>x</sub> )	LEAN-BURN COMBUSTION.	0.5 GM/HP-HR		0.50
*OR-0052	06/21/2013 &nbsp;   ACT	Caterpillar 3520C internal combustion engines which drive electric generators	17.14	landfill gas	2328 MMdscf/year		Nitrogen Oxides (NO <sub>x</sub> )		0.6 G/HP-HR		0.60
*OR-0052	06/21/2013 &nbsp;   ACT	Caterpillar 3516 internal combustion engines which drive electric generators	17.14	landfill gas	1400 MMdscf/year		Nitrogen Oxides (NO <sub>x</sub> )		1.45 G/BHP-HR		1.45
*OR-0052	06/21/2013 &nbsp;   ACT	Caterpillar 3516 internal combustion engines which drive electric generators	17.14	landfill gas	1400 MMdscf/year		Nitrogen Oxides (NO <sub>x</sub> )		1.45 G/BHP-HR		1.45
*OR-0052	06/21/2013 &nbsp;   ACT	Caterpillar 3516 internal combustion engines which drive electric generators	17.14	landfill gas	1400 MMdscf/year		Nitrogen Oxides (NO <sub>x</sub> )		1.45 G/BHP-HR		1.45
PA-0297	05/23/2013 &nbsp;   ACT	3.11 MW GENERATORS (WAUKESHA) #1 and #2	17.13	Natural Gas	0		Nitrogen Oxides (NO <sub>x</sub> )		0.5 G/BHP-HR		0.50
PA-0301	03/31/2014 &nbsp;   ACT	Three Four Stroke Lean Burn Engine - Caterpillar G3608 TA, 2370 BHP	17.13	Natural Gas	0		Nitrogen Oxides (NO <sub>x</sub> )		0.5 G/BHP-HR		0.50
PA-0301	03/31/2014 &nbsp;   ACT	One four stroke lean burn engine, Caterpillar Model G3612 TA, 3550 bhp	17.13	Natural Gas	0		Nitrogen Oxides (NO <sub>x</sub> )		0.5 G/BHP-HR		0.50
PA-0302	04/16/2014 &nbsp;   ACT	Spark Ignited 4 stroke Rich Burn Engine (7 units)	17.13	Natural Gas	0		Nitrogen Oxides (NO <sub>x</sub> )	NSCR	0.2 G/BHP-HR		0.20
*PA-0303	02/02/2012 &nbsp;   ACT	Emergency Generator Set, Rich Burn, 850 BHP	17.13	NG	0		Nitrogen Oxides (NO <sub>x</sub> )	Miratech model IQ-24-10-EC1 NSCR system	0.5 G/BHP-HR		0.50
TX-0642	12/20/2013 &nbsp;   ACT	Emergency Engine	17.13	natural gas	1328 hp		Nitrogen Oxides (NO <sub>x</sub> )		2 G/HP-H		2.00
TX-0680	06/14/2013 &nbsp;   ACT	Refrigeration compressor engine	17.13	natural gas	1183 hp		Nitrogen Oxides (NO <sub>x</sub> )	ultra-lean burn technology	0.5 G/HP-HR		0.50
TX-0680	06/14/2013 &nbsp;   ACT	Recompression compressor engine	17.13	natural gas	1380 hp		Nitrogen Oxides (NO <sub>x</sub> )	ultra-lean burn technology	0.5 G/HP-HR		0.50
TX-0692	12/20/2013 &nbsp;   ACT	(12) reciprocating internal combustion engines	17.13	natural gas	18 MW		Nitrogen Oxides (NO <sub>x</sub> )	Selective Catalytic Reduction (SCR)	0.084 G/HP-HR		0.08
CA-1186	08/26/2011 &nbsp;   ACT	Internal Combustion Engine	17.14	Landfill Gas	1966 BHP		Nitrogen Oxides (NO <sub>x</sub> )	Lean-burn engine with air fuel ratio controller	38 PPMVD@15% O <sub>2</sub>		0.44
CA-1192	06/21/2011 &nbsp;   ACT	EMERGENCY IC ENGINE	17.13	NATURAL GAS	550 KW		Nitrogen Oxides (NO <sub>x</sub> )	SCR, OPERATIONAL LIMIT OF 50 HRS/YR	0.21 G/HP-H		0.21
CA-1222	09/22/2011 &nbsp;   ACT	ICE: Spark Ignition	17.13	natural gas	2889 bhp		Nitrogen Oxides (NO <sub>x</sub> )	SCR with process control NO <sub>x</sub> monitor	7 PPMVD@15% O <sub>2</sub>		0.08
IN-0135	11/10/2011 &nbsp;   ACT	4-STROKE LEAN BURN COAL BED METHANE (CBM)-FIRED RECIPROCATING INTERNAL COMUBSTION ENGINES (RICE)	17.15	COAL BED METHANE	4601 BRAKE HORSEPOWER		Nitrous Oxide (N <sub>2</sub> O)	GOOD COMBUSTION PRACTICES AND PROPER MAINTENANCE	0.23 LB/MW-H		0.08

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - NO<sub>x</sub> (Gas-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
MI-0397	06/29/2011 &nbsp;ACT	Landfill gas fired generator engines-2	17.14	Landfill gas	260880	MMBTU/yr	Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices with an air/fuel ratio controller.	0.6	G/B-HP-H	0.60
MI-0398	06/17/2011 &nbsp;ACT	Landfill gas fired generator engine	17.14	Landfill gas	264.38	MMSCF/YR	Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices with an air/fuel ratio controller.	1	G/B-HP-H	1.00
NJ-0078	05/03/2011 &nbsp;ACT	INTERNAL COMBUSTION ENGINES	17.14	LANDFILL GAS	848820	MMBTU/YR	Nitrogen Oxides (NO <sub>x</sub> )	THESE ARE ULTRA LEAN BURN ENGINES	0.5	GRAMS/B-HP-H	0.50
OH-0347	07/05/2011 &nbsp;ACT	2 caterpillar engines 2233 HP	17.14	Landfill gas	2233	HP	Nitrogen Oxides (NO <sub>x</sub> )	Lean burn technology	5.9	LB/H	1.20
OH-0348	09/14/2011 &nbsp;ACT	Reciprocationg Internal Combustion Engines (10)	17.14	Landfill Gas	2233	HP	Nitrogen Oxides (NO <sub>x</sub> )	Lean burn technology and meeting the requirements of Part 60 Subpart JJJJ	2.46	LB/H	0.50
*PA-0279	12/13/2010 &nbsp;ACT	RIC ENGINES (2)	17.14	Treated Landfil Gas	66876	CF/H	Nitrogen Oxides (NO <sub>x</sub> )	Each engine shall be constructed with low NOx technology in the form of lean burn combustion with automatic air/fuel ratio control.	0.5	G/B-HP-H	0.50
PA-0287	09/27/2011 &nbsp;ACT	CATERPILLAR G3516B COMPRESSOR ENGINES (2)	17.13	Natural Gas	0		Nitrogen Oxides (NO <sub>x</sub> )		0.5	G/B-HP-H	0.50
PA-0287	09/27/2011 &nbsp;ACT	WAUKESHA P9390GSI COMPRESSOR ENGINES (4) (1980 BHP)	17.13	Natural Gas	0		Nitrogen Oxides (NO <sub>x</sub> )	3-way catalyst, Johnson Matthey	0.2	G/B-HP-H	0.20

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - NO<sub>x</sub> (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
*AK-0085	08/13/2020 &nbsp;ACT	One (1) Black Start Generator Engine	17.11	ULSD	186.6 gph		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices, limit operation to 500 hours per year.	3.3 G/HP-HR		3.30
AR-0161	09/23/2019 &nbsp;ACT	Emergency Engines	17.11	Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	0.4 G/KW-H		0.30
AR-0163	06/09/2019 &nbsp;ACT	Emergency Engines	17.11	Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	4.86 G/KW-HR		3.62
AR-0163	06/09/2019 &nbsp;ACT	Emergency Engines	17.11	Diesel	0		Nitrous Oxide (N <sub>2</sub> O)	Good Combustion Practices	0.0013 LB/MMBTU		
IL-0130	12/31/2018 &nbsp;ACT	Emergency Engine	17.11	Ultra-Low Sulfur Diesel	1500 kW		Nitrogen Oxides (NO <sub>x</sub> )		6.4 G/KW-HR		4.77
IN-0317	06/11/2019 &nbsp;ACT	Emergency generator EU-6006	17.11	Diesel	2800 HP		Nitrogen Oxides (NO <sub>x</sub> )	Tier II diesel engine	6.4 G/KWH		4.77
IN-0317	06/11/2019 &nbsp;ACT	Emergency fire pump EU-6008	17.11	Diesel	750 HP		Nitrogen Oxides (NO <sub>x</sub> )	Engine that complies with Table 4 to Subpart IIII of Part 60	4 G/KWH		2.98
KY-0110	07/23/2020 &nbsp;ACT	EP 10-02 - North Water System Emergency Generator	17.11	Diesel	2922 HP		Nitrogen Oxides (NO <sub>x</sub> )	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	4.77 G/HP-HR		4.77
KY-0110	07/23/2020 &nbsp;ACT	EP 10-03 - South Water System Emergency Generator	17.11	Diesel	2922 HP		Nitrogen Oxides (NO <sub>x</sub> )	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	4.77 G/HP-HR		4.77
KY-0110	07/23/2020 &nbsp;ACT	EP 10-04 - Emergency Fire Water Pump	17.11	Diesel	920 HP		Nitrogen Oxides (NO <sub>x</sub> )	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	4.77 G/HP-HR		4.77
KY-0110	07/23/2020 &nbsp;ACT	EP 10-07 - Air Separation Plant Emergency Generator	17.11	Diesel	700 HP		Nitrogen Oxides (NO <sub>x</sub> )	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	4.77 G/HP-HR		4.77
KY-0110	07/23/2020 &nbsp;ACT	EP 10-01 - Caster Emergency Generator	17.11	Diesel	2922 HP		Nitrogen Oxides (NO <sub>x</sub> )	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	4.77 G/HP-HR		4.77
KY-0115	04/19/2021 &nbsp;ACT	New Pumphouse (XB13) Emergency Generator #1 (EP 08-05)	17.11	Diesel	2922 HP		Nitrogen Oxides (NO <sub>x</sub> )	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		4.80
KY-0115	04/19/2021 &nbsp;ACT	Tunnel Furnace Emergency Generator (EP 08-06)	17.11	Diesel	2937 HP		Nitrogen Oxides (NO <sub>x</sub> )	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		4.80
KY-0115	04/19/2021 &nbsp;ACT	Caster B Emergency Generator (EP 08-07)	17.11	Diesel	2937 HP		Nitrogen Oxides (NO <sub>x</sub> )	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		4.80
KY-0115	04/19/2021 &nbsp;ACT	Air Separation Unit Emergency Generator (EP 08-08)	17.11	Diesel	700 HP		Nitrogen Oxides (NO <sub>x</sub> )	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		4.80
*LA-0364	01/06/2020 &nbsp;ACT	Emergency Generator Diesel Engines	17.11	Diesel Fuel	550 hp		Nitrogen Oxides (NO <sub>x</sub> )	Compliance with the limitations imposed by 40 CFR 63 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures designed to maximize combustion efficiency and minimize fuel usage.	0		
*LA-0364	01/06/2020 &nbsp;ACT	Emergency Fire Water Pumps	17.11	Diesel Fuel	550 hp		Nitrogen Oxides (NO <sub>x</sub> )	Compliance with the limitations imposed by 40 CFR 63 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures designed to maximize combustion efficiency and minimize fuel usage.	0		
*MI-0442	08/21/2019 &nbsp;ACT	FGENGINE	17.11	Diesel	1100 KW		Nitrogen Oxides (NO <sub>x</sub> )		5.3 G/HP-H		5.30
*MI-0445	11/26/2019 &nbsp;ACT	EUENGINE (diesel fuel emergency engine)	17.11	diesel fuel	22.68 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Good Combustion Practices and meeting NSPS Subpart IIII requirements	6.4 G/KW-H		4.77



**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - NO<sub>x</sub> (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
OH-0379	02/06/2019 &nbsp;ACT	Emergency Generators (P005 and P006)	17.11	Diesel fuel	3131 HP		Nitrogen Oxides (NO <sub>x</sub> )	Tier IV engine Tier IV NSPS standards certified by engine manufacturer.	3.45 LB/H		0.50
TX-0876	02/06/2020 &nbsp;ACT	Emergency generator	17.11	DIESEL	0		Nitrogen Oxides (NO <sub>x</sub> )	Tier 4 exhaust emission standards specified in 40 CFR Â§ 1039.101, limited to 100 hours per year of non-emergency operation	0		
TX-0879	02/19/2020 &nbsp;ACT	Emergency Firewater Engine	17.11	Ultra-low sulfur diesel	0		Nitrogen Oxides (NO <sub>x</sub> )	Meeting the requirements of 40 CFR Part 60, Subpart IIII. Firing ultra-low sulfur diesel fuel (no more than 15 ppm sulfur by weight). Limited to 100 hrs/yr of non-emergency operation. Have a non-resettable runtime meter.	0		
TX-0882	01/17/2020 &nbsp;ACT	EMERGENCY ENGINES	17.12	DIESEL	0		Nitrogen Oxides (NO <sub>x</sub> )	GOOD COMBUSTION PRACTICES, CLEAN FUEL, 100 HR/YR, ULTRA LOW SULFUR FUEL	0.0092 LB/MMBTU		
TX-0888	04/23/2020 &nbsp;ACT	EMERGENCY GENERATORS & FIRE WATER PUMP ENGINES	17.11	Ultra-low Sulfur Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )	well-designed and properly maintained engines and each limited to 100 hours per year of non-emergency use.	0		
*TX-0904	09/09/2020 &nbsp;ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	0		Nitrogen Oxides (NO <sub>x</sub> )	100 HOURS OPERATIONS, Tier 4 exhaust emission standards specified in 40 CFR Â§ 1039.101	0		
*TX-0905	09/16/2020 &nbsp;ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	0		Nitrogen Oxides (NO <sub>x</sub> )	limited to 100 hours per year of non-emergency operation	0		
VA-0332	06/24/2019 &nbsp;ACT	Emergency Diesel Generator - 300 kW	17.11	Ultra Low Sulfur Diesel	500 H/YR		Nitrogen Oxides (NO <sub>x</sub> )	good combustion practices, high efficiency design, and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	4.8 G/HP-H		4.80
AK-0084	06/30/2017 &nbsp;ACT	Black Start and Emergency Internal Combustion Engines	17.11	Diesel	1500 kW	e	Nitrogen Oxides (NO <sub>x</sub> )	Good Combustion Practices	8 G/KW-HR		5.97
AK-0084	06/30/2017 &nbsp;ACT	Twelve (12) Large ULSD/Natural Gas-Fired Internal Combustion Engines	17.11	Diesel and Natural Gas	143.5 MMBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )	Selective Catalytic Reduction (SCR) and Good Combustion Practices	0.53 G/KW-HR (ULSD)		0.40
*AL-0318	12/18/2017 &nbsp;ACT	250 Hp Emergency CI, Diesel-fired RICE	17.11	Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )		0		
*FL-0367	07/27/2018 &nbsp;ACT	1,500 kW Emergency Diesel Generator	17.11	ULSD	14.82 MMBtu/hour		Nitrogen Oxides (NO <sub>x</sub> )	Operate and maintain the engine according to the manufacturer's written instructions	6.4 G/KW-HOUR		4.77
IL-0129	07/30/2018 &nbsp;ACT	Emergency Engines	17.11	Ultra-low sulfur diesel	0		Nitrogen Oxides (NO <sub>x</sub> )		0		
*LA-0312	06/30/2017 &nbsp;ACT	DFP1-13 - Diesel Fire Pump Engine (EQI0013)	17.11	Diesel	650 horsepower		Nitrogen Oxides (NO <sub>x</sub> )	Compliance with NSPS Subpart IIII	6.6 LB/HR		4.61
*LA-0312	06/30/2017 &nbsp;ACT	DEG1-13 - Diesel Fired Emergency Generator Engine (EQI0012)	17.11	Diesel	1474 horsepower		Nitrogen Oxides (NO <sub>x</sub> )	Compliance with NSPS Subpart IIII	19.23 LB/HR		5.92
LA-0331	09/21/2018 &nbsp;ACT	Firewater Pumps	17.11	Diesel Fuel	634 kW		Nitrogen Oxides (NO <sub>x</sub> )	Good Combustion and Operating Practices.	3.1 G/HP-H		3.10
LA-0331	09/21/2018 &nbsp;ACT	Large Emergency Engines (>50kW)	17.11	Diesel Fuel	5364 HP		Nitrogen Oxides (NO <sub>x</sub> )	Good Combustion and Operating Practices	5.6 G/KW-H		4.18
*MA-0043	06/21/2017 &nbsp;ACT	Cold Start Engine	17.11	ULSD	19.04 MMBTU/HR		Nitrogen Oxides (NO <sub>x</sub> )		35.09 LB/HR		
MI-0425	05/09/2017 &nbsp;ACT	EUEMRGICE1 in FGRICE (Emergency diesel generator engine)	17.11	Diesel	500 H/YR		Nitrogen Oxides (NO <sub>x</sub> )	Certified engines, limited operating hours.	21.2 LB/H		
MI-0425	05/09/2017 &nbsp;ACT	EUEMRGICE2 in FGRICE (Emergency Diesel Generator Engine)	17.11	Diesel	500 H/YR		Nitrogen Oxides (NO <sub>x</sub> )	Certified engines, limited operating hours	4.4 LB/H		

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - NO<sub>x</sub> (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
MI-0425	05/09/2017 &nbsp;ACT	EUFIREFPUMP in FGRICE (Diesel fire pump engine)	17.11	Diesel	500 H/YR		Nitrogen Oxides (NO <sub>x</sub> )	Certified engines. Limited operating hours.	3.53 LB/H		
MI-0433	06/29/2018 &nbsp;ACT	EUENGINE (North Plant): Emergency Engine	17.11	Diesel	1341 HP		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices and meeting NSPS Subpart IIII requirements.	6.4 G/KW-H		4.77
MI-0433	06/29/2018 &nbsp;ACT	EUENGINE (South Plant): Emergency Engine	17.11	Diesel	1341 HP		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices and meeting NSPS IIII requirements.	6.4 G/KW-H		4.77
MI-0434	03/22/2018 &nbsp;ACT	EUENGINE01 through EUENGINE08	17.11	Diesel	3633 BHP		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices.	6.4 G/KW-H		4.77
MI-0435	07/16/2018 &nbsp;ACT	EUENGINE: Emergency engine	17.11	Diesel	2 MW		Nitrogen Oxides (NO <sub>x</sub> )	State of the art combustion design.	6.4 G/KW-H		4.77
*MI-0441	12/21/2018 &nbsp;ACT	EUEMGD1--A 1500 HP diesel fueled emergency engine	17.11	Diesel	1500 HP		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices and will be NSPS compliant.	6.4 G/KW-H		4.77
*MI-0441	12/21/2018 &nbsp;ACT	EUEMGD2--A 6000 HP diesel fuel fired emergency engine	17.11	Diesel	6000 HP		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices and will be NSPS compliant.	6.4 G/KW-H		4.77
OH-0370	09/07/2017 &nbsp;ACT	Emergency generator (P003)	17.11	Diesel fuel	1529 HP		Nitrogen Oxides (NO <sub>x</sub> )	State-of-the-art combustion design	16.07 LB/H		4.77
OH-0372	09/27/2017 &nbsp;ACT	Emergency generator (P003)	17.11	Diesel fuel	1529 HP		Nitrogen Oxides (NO <sub>x</sub> )	State-of-the-art combustion design	16.1 LB/H		4.78
OH-0374	10/23/2017 &nbsp;ACT	Emergency Generators (2 identical, P004 and P005)	17.11	Diesel fuel	2206 HP		Nitrogen Oxides (NO <sub>x</sub> )	Certified to the meet the emissions standards in 40 CFR 89.112 and 89.113 pursuant to 40 CFR 60.4205(b) and 60.4202(a)(2). Good combustion practices per the manufacturer's operating manual.	23.21 LB/H		4.77
OH-0375	11/07/2017 &nbsp;ACT	Emergency Diesel Generator Engine (P001)	17.11	Diesel fuel	2206 HP		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion design	24.71 LB/H		5.08
OH-0375	11/07/2017 &nbsp;ACT	Emergency Diesel Fire Pump Engine (P002)	17.11	Diesel fuel	700 HP		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion design	4.97 LB/H		3.22
OH-0376	02/09/2018 &nbsp;ACT	Emergency diesel-fired generator (P007)	17.11	Diesel fuel	2682 HP		Nitrogen Oxides (NO <sub>x</sub> )	Comply with NSPS 40 CFR 60 Subpart IIII	28.2 LB/H		4.77
OH-0377	04/19/2018 &nbsp;ACT	Emergency Diesel Generator (P003)	17.11	Diesel fuel	1860 HP		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices (ULSD) and compliance with 40 CFR Part 60, Subpart IIII	19.68 LB/H		4.80
OH-0378	12/21/2018 &nbsp;ACT	Emergency Diesel-fired Generator Engine (P007)	17.11	Diesel fuel	3353 HP		Nitrogen Oxides (NO <sub>x</sub> )	certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII, shall employ good combustion practices per the manufacturer's operating manual	37.41 LB/H		5.06
OH-0378	12/21/2018 &nbsp;ACT	1,000 kW Emergency Generators (P008 - P010)	17.11	Diesel fuel	1341 HP		Nitrogen Oxides (NO <sub>x</sub> )	certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII, shall employ good combustion practices per the manufacturer's operating manual	14.96 LB/H		5.06
VA-0328	04/26/2018 &nbsp;ACT	Emergency Diesel GEN	17.11	Ultra Low Sulfur Diesel	500 H/YR		Nitrogen Oxides (NO <sub>x</sub> )	good combustion practices and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	4.8 G/HP H		4.80
*WI-0284	04/24/2018 &nbsp;ACT	Diesel-Fired Emergency Generators	17.11	Diesel Fuel	0		Nitrogen Oxides (NO <sub>x</sub> )	The Use of Ultra-Low Sulfur Fuel and Good Combustion Practices	5.36 G/KWH		4.00
*WI-0286	04/24/2018 &nbsp;ACT	P42 -Diesel Fired Emergency Generator	17.11	Diesel Fuel	0		Nitrogen Oxides (NO <sub>x</sub> )	Good Combustion Practices, The Use of an Engine Turbocharger and Aftercooler.	5.36 G/KWH		4.00
WV-0027	09/15/2017 &nbsp;ACT	Emergency Generator - ESDG14	17.11	ULSD	900 bhp		Nitrogen Oxides (NO <sub>x</sub> )	Engine Design	4.77 G/HP-HR		4.77
IN-0263	03/23/2017 &nbsp;ACT	EMERGENCY GENERATORS (EU014A AND EU-014B)	17.11	DISTILLATE OIL	3600 HP EACH		Nitrogen Oxides (NO <sub>x</sub> )	GOOD COMBUSTION PRACTICES	4.42 G/HP-H EACH		4.42

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - NO<sub>x</sub> (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
LA-0292	01/22/2016 &nbsp;ACT	Emergency Generators No. 1 & No. 2	17.11	Diesel	1341 HP		Nitrogen Oxides (NO <sub>x</sub> )	Good equipment design, proper combustion techniques, use of low sulfur fuel, and compliance with 40 CFR 60 Subpart IIII	14.16 LB/HR		4.79
LA-0305	06/30/2016 &nbsp;ACT	Diesel Engines (Emergency)	17.11	Diesel	4023 hp		Nitrogen Oxides (NO <sub>x</sub> )	Complying with 40 CFR 60 Subpart IIII	0		
LA-0307	03/21/2016 &nbsp;ACT	Diesel Engines	17.11	Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )	good combustion practices, Use ultra low sulfur diesel, and comply with 40 CFR 60 Subpart IIII	0		
LA-0309	06/04/2015 &nbsp;ACT	Emergency Generator Engines	17.11	Diesel	2922 hp (each)		Nitrogen Oxides (NO <sub>x</sub> )	Complying with 40 CFR 60 Subpart IIII	6.4 G/KW-HR		4.77
LA-0313	08/31/2016 &nbsp;ACT	SCPS Emergency Diesel Generator 1	17.11	Diesel	2584 HP		Nitrogen Oxides (NO <sub>x</sub> )	Compliance with NESHAP 40 CFR 63 Subpart ZZZZ and NSPS 40 CFR 60 Subpart IIII, and good combustion practices (use of ultra-low sulfur diesel fuel).	27.34 LB/H		4.80
LA-0316	02/17/2017 &nbsp;ACT	emergency generator engines (6 units)	17.11	diesel	3353 hp		Nitrogen Oxides (NO <sub>x</sub> )	Complying with 40 CFR 60 Subpart IIII	0		
LA-0317	12/22/2016 &nbsp;ACT	Emergency Generator Engines (4 units)	17.11	Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )	complying with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	0		
LA-0317	12/22/2016 &nbsp;ACT	Firewater pump Engines (4 units)	17.11	diesel	896 hp (each)		Nitrogen Oxides (NO <sub>x</sub> )	complying with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	0		
LA-0323	01/09/2017 &nbsp;ACT	Fire Water Diesel Pump No. 3 Engine	17.11	Diesel Fuel	600 hp		Nitrogen Oxides (NO <sub>x</sub> )	Proper operation and limits on hours operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0		
LA-0323	01/09/2017 &nbsp;ACT	Fire Water Diesel Pump No. 4 Engine	17.11	Diesel Fuel	600 hp		Nitrogen Oxides (NO <sub>x</sub> )	Proper operation and limits on hours of operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0		
MI-0421	08/26/2016 &nbsp;ACT	Emergency Diesel Generator Engine (EUEMRGRICE in FGRICE)	17.11	Diesel	500 H/YR		Nitrogen Oxides (NO <sub>x</sub> )	Certified engines, limited operating hours.	22.6 LB/H		
MI-0421	08/26/2016 &nbsp;ACT	Dieself fire pump engine (EUFIREFPUMP in FGRICE)	17.11	Diesel	500 H/YR		Nitrogen Oxides (NO <sub>x</sub> )	Certified engines, limited operating hours.	3.53 LB/H		
MI-0423	01/04/2017 &nbsp;ACT	EUENGINE (Diesel fuel emergency engine)	17.11	Diesel Fuel	22.68 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices and meeting NSPS IIII requirements.	6.4 G/KW-H		4.77
NJ-0084	03/10/2016 &nbsp;ACT	Diesel Fired Emergency Generator	17.11	ULSD	44 H/YR		Nitrogen Oxides (NO <sub>x</sub> )	use of ultra low sulfur diesel a clean burning fuel.	42.3 LB/H		
NY-0103	02/03/2016 &nbsp;ACT	Black start generator	17.11	ultra low sulfur diesel	3000 KW		Nitrogen Oxides (NO <sub>x</sub> )	Generator equipped with selective catalytic reduction. Compliance demonstrated with vendor emission certification and adherence to vendor-specified maintenance recommendations.	2.11 G/BHP-H		2.11
OH-0366	08/25/2015 &nbsp;ACT	Emergency generator (P003)	17.11	Diesel fuel	2346 HP		Nitrogen Oxides (NO <sub>x</sub> )	State-of-the-art combustion design	21.6 LB/H		4.18
OH-0367	09/23/2016 &nbsp;ACT	Emergency generator (P003)	17.11	Diesel fuel	2947 HP		Nitrogen Oxides (NO <sub>x</sub> )	State-of-the-art combustion design	27.18 LB/H		4.18
OH-0368	04/19/2017 &nbsp;ACT	Emergency Generator (P009)	17.11	Diesel fuel	5000 HP		Nitrogen Oxides (NO <sub>x</sub> )	good combustion control and operating practices and engines designed to meet the stands of 40 CFR Part 60, Subpart IIII	5.5 LB/H		0.50
PA-0309	12/23/2015 &nbsp;ACT	2000 kW Emergency Generator	17.11	Ultra-low sulfur Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )		5.45 GM/HP-HR		5.45
PA-0310	09/02/2016 &nbsp;ACT	Emergency Generator Engines	17.11	ULSD	0		Nitrogen Oxides (NO <sub>x</sub> )		4.8 G/BHP-HR		4.80
PA-0311	09/01/2015 &nbsp;ACT	Fire Pump Engine	17.11	diesel	0		Nitrogen Oxides (NO <sub>x</sub> )		3 G/HP-HR		3.00
TX-0728	04/01/2015 &nbsp;ACT	Emergency Diesel Generator	17.11	Diesel	1500 hp		Nitrogen Oxides (NO <sub>x</sub> )	Minimized hours of operations Tier II engine	0.0218 G/HP HR		4.07

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - NO<sub>x</sub> (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
VA-0325	06/17/2016 &nbsp;ACT	DIESEL-FIRED EMERGENCY GENERATOR 3000 kW (1)	17.11	DIESEL FUEL	0		Nitrogen Oxides (NO <sub>x</sub> )	Good Combustion Practices/Maintenance	6.4 G/KW		4.77
AK-0076	08/20/2012 &nbsp;ACT	Combustion of Diesel by ICEs	17.11	ULSD	1750 kW		Nitrogen Oxides (NO <sub>x</sub> )		6.4 G/KW-H		4.77
AK-0082	01/23/2015 &nbsp;ACT	Emergency Camp Generators	17.11	Ultra Low Sulfur Diesel	2695 hp		Nitrogen Oxides (NO <sub>x</sub> )		4.8 GRAMS/HP-H		4.80
AK-0082	01/23/2015 &nbsp;ACT	Fine Water Pumps	17.11	Ultra Low Sulfur Diesel	610 hp		Nitrogen Oxides (NO <sub>x</sub> )		3 GRAMS/HP-H		3.00
AK-0082	01/23/2015 &nbsp;ACT	Bulk Tank Generator Engines	17.11	Ultra Low Sulfur Diesel	891 hp		Nitrogen Oxides (NO <sub>x</sub> )		4.8 GRAMS/HP-H		4.80
AL-0301	07/22/2014 &nbsp;ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	DIESEL	800 HP		Nitrogen Oxides (NO <sub>x</sub> )		0.015 LB/HP-H		6.80
AR-0140	09/18/2013 &nbsp;ACT	EMERGENCY GENERATORS	17.11	DIESEL	1500 KW		Nitrous Oxide (N <sub>2</sub> O)	GOOD COMBUSTION PRACTICES	0.0013 LB/MMBTU		
CA-1219	07/09/2012 &nbsp;ACT	IC engine	17.11	diesel	2722 bhp		Nitrogen Oxides (NO <sub>x</sub> )	Tier 2 certified engine and 50 hr/yr for M&T	4 G/B-HP-H		4.00
DC-0009	03/15/2012 &nbsp;ACT	Diesel Emergency Generator	17.11	Ultra-low Sulfur Diesel	2682 hp		Nitrogen Oxides (NO <sub>x</sub> )		31.87 LB/HR		5.39
FL-0338	05/30/2012 &nbsp;ACT	Main Propulsion Engines - Development Driller 1	17.11	Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )	Use of good combustion practices based on the current manufacturer's specifications for these engines, and additional enhanced work practice standards including an engine performance management system, positive crankcase ventilation, turbocharger with aftercooler, and high pressure fuel injection with aftercooler.	12.1 G/KW-H		9.02
FL-0338	05/30/2012 &nbsp;ACT	Main Propulsion Engines - C.R. Luigs	17.11	Diesel	5875 hp		Nitrogen Oxides (NO <sub>x</sub> )	Use of good combustion practices based on the current manufacturer's specifications for these engines, and additional enhanced work practice standards including an engine performance management system, positive crankcase ventilation, turbocharger with aftercooler, and high pressure fuel injection with aftercooler.	18.1 G/KW-H		13.50
FL-0338	05/30/2012 &nbsp;ACT	Fast Rescue Craft Diesel Engine - C.R. Luigs	17.11	diesel	142 hp		Nitrogen Oxides (NO <sub>x</sub> )	Use of good combustion practices based on the current manufacturer's specifications for these engines and use of low sulfur diesel fuel	0		
FL-0338	05/30/2012 &nbsp;ACT	Emergency Generator Diesel Engine - Development Driller 1	17.11	Diesel	2229 hp		Nitrogen Oxides (NO <sub>x</sub> )	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	1.6 T/12MO ROLLING TOTAL		
FL-0338	05/30/2012 &nbsp;ACT	Emergency Generator Diesel Engine - C.R. Luigs	17.11	diesel	2064 hp		Nitrogen Oxides (NO <sub>x</sub> )	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	1.49 T/12MO ROLLING TOTAL		
FL-0347	09/16/2014 &nbsp;ACT	Main Propulsion Generator Diesel Engines	17.11	Diesel	9910 hp		Nitrogen Oxides (NO <sub>x</sub> )	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	12.7 G/KW-H		9.47

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - NO<sub>x</sub> (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
FL-0347	09/16/2014 &nbsp;ACT	Emergency Diesel Engine	17.11	Diesel	3300 hp		Nitrogen Oxides (NO <sub>x</sub> )	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0		
FL-0348	05/15/2012 &nbsp;ACT	Drill Floor and Crew Quarters Electrical Generators	17.11	Diesel	6789 hp		Nitrogen Oxides (NO <sub>x</sub> )	Use of engine with turbo charger with after cooler, an enhanced work practice power management, NO <sub>x</sub> emissions maintenance system, and good combustion and maintenance practices based on the current manufacturer's specifications for each engine.	26 G/KW-H		19.39
FL-0348	05/15/2012 &nbsp;ACT	Emergency Electrical Generator	17.11	Diesel	1100 hp		Nitrogen Oxides (NO <sub>x</sub> )	Use of good combustion and maintenance practices based on the current manufacturer's specifications for this engine.	0.22 TONS		
FL-0350	12/31/2014 &nbsp;ACT	Main Propulsion Generator Engines	17.11	Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )	Use of good combustion practices based on the most recent manufacturer's specifications issued for these engines at the time that the engines are operating under this permit	0		
IA-0105	10/26/2012 &nbsp;ACT	Emergency Generator	17.11	diesel fuel	142 GAL/H		Nitrogen Oxides (NO <sub>x</sub> )	good combustion practices	6 G/KW-H		4.47
IL-0114	09/05/2014 &nbsp;ACT	Emergency Generator	17.11	distillate fuel oil	3755 HP		Nitrogen Oxides (NO <sub>x</sub> )	Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7.	0.67 G/KW-H		0.50
IN-0158	12/03/2012 &nbsp;ACT	TWO (2) EMERGENCY DIESEL GENERATORS	17.11	DIESEL	1006 HP EACH		Nitrogen Oxides (NO <sub>x</sub> )	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	4.8 G/HP-H		4.80
IN-0158	12/03/2012 &nbsp;ACT	EMERGENCY DIESEL GENERATOR	17.11	DIESEL	2012 HP		Nitrogen Oxides (NO <sub>x</sub> )	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	4.8 G/HP-H		4.80
IN-0166	06/27/2012 &nbsp;ACT	TWO (2) EMERGENCY GENERATORS	17.11	DIESEL	1341 HORSEPOWER, EACH		Nitrogen Oxides (NO <sub>x</sub> )	GOOD COMBUSTION PRACTICES AND LIMITED HOURS OF NON-EMERGENCY OPERATION	0		
IN-0166	06/27/2012 &nbsp;ACT	THREE (3) FIREWATER PUMP ENGINES	17.11	DIESEL	575 HORSEPOWER, EACH		Nitrogen Oxides (NO <sub>x</sub> )	GOOD COMBUSTION PRACTICES AND LIMITED HOURS OF NON-EMERGENCY OPERATION	0		
IN-0173	06/04/2014 &nbsp;ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	NO. 2, DIESEL	3600 BHP		Nitrogen Oxides (NO <sub>x</sub> )	GOOD COMBUSTION PRACTICES	4.46 G/BHP-H		4.46
IN-0179	09/25/2013 &nbsp;ACT	DIESEL-FIRED EMERGENCY GENERATOR	17.11	NO. 2 FUEL OIL	4690 B-HP		Nitrogen Oxides (NO <sub>x</sub> )	GOOD COMBUSTION PRACTICES	4.46 G/B-HP-H		4.46
IN-0180	06/04/2014 &nbsp;ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	NO. 2, DIESEL	3600 BHP		Nitrogen Oxides (NO <sub>x</sub> )	GOOD COMBUSTION PRACTICES	4.46 G/B-HP-H		4.46
IN-0185	04/24/2014 &nbsp;ACT	DIESEL FIRE PUMP	17.11	DIESEL	300 HP		Nitrogen Oxides (NO <sub>x</sub> )		3 G/HP-H		3.00
*KS-0036	03/18/2013 &nbsp;ACT	Caterpillar C18DITA Diesel Engine Generator	17.11	No. 2 Distillate Fuel Oil	900 BHP		Nitrogen Oxides (NO <sub>x</sub> )	utilize efficient combustion/ design technology	14 LB/HR		7.06
LA-0296	05/23/2014 &nbsp;ACT	Emergency Diesel Generators (EQTs 622, 671, 773, 850, 994, 995, 996, 1033, 1077, 1105, & 1202)	17.11	Diesel	2682 HP		Nitrogen Oxides (NO <sub>x</sub> )	Compliance with 40 CFR 60 Subpart IIII; operating the engine in accordance with the engine manufacturer's instructions and/or written procedures (consistent with safe operation) designed to maximize combustion efficiency and minimize fuel usage.	27.37 LB/HR		4.63
LA-0308	09/26/2013 &nbsp;ACT	2000 KW Diesel Fired Emergency Generator Engine	17.11	Diesel	20.4 MMBTU/hr		Nitrous Oxide (N <sub>2</sub> O)	Good combustion practices	0		
LA-0308	09/26/2013 &nbsp;ACT	2000 KW Diesel Fired Emergency Generator Engine	17.11	Diesel	20.4 MMBTU/hr		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion and maintenance practices, and compliance with NSPS 40 CFR 60 Subpart IIII	33.07 LB/H		

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - NO<sub>x</sub> (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
*LA-0315	05/23/2014 &nbsp;ACT	Emergency Diesel Generator 1	17.11	Diesel	5364 HP		Nitrogen Oxides (NO <sub>x</sub> )	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	52.58 LB/H		4.45
*LA-0315	05/23/2014 &nbsp;ACT	Emergency Diesel Generator 2	17.11	Diesel	5364 HP		Nitrogen Oxides (NO <sub>x</sub> )	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	52.58 LB/H		4.45
*LA-0315	05/23/2014 &nbsp;ACT	Fire Pump Diesel Engine 1	17.11	Diesel	751 HP		Nitrogen Oxides (NO <sub>x</sub> )	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	4.6 LB/H		2.78
*LA-0315	05/23/2014 &nbsp;ACT	Fire Pump Diesel Engine 2	17.11	Diesel	751 HP		Nitrogen Oxides (NO <sub>x</sub> )	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	4.6 LB/H		2.78
MA-0039	01/30/2014 &nbsp;ACT	Emergency Engine/Generator	17.11	ULSD	7.4 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )		4.8 GM/BHP-H		4.80
MD-0042	04/08/2014 &nbsp;ACT	EMERGENCY GENERATOR 1	17.11	ULTRA LOW SULFU DIESEL	2250 KW		Nitrogen Oxides (NO <sub>x</sub> )	LIMITED OPERATING HOURS, USE OF ULTRA- LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	4.8 G/HP-H		4.80
MD-0043	07/01/2014 &nbsp;ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	1300 HP		Nitrogen Oxides (NO <sub>x</sub> )	GOOD COMBUSTION PRACTICES, LIMITED HOURS OF OPERATION, AND EXCLUSIVE USE OF ULSD	4.8 G/HP-H		4.80
MD-0044	06/09/2014 &nbsp;ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	1550 HP		Nitrogen Oxides (NO <sub>x</sub> )	GOOD COMBUSTION PRACTICES AND DESIGNED TO ACHIEVE EMISSION LIMIT	4.8 G/HP-H		4.80
MI-0394	02/29/2012 &nbsp;ACT	Four (4) Emergency Generators	17.11	Diesel	2280 KW		Nitrogen Oxides (NO <sub>x</sub> )	No add-on controls, but ignition timing retardation (ITR) is good design. Engines are tuned for low-NO <sub>x</sub> operation versus low CO operation.	6.93 G/KW-H		5.17
MI-0394	02/29/2012 &nbsp;ACT	Nine (9) DRUPS Emergency Generators	17.11	Diesel	3010 KW		Nitrogen Oxides (NO <sub>x</sub> )	No add-on controls, but ignition timing retardation (ITR) is good design. Engines are tuned for low-NO <sub>x</sub> operation versus low CO operation.	5.98 G/KW-H		4.46
MI-0395	07/13/2012 &nbsp;ACT	Nine (9) DRUPS Emergency Generators	17.11	Diesel	3010 KW		Nitrogen Oxides (NO <sub>x</sub> )	No add-on controls, but ignition timing retardation (ITR) is good design. Engines are tuned for low-NO <sub>x</sub> operation versus low CO operation.	5.98 G/KW-H		4.46
MI-0395	07/13/2012 &nbsp;ACT	Four (4) Emergency Generators	17.11	Diesel	2500 KW		Nitrogen Oxides (NO <sub>x</sub> )	No add-on control, but ignition timing retardation (ITR) is good design. Engines are tuned for low-NO <sub>x</sub> operation versus low CO operation.	7.13 G/KW-H		5.32
MI-0406	11/01/2013 &nbsp;ACT	FG-EMGEN7-8; Two (2) 1,000kW diesel-fueled emergency reciprocating internal combustion engines	17.11	Diesel	1000 kW		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices	4.8 G/B-HP-H		4.80
MI-0418	01/14/2015 &nbsp;ACT	FG-BACKUPGENS (Nine (9) DRUPS Emergency Engines)	17.11	Diesel	3490 KW		Nitrogen Oxides (NO <sub>x</sub> )	No add-on controls, but injection timing retardation (ITR) is good design. Engines are tuned for low-NO <sub>x</sub> operation versus low CO operation.	8 G/KW-H		5.97
MI-0418	01/14/2015 &nbsp;ACT	Four (4) emergency engines in FG-BACKUPGENS	17.11	Diesel	2710 KW		Nitrogen Oxides (NO <sub>x</sub> )	No add-on controls, but injection timing retardation (ITR) is good design. Engines are tuned for low-NO <sub>x</sub> operation versus low CO operation.	7.13 G/KW-H		5.32
NJ-0079	07/25/2012 &nbsp;ACT	Emergency Generator	17.11	Ultra Low Sulfur distillate Diesel	100 H/YR		Nitrogen Oxides (NO <sub>x</sub> )	Use of ULSD diesel oil	21.16 LB/H		
NJ-0080	11/01/2012 &nbsp;ACT	Emergency Generator	17.11	ULSD	200 H/YR		Nitrogen Oxides (NO <sub>x</sub> )	use of ultra low sulfur diesel (ULSD) a clean fuel	18.53 LB/H		
OH-0352	06/18/2013 &nbsp;ACT	Emergency generator	17.11	diesel	2250 KW		Nitrogen Oxides (NO <sub>x</sub> )	Purchased certified to the standards in NSPS Subpart IIII	27.8 LB/H		4.18
OH-0355	05/07/2013 &nbsp;ACT	Test Cell 1 for Aircraft Engines and Turbines	17.11	JET FUEL	0		Nitrogen Oxides (NO <sub>x</sub> )		1.7 LB/MMBTU		
OH-0355	05/07/2013 &nbsp;ACT	Test Cell 2 for Aircraft Engines and Turbines	17.11	JET FUEL	0		Nitrogen Oxides (NO <sub>x</sub> )		4.4 LB/MMBTU		
OH-0360	11/05/2013 &nbsp;ACT	Emergency generator (P003)	17.11	diesel	1112 KW		Nitrogen Oxides (NO <sub>x</sub> )	Purchased certified to the standards in NSPS Subpart IIII	13.74 LB/H		4.18

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - NO<sub>x</sub> (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
OH-0363	11/05/2014 &nbsp;ACT	Emergency generator (P002)	17.11	Diesel fuel	1100 KW		Nitrogen Oxides (NO <sub>x</sub> )	Emergency operation only, < 500 hours/year each for maintenance checks and readiness testing designed to meet NSPS Subpart IIII	29.01 LB/H		8.92
OK-0145	06/25/2012 &nbsp;ACT	Emerg Diesel Gen, Fire Pump, Rail Steam Gen, Air Makeup Units	17.11	Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )		0		
OK-0154	07/02/2013 &nbsp;ACT	DIESEL-FIRED EMERGENCY GENERATOR ENGINE	17.11	DIESEL	1341 HP		Nitrogen Oxides (NO <sub>x</sub> )	COMBUSTION CONTROL	0.011 LB/HP-HR		4.99
PA-0278	10/10/2012 &nbsp;ACT	Emergency Generator	17.11	Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )		4.93 G/B-HP-H		4.93
*PA-0282	06/01/2012 &nbsp;ACT	650-KW BACKUP DIESEL GENERATOR	17.11	Diesel / #2 Oil	45.8 GAL/H		Nitrogen Oxides (NO <sub>x</sub> )		6.9 G/HP-H		6.90
PA-0286	01/31/2013 &nbsp;ACT	EMERGENCY GENERATOR-ENGINE	17.13	Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )		4.93 GM/B-HP-H		4.93
PA-0291	04/23/2013 &nbsp;ACT	EMERGENCY GENERATOR	17.11	Ultra Low sulfur Distillate	7.8 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )		9.89 LB/H		
*PA-0292	06/01/2012 &nbsp;ACT	DIESEL GENERATOR (2.25 MW EACH) - 5 UNITS	17.11	#2 Oil	0		Nitrogen Oxides (NO <sub>x</sub> )	SCR	0.67 GRAMS/KW-H		0.50
PR-0009	04/10/2014 &nbsp;ACT	Emergency Diesel Generator	17.11	ULSD Fuel oil # 2	0		Nitrogen Oxides (NO <sub>x</sub> )		2.85 G/B-HP-H		2.85
SC-0113	02/08/2012 &nbsp;ACT	EMERGENCY GENERATORS 1 THRU 8	17.11	DIESEL	757 HP		Nitrogen Oxides (NO <sub>x</sub> )	ENGINES MUST BE CERTIFIED TO COMPLY WITH NSPS, SUBPART IIII.	4 GR/KW-H		2.98
TX-0671	12/01/2014 &nbsp;ACT	Engines	17.11	ultra low sulfur diesel fuel	0		Nitrogen Oxides (NO <sub>x</sub> )	Each emergency generator's emission factor is based on EPA's Tier 2 standards at 40CFR89.112 for NO <sub>x</sub>	5.43 G/KW-H		4.05
WV-0025	11/21/2014 &nbsp;ACT	Emergency Generator	17.11	Diesel	2015.7 HP		Nitrogen Oxides (NO <sub>x</sub> )		0		
WY-0070	08/28/2012 &nbsp;ACT	Diesel Emergency Generator (EP15)	17.11	Ultra Low Sulfur Diesel	839 hp		Nitrogen Oxides (NO <sub>x</sub> )	EPA Tier 2 rated	0		
AK-0072	07/14/2011 &nbsp;ACT	EU 15 Caterpillar C-280-16	17.11	ULSD	4400 KW		Nitrogen Oxides (NO <sub>x</sub> )	Engine has turbo charger and after cooler installed as part of the design	9.8 G/KW-H		7.31
CA-1212	10/18/2011 &nbsp;ACT	EMERGENCY IC ENGINE	17.11	DIESEL	2683 HP		Nitrogen Oxides (NO <sub>x</sub> )		6.4 G/KW-H		4.77
CA-1220	10/03/2011 &nbsp;ACT	ICE:Emergency-Compression Ignition	17.11	diesel	1881 BHP		Nitrogen Oxides (NO <sub>x</sub> )	Tier 2 certified and 50 hr/y M&T limit	3.9 G/B-HP-H		3.90
CA-1221	12/05/2011 &nbsp;ACT	ICE:Emergency-Compression Ignition	17.11	diesel	3634 bhp		Nitrogen Oxides (NO <sub>x</sub> )	Tier 2 certified and 50 hr/yr for M&T limit	3.5 G/B-HP-H		3.50
FL-0327	06/13/2011 &nbsp;ACT	Main Propulsion Engines	17.11	Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )	Use of good combustion and maintenance practices, Power Management System, and NO <sub>x</sub> Concentration Maintenance System as described in the OCS permit application.	12.7 G/KW-H		9.47
FL-0327	06/13/2011 &nbsp;ACT	Emergency Engine	17.11	Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )	Limited use of 24 hours/week and recordkeeping of operation.	9.4 TONS PER PROJECT		
FL-0328	10/27/2011 &nbsp;ACT	Main Propulsion Engines	17.11	Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )	Use of good combustion practices based on the current manufacturer's specifications for these engines, and additional enhanced work practice standards including an engine performance management system and the Diesel Engines with Turbochargers (DEWT) measurement system.	12.7 G/KW-H		9.47
FL-0328	10/27/2011 &nbsp;ACT	Crane Engines (units 1 and 2)	17.11	Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )	Use of certified EPA Tier 1 engines and good combustion practices based on the current manufacturer's specifications for this engine.	9.5 TONS PER YEAR		

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - NO<sub>x</sub> (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
FL-0328	10/27/2011 &nbsp;ACT	Crane Engines (units 3 and 4)	17.11	Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )	Use of good combustion practices, based on the current manufacturer's specifications for this engine	9.7 T/YR		
FL-0328	10/27/2011 &nbsp;ACT	Emergency Engine	17.11	Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )	Use of good combustion practices, based on the current manufacturer's specifications for this engine	0.4 TONS PER YEAR		
FL-0328	10/27/2011 &nbsp;ACT	Emergency Fire Pump Engine	17.11	Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )	Use of good combustion practices, based on the current manufacturer's specifications for this engine	0.02 TONS PER YEAR		
FL-0332	09/23/2011 &nbsp;ACT	600 HP Emergency Equipment	17.11	Ultra-Low Sulfur Oil	0		Nitrogen Oxides (NO <sub>x</sub> )	See Pollutant Notes.	3 G/HP-H		3.00
LA-0251	04/26/2011 &nbsp;ACT	Large Generator Engines (17 units)	17.11	Diesel	0		Nitrogen Oxides (NO <sub>x</sub> )		6.32 LB/H		4.77
LA-0254	08/16/2011 &nbsp;ACT	EMERGENCY DIESEL GENERATOR	17.11	DIESEL	1250 HP		Nitrous Oxide (N <sub>2</sub> O)	PROPER OPERATION AND GOOD COMBUSTION PRACTICES	0.0014 LB/MMBTU		
MI-0402	11/17/2011 &nbsp;ACT	Diesel fuel-fired combustion engine (RICE)	17.11	Diesel	732 HP		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices	4.85 G/HP-H		4.85
*SD-0005	06/29/2010 &nbsp;ACT	Emergency Generator	17.11	Distillate Oil	2000 Kilowatts		Nitrogen Oxides (NO <sub>x</sub> )				
*SD-0005	06/29/2010 &nbsp;ACT	Fire Water Pump	17.11	Distillate Oil	577 horsepower		Nitrogen Oxides (NO <sub>x</sub> )				



**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - PM (Gas-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
AR-0163	06/09/2019 &nbsp;   ACT	Lime Injector Burners	17.13	Natural Gas	0		Particulate matter, filterable (FPM)	Combustion of Natural gas and Good Combustion Practices	0.0075 LB/MMBTU		0.02
*FL-0368	02/14/2019 &nbsp;   ACT	Emergency Engines	17.13	Natural gas	0		Particulate matter, filterable (FPM)	Good combustion practices	0.048 G/HP-HR		0.05
KY-0110	07/23/2020 &nbsp;   ACT	EP 10-05 - Austenitizing Furnace Rolls Emergency Generator	17.13	Natural Gas	636 HP		Particulate matter, filterable (FPM)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0		
*MI-0440	05/22/2019 &nbsp;   ACT	FGENGINES	17.13	natural gas	16500 HP		Particulate matter, filterable (FPM)	Natural gas and good combustion practices.	2 LB/H		0.05
AK-0084	06/30/2017 &nbsp;   ACT	Twelve (12) Large ULSD/Natural Gas-Fired Internal Combustion Engines	17.11	Diesel and Natural Gas	143.5 MMBtu/hr		Particulate matter, total (TPM)	Clean Fuel and Good Combustion Practices	0.29 G/KW-HR (ULSD)		0.10
*LA-0346	01/04/2018 &nbsp;   ACT	emergency generators (4 units)	17.11	natural gas	13410 hp (each)		Particulate matter, total &lt; 10 Åµ (TPM10)		0		
*MI-0441	12/21/2018 &nbsp;   ACT	EUEMGNG1--A 1500 HP natural gas fueled emergency engine	17.13	Natural gas	1500 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Burn pipeline quality natural gas	0.13 LB/H		0.04
*MI-0441	12/21/2018 &nbsp;   ACT	EUEMGNG2	17.13	NATURAL GAS	6000 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Burn pipeline quality natural gas.	0.5 LB/H		0.04
IN-0246	10/22/2015 &nbsp;   ACT	LANDFILL GAS-FIRED ENGINE GENERATOR SETS	17.14	LANDFILL GAS	2233 BHP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	GOOD COMBUSTION PRACTICES	23.3 LB/MMCF, CH4 DRY		
*KS-0030	03/31/2016 &nbsp;   ACT	Spark ignition RICE emergency AC generators	17.13	Natural gas	450 kW		Particulate matter, total (TPM)		0.0001 G/HP-HR		0.00
*KS-0030	03/31/2016 &nbsp;   ACT	Spark ignition RICE electricity generating units (EGUs)	17.13	Natural Gas	10 MW		Particulate matter, total &lt; 10 Åµ (TPM10)		1.31 LB/H		0.04
LA-0292	01/22/2016 &nbsp;   ACT	Waukesha 16V-275GL Compressor Engines Nos. 1-12	17.13	Natural Gas	5000 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Use of natural gas as fuel, good equipment design, and proper combustion techniques	0.003 LB/HR		0.00
ME-0041	03/30/2016 &nbsp;   ACT	Engine #1	17.14	landfill gas	16.5 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Coalescing Filters	1.2 LB/H		0.23
ME-0041	03/30/2016 &nbsp;   ACT	Engine #2	17.14	landfill gas	16.5 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Coalescing Filters	1.2 LB/H		0.23
ME-0041	03/30/2016 &nbsp;   ACT	Engine #3	17.14	landfill gas	16.5 MMBTU/H		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Coalescing Filters	1.2 LB/H		0.23
MI-0420	06/03/2016 &nbsp;   ACT	EUN_EM_GEN	17.13	Natural gas	225 H/YR		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices and low sulfur fuel (pipeline quality natural gas).	0.01 LB/MMBTU		0.03
MI-0424	12/05/2016 &nbsp;   ACT	EUNENGINE (Emergency engine--natural gas)	17.13	Natural gas	500 H/YR		Particulate matter, filterable (FPM)	Good combustion practices.	0.0001 LB/MMBTU		0.00
MI-0426	03/24/2017 &nbsp;   ACT	EUN_EM_GEN (Natural gas emergency engine).	17.13	Natural gas	205 H/YR		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices and low sulfur fuel (pipeline quality natural gas).	0.01 LB/MMBTU		0.03
AL-0301	07/22/2014 &nbsp;   ACT	PROPANE FIRED EMERGENCY GENERATOR	17.13	PROPANE	400 KW		Particulate matter, filterable (FPM)		0.7 LB/1000 GAL		
FL-0345	12/18/2013 &nbsp;   ACT	Four landfill gas-to-energy engines	17.14	Landfill gas	554 scfm		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Required treatment of LFG before burning. Maintain the air-to-fuel ratio to ensure efficient combustion.	0		0.24
IL-0113	12/23/2013 &nbsp;   ACT	Engines	17.14	Treated landfill gas	2.6 MW		Particulate matter, total (TPM)		0.1 G/HP-H		0.10
IN-0167	04/16/2013 &nbsp;   ACT	EMERGENCY GENERATOR	17.13	NATURAL GAS	620 HP		Particulate matter, filterable (FPM)	RESTRICTED TO USE OF NATURAL GAS AND GOOD COMBUSTION PRACTICES	500 H/YR		0.20

### BACT Determinations for Large Internal Combustion Engines (> 500 HP) - PM (Gas-Fired)

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
IN-0185	04/24/2014 &nbsp;   ACT	EMERGENCY GENERATORS	17.13	NATURAL GAS	620 HP		Particulate matter, filterable (FPM)		0.2 G/KW-H		0.15
KS-0035	01/24/2014 &nbsp;   ACT	spark ignition four stroke lean burn reciprocating internal combustion engine (RICE) electric generating units (EGUs)	17.13	Natural gas	12526 BHP		Particulate matter, total (TPM)	selective catalytic reduction (SCR) system and an oxidation catalyst	1.44 LBS PER HOUR		0.05
LA-0256	12/06/2011 &nbsp;   ACT	EMERGENCY GENERATOR	17.13	NATURAL GAS	1818 HP		Total Suspended Particulates	USE OF NATURAL GAS AS FUEL AND GOOD COMBUSTION PRACTICES	0.01 LB/H		0.00
LA-0257	12/06/2011 &nbsp;   ACT	Generator Engines (2)	17.13	Natural Gas	2012 hp		Particulate matter, total (TPM)	fueled by natural gas	0.75 LB/H		0.17
LA-0287	07/21/2014 &nbsp;   ACT	Emergency Generator Reciprocating Engine (G30, EQT 15)	17.13	Natural Gas	1175 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices; use of natural gas as fuel; limit non-emergency use to <= 100 hours per year; adherence to the permittee's operating and maintenance practices	0.004 LB/HR		0.00
MI-0396	05/08/2012 &nbsp;   ACT	(1) Caterpillar 3516 Generator Engine (&quot;Engine 7&quot;)	17.14	Landfill gas	800 KW		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Proper operation and maintenance	0.2 G/B-HP-H		0.20
MI-0396	05/08/2012 &nbsp;   ACT	(1) Caterpillar 3512 Generator Engine (&quot;Engine 8&quot;)	17.14	Landfill gas	615 KW		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Proper operation and maintenance	0.2 G/B-HP-H		0.20
MI-0396	05/08/2012 &nbsp;   ACT	(2) Landfill Gas Generator Engine (&quot;Engines 9&amp;10&quot;)	17.14	Landfill gas	1600 KW		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Proper operation and maintenance	0.2 G/B-HP-H		0.20
MI-0401	12/21/2011 &nbsp;   ACT	Emergency generator	17.13	Natural gas	1200 kW output		Particulate matter, total &lt; 10 Åµ (TPM10)		9.99 E-3 LB/MMBTU		
MI-0412	12/04/2013 &nbsp;   ACT	Emergency Engine--natural gas (EUNGENGINE)	17.13	natural gas	1000 kW		Particulate matter, filterable (FPM)	Good combustion practices	0.0001 LB/MMBTU		0.00
OK-0148	09/12/2012 &nbsp;   ACT	Large Internal Combustion Engines (&gt;500 hp)	17.13	Natural Gas	1775 Horsepower		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)		0.01 LB/MMBTU		0.03
OK-0153	03/01/2013 &nbsp;   ACT	COMPRESSOR ENGINE 1,775-HP CAT G3606LE	17.13	NATURAL GAS	1775 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	NATURAL GAS COMBUSTION PRACTICES.	0.01 LB/MMBTU		0.03
*OR-0052	06/21/2013 &nbsp;   ACT	Caterpillar 3520C internal combustion engines which drive electric generators	17.14	landfill gas	2328 MMdscf/year		Particulate matter, total (TPM)		0.492 LB/HOUR		0.10
*OR-0052	06/21/2013 &nbsp;   ACT	Caterpillar 3516 internal combustion engines which drive electric generators	17.14	landfill gas	1400 MMdscf/year		Particulate matter, total (TPM)		0.1 G/HP-HR		0.10
TX-0692	12/20/2013 &nbsp;   ACT	(12) reciprocating internal combustion engines	17.13	natural gas	18 MW		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)		0		
CA-1192	06/21/2011 &nbsp;   ACT	EMERGENCY IC ENGINE	17.13	NATURAL GAS	550 KW		Particulate matter, total (TPM)	USE PUC QUALITY PIPELINE NATURAL GAS	0.34 G/HP-H		0.34
FL-0326	08/25/2011 &nbsp;   ACT	Landfill Gas-to-Energy	17.14	Landfill gas	4000 scfm		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Pretreatment of landfill gas and good combustion practices	10 % OPACITY		0.24
MI-0397	06/29/2011 &nbsp;   ACT	Landfill gas fired generator engines-2	17.14	Landfill gas	260880 MMBTU/yr		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices of gas treated according to NSPS WWW.	0.23 G/B-HP-H		0.23
MI-0398	06/17/2011 &nbsp;   ACT	Landfill gas fired generator engine	17.14	Landfill gas	264.38 MMSCF/YR		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Good combustion practices of gas treated according to NSPS WWW.	0.15 G/B-HP-H		0.15
OH-0347	07/05/2011 &nbsp;   ACT	2 caterpillar engines 2233 HP	17.14	Landfill gas	2233 HP		Particulate matter, filterable &lt; 10 Åµ (FPM10)		0.98 LB/H		0.20

BACT Determinations for Large Internal Combustion Engines (> 500 HP) - PM (Gas-Fired)

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
OH-0348	09/14/2011 &nbsp;ACT	Reciprocating Internal Combustion Engines (10)	17.14	Landfill Gas	2233	HP	Particulate matter, filterable &lt; 10 Åµ (FPM10)		0.49	LB/H	0.10
*PA-0279	12/13/2010 &nbsp;ACT	RIC ENGINES (2)	17.14	Treated Landfil Gas	66876	CF/H	Particulate matter, filterable &lt; 10 Åµ (FPM10)		0.17	G/B-HP-H	0.17

### BACT Determinations for Large Internal Combustion Engines (> 500 HP) - PM (Oil-Fired)

BACT Determinations for Large Internal Combustion Engines (> 500 HP) - PM (Oil-Fired)											Std Units Limit g/hp-hr
RBLCHD	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	
*AK-0085	08/13/2020 &nbsp;  ACT	One (1) Black Start Generator Engine	17.11	ULSD	186.6 gph		Particulate matter, total (IPM)	Good combustion practices, ULSD, and limit operation to 500 hours per year.	0.045 G/HP-HR		0.05
AR-0161	09/23/2019 &nbsp;  ACT	Emergency Engines	17.11	Diesel	0		Particulate matter, filterable (FPM)	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	0.02 G/KW-H		0.01
AR-0163	06/09/2019 &nbsp;  ACT	Emergency Engines	17.11	Diesel	0		Particulate matter, filterable (FPM)	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	0.2 G/KW-HR		0.15
*IA-0117	03/17/2021 &nbsp;  ACT	Emergency Fire Pump Engine	17.11	diesel	510 bhp		Particulate matter, total (IPM)		0.17 LB/HR		0.15
IL-0130	12/31/2018 &nbsp;  ACT	Emergency Engine	17.11	Ultra-Low Sulfur Diesel	1500 kW		Particulate matter, total (IPM)		0.2 G/KW-HR		0.15
IN-0317	06/11/2019 &nbsp;  ACT	Emergency generator EU-6006	17.11	Diesel	2800 HP		Particulate matter, total (IPM)	Tier II diesel engine	0.2 G/KWH		0.15
IN-0317	06/11/2019 &nbsp;  ACT	Emergency fire pump EU-6008	17.11	Diesel	750 HP		Particulate matter, total (IPM)	Engine that complies with Table 4 to Subpart IIII of Part 60	0.2 G/KWH		0.15
KY-0110	07/23/2020 &nbsp;  ACT	EP 10-02 - North Water System Emergency Generator	17.11	Diesel	2922 HP		Particulate matter, filterable (FPM)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		0.15
KY-0110	07/23/2020 &nbsp;  ACT	EP 10-03 - South Water System Emergency Generator	17.11	Diesel	2922 HP		Particulate matter, filterable (FPM)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		0.15
KY-0110	07/23/2020 &nbsp;  ACT	EP 10-04 - Emergency Fire Water Pump	17.11	Diesel	920 HP		Particulate matter, filterable (FPM)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		0.15
KY-0110	07/23/2020 &nbsp;  ACT	EP 10-07 - Air Separation Plant Emergency Generator	17.11	Diesel	700 HP		Particulate matter, filterable (FPM)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		0.15
KY-0110	07/23/2020 &nbsp;  ACT	EP 10-01 - Caster Emergency Generator	17.11	Diesel	2922 HP		Particulate matter, filterable (FPM)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		0.15
KY-0115	04/19/2021 &nbsp;  ACT	New Pumphouse (XB13) Emergency Generator #1 (EP 08-05)	17.11	Diesel	2922 HP		Particulate matter, filterable (FPM)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		0.15
KY-0115	04/19/2021 &nbsp;  ACT	Tunnel Furnace Emergency Generator (EP 08-06)	17.11	Diesel	2937 HP		Particulate matter, filterable (FPM)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0.15 G/HP-HR		0.15
KY-0115	04/19/2021 &nbsp;  ACT	Caster B Emergency Generator (EP 08-07)	17.11	Diesel	2937 HP		Particulate matter, filterable (FPM)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0.15 G/HP-HR		0.15
KY-0115	04/19/2021 &nbsp;  ACT	Air Separation Unit Emergency Generator (EP 08-08)	17.11	Diesel	700 HP		Particulate matter, filterable (FPM)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0.15 G/HP-HR		0.15
*LA-0364	01/06/2020 &nbsp;  ACT	Emergency Generator Diesel Engines	17.11	Diesel Fuel	550 hp		Particulate matter, total &lt; 10 Åµ (TPM10)	Compliance with the limitations imposed by 40 CFR 63 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures designed to maximize combustion efficiency and minimize fuel usage.	0		
*MI-0442	08/21/2019 &nbsp;  ACT	FGEMENGINE	17.11	Diesel	1100 KW		Particulate matter, total (IPM)	Good combustion practices and ultra low sulfur diesel	0.04 G/HP-H		0.04
*MI-0445	11/26/2019 &nbsp;  ACT	EUENGINE (diesel fuel emergency engine)	17.11	diesel fuel	22.68 MMBTU/H		Particulate matter, filterable (FPM)	Good Combustion Practices and meeting NSPS Subpart IIII requirements	0.2 G/KW-H		0.15
OH-0379	02/06/2019 &nbsp;  ACT	Emergency Generators (P005 and P006)	17.11	Diesel fuel	3131 HP		Particulate matter, filterable &lt; 10 Åµ (FPM10)	Tier IV engine Good combustion practices	0.15 LB/H		0.02
TX-0876	02/06/2020 &nbsp;  ACT	Emergency generator	17.11	DIESEL	0		Particulate matter, filterable &lt; 10 Åµ (FPM10)	Tier 4 exhaust emission standards specified in 40 CFR Å§ 1039.101, limited to 100 hours per year of non-emergency operation	0		
TX-0882	01/17/2020 &nbsp;  ACT	EMERGENCY ENGINES	17.12	DIESEL	0		Particulate matter, total (IPM)	GOOD COMBUSTION PRACTICES, CLEAN FUEL, 100 HR/YR, ULTRA LOW SULFUR FUEL	0.0001 LB/MMBTU		
TX-0888	04/23/2020 &nbsp;  ACT	EMERGENCY GENERATORS & FIRE WATER PUMP ENGINES	17.11	Ultra-low Sulfur Diesel	0		Particulate matter, filterable (FPM)	well-designed and properly maintained engines and each limited to 100 hours per year of non-emergency use.	0		

### Std Units

hp-hr

### BACT Determinations for Large Internal Combustion Engines (> 500 HP) - PM (Oil-Fired)

RBLCHD	PERMIT	ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
*MI-0441	12/21/2018 &nbsp;	ACT	EUEM/GD2--A 6000 HP diesel fuel fired emergency engine	17.11	Diesel	6000 HP		Particulate matter, total &lt; 10 Åµ (IPM10)	Good combustion practices, burn ultra low sulfur diesel fuel, and be NSPS compliant.	2.7 LB/H		0.20
OH-0370	09/07/2017 &nbsp;	ACT	Emergency generator (P003)	17.11	Diesel fuel	1529 HP		Particulate matter, total &lt; 10 Åµ (IPM10)	Ultra low sulfur diesel fuel	0.5 LB/H		0.15
OH-0372	09/27/2017 &nbsp;	ACT	Emergency generator (P003)	17.11	Diesel fuel	1529 HP		Particulate matter, total &lt; 10 Åµ (IPM10)	Ultra low sulfur diesel fuel	0.5 LB/H		0.15
OH-0374	10/23/2017 &nbsp;	ACT	Emergency Generators (2 identical, P004 and P005)	17.11	Diesel fuel	2206 HP		Particulate matter, total (IPM)	Certified to the meet the emissions standards in 40 CFR 89.112 and 89.113 pursuant to 40 CFR 60.4205(b) and 60.4202(a)(2). Good combustion practices per the manufacturerâ€™s operating manual.	0.73 LB/H		0.15
OH-0375	11/07/2017 &nbsp;	ACT	Emergency Diesel Generator Engine (P001)	17.11	Diesel fuel	2206 HP		Particulate matter, total (IPM)	Good combustion design	0.73 LB/H		0.15
OH-0375	11/07/2017 &nbsp;	ACT	Emergency Diesel Fire Pump Engine (P002)	17.11	Diesel fuel	700 HP		Particulate matter, total (IPM)	Good combustion design	0.23 LB/H		0.15
OH-0376	02/09/2018 &nbsp;	ACT	Emergency diesel-fired generator (P007)	17.11	Diesel fuel	2682 HP		Particulate matter, total &lt; 10 Åµ (IPM10)	Comply with NSPS 40 CFR 60 Subpart IIII	1.01 LB/H		0.17
OH-0377	04/19/2018 &nbsp;	ACT	Emergency Diesel Generator (P003)	17.11	Diesel fuel	1860 HP		Particulate matter, total (IPM)	Good combustion practices (ULSD) and compliance with 40 CFR Part 60, Subpart IIII	0.62 LB/H		0.15
OH-0378	12/21/2018 &nbsp;	ACT	Emergency Diesel-fired Generator Engine (P007)	17.11	Diesel fuel	3353 HP		Particulate matter, total (IPM)	certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII, shall employ good combustion practices per the manufacturerâ€™s operating manual	1.1 LB/H		0.15
OH-0378	12/21/2018 &nbsp;	ACT	1,000 kW Emergency Generators (P008 - P010)	17.11	Diesel fuel	1341 HP		Particulate matter, total (IPM)	certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII, shall employ good combustion practices per the manufacturerâ€™s operating manual	0.44 LB/H		0.15
*PA-0313	07/27/2017 &nbsp;	ACT	Emergency Generator	17.11	Diesel	2500 bhp		Particulate matter, total (IPM)		0.2 G		0.20
VA-0328	04/26/2018 &nbsp;	ACT	Emergency Diesel GEN	17.11	Ultra Low Sulfur Diesel	500 H/YR		Particulate matter, filterable (FPM)	good combustion practices and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	0.15 G/HP H		0.15
*WI-0284	04/24/2018 &nbsp;	ACT	Diesel-Fired Emergency Generators	17.11	Diesel Fuel	0		Particulate matter, total (IPM)	The Use of Ultra-Low Sulfur Fuel and Good Combustion Practices	0.17 G/KWH		0.13
*WI-0286	04/24/2018 &nbsp;	ACT	P42 -Diesel Fired Emergency Generator	17.11	Diesel Fuel	0		Particulate matter, total (IPM)	Good Combustion Practices and The Use of Ultra-low Sulfur Fuel	0.17 G/KWH		0.13
WV-0027	09/15/2017 &nbsp;	ACT	Emergency Generator - ESDG14	17.11	ULSD	900 bhp		Particulate matter, total &lt; 10 Åµ (IPM10)	ULSD	0.2 G/HP-HR		0.20
FL-0356	03/09/2016 &nbsp;	ACT	Three 3300-kW ULSD emergency generators	17.11	ULSD	0		Particulate matter, total (IPM)	Use of clean fuel	0.2 G / KW-HR		0.15
IN-0263	03/23/2017 &nbsp;	ACT	EMERGENCY GENERATORS (EU014A AND EU-014B)	17.11	DISTILLATE OIL	3600 HP EACH		Particulate matter, total (IPM)	GOOD COMBUSTION PRACTICES	0.15 G/HP-H EACH		0.15

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
KY-0109	10/24/2016 &nbsp;ACT	Emergency Generators #1, #2, & #3 (EU72, EU73, & EU74)	17.11	Diesel	53.6 gal/hr		Particulate matter, filterable (FPM)	The permittee shall prepare and maintain for EU72, EU73, and EU74, within 90 days of startup, a good combustion and operation practices plan (GCOP) that defines, measures and verifies the use of operational and design practices determined as BACT for minimizing CO, VOC, PM, PM10, and PM2.5 emissions. Any revisions requested by the Division shall be made and the plan shall be maintained on site. The permittee shall operate according to the provisions of this plan at all times, including periods of startup, shutdown, and malfunction. The plan shall be incorporated into the plant standard operating procedures (SOP) and shall be made available for the Division's inspection. The plan shall include, but not be limited to: i. A list of combustion optimization practices and a means of verifying the practices have occurred. ii. A list of combustion and operation practices to be used to lower energy consumption and a means of verifying the practices have occurred. iii. A list of the design choices determined to be BACT and verification that designs were implemented in the final construction.	0.149 G/HP-HR (EU72 & EU73)		0.15
LA-0292	01/22/2016 &nbsp;ACT	Emergency Generators No. 1 & No. 2	17.11	Diesel	1341 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Use of a certified engine, low sulfur diesel, and limiting non-emergency use to no more than 100 hours per year	0.44 LB/HR		0.15
LA-0305	06/30/2016 &nbsp;ACT	Diesel Engines (Emergency)	17.11	Diesel	4023 hp		Particulate matter, total &lt; 10 Åµ (TPM10)	Complying with 40 CFR 60 Subpart IIII	0		
LA-0307	03/21/2016 &nbsp;ACT	Diesel Engines	17.11	Diesel	0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	good combustion practices, Use ultra low sulfur diesel, and comply with 40 CFR 60 Subpart IIII	0		
LA-0309	06/04/2015 &nbsp;ACT	Emergency Generator Engines	17.11	Diesel	2922 hp (each)		Particulate matter, total &lt; 10 Åµ (TPM10)	Complying with 40 CFR 60 Subpart IIII	0.2 G/KW-HR		0.15
LA-0313	08/31/2016 &nbsp;ACT	SCPS Emergency Diesel Generator 1	17.11	Diesel	2584 HP		Particulate matter, filterable &lt; 10 Åµ (FPM10)	Compliance with NESHAP 40 CFR 63 Subpart ZZZZ and NSPS 40 CFR 60 Subpart IIII, and good combustion practices (use of ultra-low sulfur diesel fuel).	0.86 LB/H		0.15
LA-0316	02/17/2017 &nbsp;ACT	emergency generator engines (6 units)	17.11	diesel	3353 hp		Particulate matter, total &lt; 10 Åµ (TPM10)	Complying with 40 CFR 60 Subpart IIII	0		
LA-0317	12/22/2016 &nbsp;ACT	Emergency Generator Engines (4 units)	17.11	Diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)	complying with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	0		
LA-0317	12/22/2016 &nbsp;ACT	Firewater pump Engines (4 units)	17.11	diesel	896 hp (each)		Particulate matter, total &lt; 10 Åµ (TPM10)	complying with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	0		
LA-0323	01/09/2017 &nbsp;ACT	Fire Water Diesel Pump No. 3 Engine	17.11	Diesel Fuel	600 hp		Particulate matter, total &lt; 10 Åµ (TPM10)	Proper operation and limits on hours operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0		
LA-0323	01/09/2017 &nbsp;ACT	Fire Water Diesel Pump No. 4 Engine	17.11	Diesel Fuel	600 hp		Particulate matter, total &lt; 10 Åµ (TPM10)	Proper operation and limits on hours of operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0		
MI-0421	08/26/2016 &nbsp;ACT	Emergency Diesel Generator Engine (EUEMRGRICE in FGRICE)	17.11	Diesel	500 H/YR		Particulate matter, filterable (FPM)	Certified engines, good design, operation and combustion practices. Operational restrictions/limited use.	1.41 LB/H		0.15

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
MI-0421	08/26/2016 &nbsp;   ACT	Dieself fire pump engine (EUFIREPUMP in FGRICE)	17.11	Diesel	500 H/YR		Particulate matter, filterable (FPM)	Certified engines, good design, operation and combustion practices. Operational restrictions/limited use.	0.18 LB/H		0.15
MI-0423	01/04/2017 &nbsp;   ACT	EUEMENGINE (Diesel fuel emergency engine)	17.11	Diesel Fuel	22.68 MMBTU/H		Particulate matter, filterable (FPM)	Good combustion practices and meeting NSPS Subpart IIII requirements.	0.2 G/KW-H		0.15
NJ-0084	03/10/2016 &nbsp;   ACT	Diesel Fired Emergency Generator	17.11	ULSD	44 H/YR		Particulate matter, filterable (FPM)	use of ULSD a clean burning fuel, and limited hours of operation	0.26 LB/H		
NY-0103	02/03/2016 &nbsp;   ACT	Black start generator	17.11	ultra low sulfur diesel	3000 KW		Particulate matter, filterable (FPM)	Compliance demonstrated with vendor emission certification and adherence to vendor- specified maintenance recommendations.	0.15 G/BHP-H		0.15
OH-0366	08/25/2015 &nbsp;   ACT	Emergency generator (P003)	17.11	Diesel fuel	2346 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	State-of-the-art combustion design	0.77 LB/H		0.15
OH-0367	09/23/2016 &nbsp;   ACT	Emergency generator (P003)	17.11	Diesel fuel	2947 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	State-of-the-art combustion design	0.97 LB/H		0.15
OH-0368	04/19/2017 &nbsp;   ACT	Emergency Generator (P009)	17.11	Diesel fuel	5000 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	good combustion control and operating practices and engines designed to meet the stands of 40 CFR Part 60, Subpart IIII	0.2 LB/H		0.02
PA-0309	12/23/2015 &nbsp;   ACT	2000 kW Emergency Generator	17.11	Ultra-low sulfur Diesel	0		Particulate matter, filterable (FPM)		0.025 GM/HP-HR		0.03
PA-0310	09/02/2016 &nbsp;   ACT	Emergency Generator Engines	17.11	ULSD	0		Particulate matter, total (TPM)		0.15 G/BHP-HR		0.15
PA-0311	09/01/2015 &nbsp;   ACT	Fire Pump Engine	17.11	diesel	0		Particulate matter, total (TPM)		0.2 G/HP-HR		0.20
*SC-0193	04/15/2016 &nbsp;   ACT	Emergency Generators and Fire Pump	17.11	No. 2 Fuel Oil	1500 hp		Particulate matter, total (TPM)	Meet emission standards of 40 CFR 60, Subpart IIII	100 HRS/YR		
TX-0728	04/01/2015 &nbsp;   ACT	Emergency Diesel Generator	17.11	Diesel	1500 hp		Particulate matter, filterable (FPM)	Minimized hours of operations Tier II engine	0.15 LB/H		0.05
VA-0325	06/17/2016 &nbsp;   ACT	DIESEL-FIRED EMERGENCY GENERATOR 3000 kW (1)	17.11	DIESEL FUEL	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Ultra Low Sulfur Diesel/Fuel (15 ppm max)	0.4 G/KW		0.30
AK-0076	08/20/2012 &nbsp;   ACT	Combustion of Diesel by ICEs	17.11	ULSD	1750 kW		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)		0.2 G/KW-H		0.15
AK-0080	06/06/2013 &nbsp;   ACT	Combustion	17.13	Ultra Low Sulfur Diesel	2000 ekW		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Good Combustion and Operating Practices	0.2 G/KW-H		0.15
AK-0081	06/12/2013 &nbsp;   ACT	Combustion	17.11	ULSD	610 hp		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Good operation and combustion practices	0.15 G/KW-H		0.11
AK-0082	01/23/2015 &nbsp;   ACT	Emergency Camp Generators	17.11	Ultra Low Sulfur Diesel	2695 hp		Particulate matter, filterable &lt; 10 Åµ (FPM10)		0.15 GRAMS/HP-H		0.15
AK-0082	01/23/2015 &nbsp;   ACT	Fine Water Pumps	17.11	Ultra Low Sulfur Diesel	610 hp		Particulate matter, filterable &lt; 10 Åµ (FPM10)		0.15 GRAMS/HP-H		0.15
AK-0082	01/23/2015 &nbsp;   ACT	Bulk Tank Generator Engines	17.11	Ultra Low Sulfur Diesel	891 hp		Particulate matter, filterable &lt; 10 Åµ (FPM10)		0.15 GRAMS/HP-H		0.15
AL-0301	07/22/2014 &nbsp;   ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	DIESEL	800 HP		Particulate matter, filterable (FPM)		0.0007 LB/HP-H		0.32
AR-0140	09/18/2013 &nbsp;   ACT	EMERGENCY GENERATORS	17.11	DIESEL	1500 KW		Particulate matter, filterable (FPM)	GOOD OPERATING PRACTICES, LIMITED HOURS OF OPERATION, COMPLIANCE WITH NSPS SUBPART IIII	0.02 G/KW-H		0.01



**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
FL-0338	05/30/2012 &nbsp;ACT	Main Propulsion Engines - Development Driller 1	17.11	Diesel	0		Particulate matter, filterable (FPM)	Use of good combustion practices based on the current manufacturer's specifications for these engines, and additional enhanced work practice standards including an engine performance management system, positive crankcase ventilation, turbocharger with aftercooler, and high pressure fuel injection with aftercooler.	0.43 G/KW-H		0.32
FL-0338	05/30/2012 &nbsp;ACT	Main Propulsion Engines - C.R. Luigs	17.11	Diesel	5875 hp		Particulate matter, filterable (FPM)	Use of good combustion practices based on the current manufacturer's specifications for these engines, and additional enhanced work practice standards including an engine performance management system and the Diesel Engines with Turbochargers measurement system, positive crankcase ventilation, turbocharger and aftercooler, and high pressure fuel injection with aftercooler.	0.43 G/KW-H		0.32
FL-0338	05/30/2012 &nbsp;ACT	Fast Rescue Craft Diesel Engine - C.R. Luigs	17.11	diesel	142 hp		Particulate matter, total (TPM)	Use of good combustion practices based on the current manufacturer's specifications for these engines and use of low sulfur diesel fuel	0		
FL-0338	05/30/2012 &nbsp;ACT	Emergency Generator Diesel Engine - Development Driller 1	17.11	Diesel	2229 hp		Particulate matter, total (TPM)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	0.03 T/12MO ROLLING TOTAL		
FL-0338	05/30/2012 &nbsp;ACT	Emergency Generator Diesel Engine - C.R. Luigs	17.11	diesel	2064 hp		Particulate matter, total (TPM)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	0.04 T/12MO ROLLING TOTAL		
FL-0346	04/22/2014 &nbsp;ACT	Four 3100 kW black start emergency generators	17.11	ULSD	2.32 MMBtu/hr (HHV) per engine		Particulate matter, total (TPM)	Good combustion practice	0.2 GRAMS PER KW-HR		0.15
FL-0347	09/16/2014 &nbsp;ACT	Main Propulsion Generator Diesel Engines	17.11	Diesel	9910 hp		Particulate matter, total &lt; 10 Åµ (TPM10)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0.24 G/KW-H		0.18
FL-0347	09/16/2014 &nbsp;ACT	Emergency Diesel Engine	17.11	Diesel	3300 hp		Particulate matter, total (TPM)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0		
FL-0348	05/15/2012 &nbsp;ACT	Source Wide Emission Limit	17.11	Diesel	0		Particulate matter, total (TPM)	PSD Avoidance Limit	9.9 TONS PER YEAR		
IA-0105	10/26/2012 &nbsp;ACT	Emergency Generator	17.11	diesel fuel	142 GAL/H		Particulate matter, total (TPM)	good combustion practices	0.2 G/KW-H		0.15
IA-0106	07/12/2013 &nbsp;ACT	Emergency Generators	17.11	diesel fuel	180 GAL/H		Particulate matter, total (TPM)	good combustion practices	0.2 G/KW-H		0.15
IL-0114	09/05/2014 &nbsp;ACT	Emergency Generator	17.11	distillate fuel oil	3755 HP		Particulate matter, filterable (FPM)	Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7.	0.1 G/KW-H		0.07
IN-0158	12/03/2012 &nbsp;ACT	TWO (2) EMERGENCY DIESEL GENERATORS	17.11	DIESEL	1006 HP EACH		Particulate matter, filterable (FPM)	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	0.15 G/HP-H		0.15
IN-0158	12/03/2012 &nbsp;ACT	EMERGENCY DIESEL GENERATOR	17.11	DIESEL	2012 HP		Particulate matter, filterable (FPM)	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	0.15 G/HP-H		0.15
IN-0166	06/27/2012 &nbsp;ACT	TWO (2) EMERGENCY GENERATORS	17.11	DIESEL	1341 HORSEPOWER, EACH		Particulate matter, total &lt; 10 Åµ (TPM10)	USE OF LOW-S DIESEL AND LIMITED HOURS OF NON-EMERGENCY OPERATION	15 PPM SULFUR		
IN-0166	06/27/2012 &nbsp;ACT	THREE (3) FIREWATER PUMP ENGINES	17.11	DIESEL	575 HORSEPOWER, EACH		Particulate matter, filterable (FPM)	USE OF LOW-S DIESEL AND LIMITED HOURS OF NON-EMERGENCY OPERATION	15 PPM SULFUR		
IN-0173	06/04/2014 &nbsp;ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	NO. 2, DIESEL	3600 BHP		Particulate matter, filterable (FPM)	GOOD COMBUSTION PRACTICES	0.15 G/BHP-H		0.15

### BACT Determinations for Large Internal Combustion Engines (> 500 HP) - PM (Oil-Fired)

BACT Determinations for Large Internal Combustion Engines (> 500 HP) - PM (Oil-Fired)											Std Units Limit g/hp-hr	
RBLCHD	PERMIT	ISSUANCE DATE	PROCESS NAME	PROCESS TYPE	PRIMARY FUEL	THROUGHPUT	THROUGHPUT UNIT	POLLUTANT	CONTROL METHOD DESCRIPTION	EMISSION LIMIT 1	EMISSION LIMIT 1 UNIT	
IN-0179	09/25/2013	ACT	DIESEL-FIRED EMERGENCY GENERATOR	17.11	NO. 2 FUEL OIL	4690	B-HP	Particulate matter, filterable (FPM)	GOOD COMBUSTION PRACTICES	0.15	G/B-HP-H	0.15
IN-0180	06/04/2014	ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	NO. 2, DIESEL	3600	BHP	Particulate matter, filterable (FPM)	GOOD COMBUSTION PRACTICES	0.15	G/B-HP-H	0.15
IN-0185	04/24/2014	ACT	DIESEL FIRE PUMP	17.11	DIESEL	300	HP	Particulate matter, filterable (FPM)		0.15	G/HP-H	0.15
*KS-0036	03/18/2013	ACT	Caterpillar C18DITA Diesel Engine Generator	17.11	No. 2 Distillate Fuel Oil	900	BHP	Particulate matter, total &lt; 10 Åµ (IPM10)	utilize efficient combustion/design technology	0.066	G/BHP-H	0.07
LA-0296	05/23/2014	ACT	Emergency Diesel Generators (EQTs 622, 671, 773, 850, 994, 995, 996, 1033, 1077, 1105, & 1202)	17.11	Diesel	2682	HP	Particulate matter, total &lt; 10 Åµ (IPM10)	Compliance with 40 CFR 60 Subpart IIII; operating the engine in accordance with the engine manufacturerâ€™s instructions and/or written procedures (consistent with safe operation) designed to maximize combustion efficiency and minimize fuel usage.	0.88	LB/HR	0.15
LA-0308	09/26/2013	ACT	2000 KW Diesel Fired Emergency Generator Engine	17.11	Diesel	20.4	MMBTU/hr	Particulate matter, filterable &lt; 10 Åµ (FPM10)	Good combustion and maintenance practices, and compliance with NSPS 40 CFR 60 Subpart IIII	1.06	LB/H	
*LA-0315	05/23/2014	ACT	Emergency Diesel Generator 1	17.11	Diesel	5364	HP	Particulate matter, total &lt; 10 Åµ (IPM10)	Proper design and operation; use of ultra-low sulfur diesel	1.76	LB/H	0.15
*LA-0315	05/23/2014	ACT	Emergency Diesel Generator 2	17.11	Diesel	5364	HP	Particulate matter, total &lt; 10 Åµ (IPM10)	Proper design and operation; use of ultra-low sulfur diesel	1.76	LB/H	0.15
*LA-0315	05/23/2014	ACT	Fire Pump Diesel Engine 1	17.11	Diesel	751	HP	Particulate matter, total &lt; 10 Åµ (IPM10)	Proper design and operation; use of ultra-low sulfur diesel	0.25	LB/H	0.15
*LA-0315	05/23/2014	ACT	Fire Pump Diesel Engine 2	17.11	Diesel	751	HP	Particulate matter, total &lt; 10 Åµ (IPM10)	Proper design and operation; use of ultra-low sulfur diesel	0.25	LB/H	0.15
MA-0039	01/30/2014	ACT	Emergency Engine/Generator	17.11	ULSD	7.4	MMBTU/H	Particulate matter, total &lt; 10 Åµ (IPM10)		0.15	GM/BHP-H	0.15
MD-0042	04/08/2014	ACT	EMERGENCY GENERATOR 1	17.11	ULTRA LOW SULFU DIESEL	2250	KW	Particulate matter, filterable (FPM)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES, LIMITED HOURS OF OPERATION, AND DESIGNED TO ACHIEVE EMISSION LIMITS	0.15	G/HP-H	0.15
MD-0043	07/01/2014	ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	1300	HP	Particulate matter, total &lt; 10 Åµ (IPM10)	GOOD COMBUSTION PRACTICES, LIMITED HOURS OF OPERATION, AND EXCLUSIVE USE OF ULSD	0.17	G/HP-H	0.17
MD-0044	06/09/2014	ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	1550	HP	Particulate matter, filterable (FPM)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES AND DESIGNED TO ACHIEVE EMISSION LIMITS	0.15	G/HP-H	0.15
MI-0406	11/01/2013	ACT	FG-EMGEN7-8; Two (2) 1,000kW diesel-fueled emergency reciprocating internal combustion engines	17.11	Diesel	1000	kW	Particulate matter, filterable (FPM)	Good combustion practices.	0.15	G/B-HP-H	0.15
NJ-0079	07/25/2012	ACT	Emergency Generator	17.11	Ultra Low Sulfur distillate Diesel	100	H/YR	Particulate matter, total &lt; 10 Åµ (IPM10)	Use of ULSD oil	0.13	LB/H	
NJ-0080	11/01/2012	ACT	Emergency Generator	17.11	ULSD	200	H/YR	Particulate matter, filterable (FPM)	use of ULSD, a low sulfur clean fuel	0.59	LB/H	
NY-0104	08/01/2013	ACT	Emergency generator	17.11	ultra low sulfur diesel	0		Particulate matter, filterable (FPM)	Ultra low sulfur diesel with maximum sulfur content 0.0015 percent.	0.03	G/BHP-H	0.03
OH-0352	06/18/2013	ACT	Emergency generator	17.11	diesel	2250	KW	Particulate matter, total &lt; 10 Åµ (IPM10)	Purchased certified to the standards in NSPS Subpart IIII	0.99	LB/H	0.15
OH-0355	05/07/2013	ACT	Test Cell 1 for Aircraft Engines and Turbines	17.11	JET FUEL	0		Particulate matter, total &lt; 10 Åµ (IPM10)		0.038	LB/MMBTU	

### Std Units

hp-hr

BACT Determinations for Large Internal Combustion Engines (> 500 HP) - PM (Oil-Fired)

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
*SD-0005	06/29/2010 &nbsp;ACT	Emergency Generator	17.11	Distillate Oil	2000 Kilowatts		Particulate matter, filterable (FPM)		0		
*SD-0005	06/29/2010 &nbsp;ACT	Fire Water Pump	17.11	Distillate Oil	577 horsepower		Particulate matter, filterable (FPM)		0		

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - VOC (Gas-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
*FL-0368	02/14/2019 &nbsp;ACT	Emergency Engines	17.13	Natural gas	0		Volatile Organic Compounds (VOC)	Good combustion practices	1 G/HP-HR		1.00
KY-0110	07/23/2020 &nbsp;ACT	EP 10-05 - Austenitizing Furnace Rolls Emergency Generator	17.13	Natural Gas	636 HP		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	1 G/HP-HR		1.00
KY-0110	07/23/2020 &nbsp;ACT	EP 10-06 - Tempering Furnace Rolls Emergency Generator	17.13	Natural Gas	636 HP		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	1 G/HP-HR		1.00
*MI-0440	05/22/2019 &nbsp;ACT	FGENGINES	17.13	natural gas	16500 HP		Volatile Organic Compounds (VOC)	Oxidation catalyst	11 LB/H		0.30
*MI-0443	04/26/2019 &nbsp;ACT	EUEMERGEN1	17.13	natural gas	500 h/yr		Volatile Organic Compounds (VOC)		0.5 G/HP-H		0.50
*MI-0443	04/26/2019 &nbsp;ACT	EUEMERGEN2	17.13	natural gas	500 h/yr		Volatile Organic Compounds (VOC)		0.5 G/HP-H		0.50
*MI-0443	04/26/2019 &nbsp;ACT	EUEMERGEN3	17.13	natural gas	500 h/yr		Volatile Organic Compounds (VOC)		0.5 G/HP-H		0.50
*MI-0444	08/26/2019 &nbsp;ACT	FGNGEMENG (multiple emission units in this flexible group)	17.13	natural gas	0		Volatile Organic Compounds (VOC)	Combustion of pipeline quality natural gas only.	0.5 G/HP-H		0.50
*MI-0446	10/30/2020 &nbsp;ACT	EUEMERGEN1	17.13	Natural gas	500 h/yr		Volatile Organic Compounds (VOC)		0.5 G/HP-H		0.50
*MI-0446	10/30/2020 &nbsp;ACT	EUEMERGEN2	17.13	Natural gas	500 h/yr		Volatile Organic Compounds (VOC)		0.5 G/HP-H		0.50
AK-0084	06/30/2017 &nbsp;ACT	Twelve (12) Large ULSD/Natural Gas-Fired Internal Combustion Engines	17.11	Diesel and Natural Gas	143.5 MMBtu/hr		Volatile Organic Compounds (VOC)	Oxidation Catalyst and Good Combustion Practices	0.21 G/KW-HR (ULSD)		0.07
*LA-0346	01/04/2018 &nbsp;ACT	emergency generators (4 units)	17.11	natural gas	13410 hp (each)		Volatile Organic Compounds (VOC)	Comply with standards of 40 CFR 60 Subpart JJJJ	1 G/BHP-HR		1.00
*MI-0441	12/21/2018 &nbsp;ACT	EUEMGNG1--A 1500 HP natural gas fueled emergency engine	17.13	Natural gas	1500 HP		Volatile Organic Compounds (VOC)	Burn natural gas and be NSPS compliant	1 G/HP-H		1.00
*MI-0441	12/21/2018 &nbsp;ACT	EUEMGNG2	17.13	NATURAL GAS	6000 HP		Volatile Organic Compounds (VOC)	Burn natural gas and be NSPS compliant.	1 G/HP-H		1.00
CA-1240	03/17/2017 &nbsp;ACT	Internal Combustion Engine	17.13	Natural gas	881 bhp		Volatile Organic Compounds (VOC)	Oxidation catalyst	25 PPMVD		0.28
CA-1241	08/19/2016 &nbsp;ACT	ICE Landfill or digested gas fired	17.14	Digester gas	1573 bhp		Volatile Organic Compounds (VOC)	SCR/Oxidation catalyst	26 PPMV		0.29
*KS-0030	03/31/2016 &nbsp;ACT	Spark ignition RICE emergency AC generators	17.13	Natural gas	450 kW		Volatile Organic Compounds (VOC)		1 G/HP-HR		1.00
*KS-0030	03/31/2016 &nbsp;ACT	Spark ignition RICE electricity generating units (EGUs)	17.13	Natural Gas	10 MW		Volatile Organic Compounds (VOC)		5.82 LB/H		0.20
LA-0292	01/22/2016 &nbsp;ACT	Waukesha 16V-275GL Compressor Engines Nos. 1-12	17.13	Natural Gas	5000 HP		Volatile Organic Compounds (VOC)	CO oxidation catalyst, use of natural gas as fuel, good equipment design, and proper combustion techniques	1.25 LB/HR		0.11

Std Units	Limit
g/hp-hr	

Appendix C, Page C2-40

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - VOC (Gas-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
PA-0301	03/31/2014 &nbsp;   ACT	One four stroke lean burn engine, Caterpillar Model G3612 TA, 3550 bhp	17.13	Natural Gas	0		Volatile Organic Compounds (VOC)	Oxidation Catalyst	0.25 G-BHP-HR		0.25
PA-0302	04/16/2014 &nbsp;   ACT	Spark Ignited 4 stroke Rich Burn Engine (7 units)	17.13	Natural Gas	0		Volatile Organic Compounds (VOC)	NONE	0.2 G/BHP-HR		0.20
TX-0680	06/14/2013 &nbsp;   ACT	Refrigeration compressor engine	17.13	natural gas	1183 hp		Volatile Organic Compounds (VOC)	oxidation catalyst	0.245 G/HP-HR		0.25
TX-0680	06/14/2013 &nbsp;   ACT	Recompression compressor engine	17.13	natural gas	1380 hp		Volatile Organic Compounds (VOC)	oxidation catalyst	0.245 G/HP-HR		0.25
TX-0692	12/20/2013 &nbsp;   ACT	(12) reciprocating internal combustion engines	17.13	natural gas	18 MW		Volatile Organic Compounds (VOC)	oxidation catalyst	0.3 G/HP-HR		0.30
CA-1186	08/26/2011 &nbsp;   ACT	Internal Combustion Engine	17.14	Landfill Gas	1966 BHP		Volatile Organic Compounds (VOC)	Lean-burn engine with air-fuel ratio controller	86 PPMVD@15% O2		0.96
CA-1222	09/22/2011 &nbsp;   ACT	ICE: Spark Ignition	17.13	natural gas	2889 bhp		Volatile Organic Compounds (VOC)	Oxidation Catalyst	30 PPMVD@15% O2		0.34
FL-0326	08/25/2011 &nbsp;   ACT	Landfill Gas-to-Energy	17.14	Landfill gas	4000 scfm		Volatile Organic Compounds (VOC)		1 G/B-HP-H		1.00
OH-0347	07/05/2011 &nbsp;   ACT	2 caterpillar engines 2233 HP	17.14	Landfill gas	2233 HP		Volatile Organic Compounds (VOC)		1.64 LB/H		0.33
OH-0348	09/14/2011 &nbsp;   ACT	Reciprocating Internal Combustion Engines (10)	17.14	Landfill Gas	2233 HP		Volatile Organic Compounds (VOC)		28.72 LB/H		5.83
*PA-0279	12/13/2010 &nbsp;   ACT	RIC ENGINES (2)	17.14	Treated Landfil Gas	66876 CF/H		Volatile Organic Compounds (VOC)		0.32 G/B-HP-H		0.32
PA-0287	09/27/2011 &nbsp;   ACT	CATERPILLAR G3516B COMPRESSOR ENGINES (2)	17.13	Natural Gas	0		Volatile Organic Compounds (VOC)	Oxidation Catalyst - Miratech	0.12 G/B-HP-H		0.12
PA-0287	09/27/2011 &nbsp;   ACT	WAUKESHA P9390GSI COMPRESSOR ENGINES (4) (1980 BHP)	17.13	Natural Gas	0		Volatile Organic Compounds (VOC)	3-way catalyst, Johnson Matthey	0.12 G/B-HP-H		0.12

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
*AK-0085	08/13/2020 &nbsp;ACT	One (1) Black Start Generator Engine	17.11	ULSD	186.6 gph		Volatile Organic Compounds (VOC)	Oxidation Catalyst, Good combustion practices, and limit operation to 500 hours per year.	0.18 G/HP-HR		0.18
AR-0161	09/23/2019 &nbsp;ACT	Emergency Engines	17.11	Diesel	0		Volatile Organic Compounds (VOC)	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	1.9 G/KW-HR		1.42
AR-0163	06/09/2019 &nbsp;ACT	Emergency Engines	17.11	Diesel	0		Volatile Organic Compounds (VOC)	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	1.55 G/KW-HR		1.16
IN-0317	06/11/2019 &nbsp;ACT	Emergency generator EU-6006	17.11	Diesel	2800 HP		Volatile Organic Compounds (VOC)	Tier II diesel engine	6.4 G/KWH		4.77
IN-0317	06/11/2019 &nbsp;ACT	Emergency fire pump EU-6008	17.11	Diesel	750 HP		Volatile Organic Compounds (VOC)	Engine that complies with Table 4 to Subpart IIII of Part 60	4 G/KWH		2.98
KY-0110	07/23/2020 &nbsp;ACT	EP 10-02 - North Water System Emergency Generator	17.11	Diesel	2922 HP		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0		
KY-0110	07/23/2020 &nbsp;ACT	EP 10-03 - South Water System Emergency Generator	17.11	Diesel	2922 HP		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0		
KY-0110	07/23/2020 &nbsp;ACT	EP 10-04 - Emergency Fire Water Pump	17.11	Diesel	920 HP		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0		
KY-0110	07/23/2020 &nbsp;ACT	EP 10-07 - Air Separation Plant Emergency Generator	17.11	Diesel	700 HP		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0		
KY-0110	07/23/2020 &nbsp;ACT	EP 10-01 - Caster Emergency Generator	17.11	Diesel	2922 HP		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0		
*LA-0364	01/06/2020 &nbsp;ACT	Emergency Generator Diesel Engines	17.11	Diesel Fuel	550 hp		Volatile Organic Compounds (VOC)	Compliance with the limitations imposed by 40 CFR 63 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures designed to maximize combustion efficiency and minimize fuel usage.	0		
*LA-0364	01/06/2020 &nbsp;ACT	Emergency Fire Water Pumps	17.11	Diesel Fuel	550 hp		Volatile Organic Compounds (VOC)	Compliance with the limitations imposed by 40 CFR 63 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures designed to maximize combustion efficiency and minimize fuel usage.	0		
*MI-0442	08/21/2019 &nbsp;ACT	FGEMENGINE	17.11	Diesel	1100 KW		Volatile Organic Compounds (VOC)		0.86 LB/H		0.26
*OK-0181	09/11/2019 &nbsp;ACT	EMERGENCY USE ENGINES &gt; 500 HP	17.11	DIESEL	0		Volatile Organic Compounds (VOC)	Good combustion practices. Certified to meet EPA Tier 3 engine standards. Each engine shall be limited to operate not more than 500 hours per year.	3 GM/HP-HR		3.00
TX-0859	06/12/2019 &nbsp;ACT	Fuel Storage Tanks	17.12	diesel	0		Volatile Organic Compounds (VOC)	Two fixed roof storage tanks will store diesel fuel, which has a VOC vapor pressure than less than 0.5 psia at 95Â° F. The permit requires that the tanks be painted white and use submerged fill	0		
TX-0872	10/31/2019 &nbsp;ACT	Emergency Generators	17.11	ultra low sulfur diesel	0		Volatile Organic Compounds (VOC)	Limiting duration and frequency of generator use to 100 hr/yr. Good combustion practices will be used to reduce VOC including maintaining proper air-to-fuel ratio.	0.12 G/KW HR		0.09
TX-0876	02/06/2020 &nbsp;ACT	Emergency generator	17.11	DIESEL	0		Volatile Organic Compounds (VOC)	Tier 4 exhaust emission standards specified in 40 CFR Â§ 1039.101, limited to 100 hours per year of non-emergency operation	0		



Std Units  
Limit

Limit  
g/hp-hr

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
OH-0374	10/23/2017 &nbsp;ACT	Emergency Generators (2 identical, P004 and P005)	17.11	Diesel fuel	2206 HP		Volatile Organic Compounds (VOC)	Certified to the meet the emissions standards in 40 CFR 89.112 and 89.113 pursuant to 40 CFR 60.4205(b) and 60.4202(a)(2). Good combustion practices per the manufacturer's operating manual.	23.21 LB/H		4.77
OH-0375	11/07/2017 &nbsp;ACT	Emergency Diesel Generator Engine (P001)	17.11	Diesel fuel	2206 HP		Volatile Organic Compounds (VOC)	Good combustion design	24.71 LB/H		4.80
OH-0375	11/07/2017 &nbsp;ACT	Emergency Diesel Fire Pump Engine (P002)	17.11	Diesel fuel	700 HP		Volatile Organic Compounds (VOC)	Good combustion design	4.97 LB/H		3.00
OH-0377	04/19/2018 &nbsp;ACT	Emergency Diesel Generator (P003)	17.11	Diesel fuel	1860 HP		Volatile Organic Compounds (VOC)	Good combustion practices (ULSD) and compliance with 40 CFR Part 60, Subpart IIII	19.68 LB/H		4.80
OH-0378	12/21/2018 &nbsp;ACT	Emergency Diesel-fired Generator Engine (P007)	17.11	Diesel fuel	3353 HP		Volatile Organic Compounds (VOC)	certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII, shall employ good combustion practices per the manufacturer's operating manual	37.41 LB/H		4.80
OH-0378	12/21/2018 &nbsp;ACT	1,000 kW Emergency Generators (P008 - P010)	17.11	Diesel fuel	1341 HP		Volatile Organic Compounds (VOC)	certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII, shall employ good combustion practices per the manufacturer's operating manual	14.96 LB/H		4.80
OK-0175	06/29/2017 &nbsp;ACT	Emergency Use Engines &gt; 500 HP	17.11	Diesel	0		Volatile Organic Compounds (VOC)	Good combustion practices. Certified to meet EPA Tier 3 engine standards. Shall be limited to operate at no more than 500 hr/yr.	3 GM/HP-HR		3.00
*PA-0313	07/27/2017 &nbsp;ACT	Emergency Generator	17.11	Diesel	2500 bhp		Volatile Organic Compounds (VOC)		3.5 G		2.61
VA-0327	07/12/2017 &nbsp;ACT	Emergency Generator	17.11	Diesel	0		Volatile Organic Compounds (VOC)		0.49 LB/HR		
*WI-0284	04/24/2018 &nbsp;ACT	Diesel-Fired Emergency Generators	17.11	Diesel Fuel	0		Volatile Organic Compounds (VOC)	Good Combustion Practices	0.56 G/KWH		0.42
*WI-0286	04/24/2018 &nbsp;ACT	P42 -Diesel Fired Emergency Generator	17.11	Diesel Fuel	0		Volatile Organic Compounds (VOC)	Good Combustion Practices	0.56 G/KWH		0.42
IN-0263	03/23/2017 &nbsp;ACT	EMERGENCY GENERATORS (EU014A AND EU-014B)	17.11	DISTILLATE OIL	3600 HP EACH		Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES	0.35 G/HP-H EACH		0.35

### BACT Determinations for Large Internal Combustion Engines (> 500 HP) - VOC (Oil-Fired)

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
KY-0109	10/24/2016 &nbsp;  ACT	Emergency Generators #1, #2, & #3 (EU72, EU73, & #4; EU74)	17.11	Diesel	53.6 gal/hr		Volatile Organic Compounds (VOC)	The permittee shall prepare and maintain for EU72, EU73, and EU74, within 90 days of startup, a good combustion and operation practices plan (GCOP) that defines, measures and verifies the use of operational and design practices determined as BACT for minimizing CO, VOC, PM, PM10, and PM2.5 emissions. Any revisions requested by the Division shall be made and the plan shall be maintained on site. The permittee shall operate according to the provisions of this plan at all times, including periods of startup, shutdown, and malfunction. The plan shall be incorporated into the plant standard operating procedures (SOP) and shall be made available for the Division's inspection. The plan shall include, but not be limited to:  i. A list of combustion optimization practices and a means of verifying the practices have occurred.  ii. A list of combustion and operation practices to be used to lower energy consumption and a means of verifying the practices have occurred.  iii. A list of the design choices determined to be BACT and verification that designs were implemented in the final construction.	4.77 G/HP-HR (EU72 & EU73)		4.77
LA-0276	12/15/2016 &nbsp;  ACT	Fire Pump Engines (2 units)	17.11	Diesel	700 hp		Volatile Organic Compounds (VOC)	Comply with standards of NSPS Subpart IIII	0		
LA-0292	01/22/2016 &nbsp;  ACT	Emergency Generators No. 1 & #2; No. 2	17.11	Diesel	1341 HP		Volatile Organic Compounds (VOC)	Good combustion practices consistent with the manufacturer's recommendations to maximize fuel efficiency and minimize emissions	0.83 LB/HR		0.28
LA-0307	03/21/2016 &nbsp;  ACT	Diesel Engines	17.11	Diesel	0		Volatile Organic Compounds (VOC)	good combustion practices, Use ultra low sulfur diesel, and comply with 40 CFR 60 Subpart IIII	0		
LA-0309	06/04/2015 &nbsp;  ACT	Emergency Generator Engines	17.11	Diesel	2922 hp (each)		Volatile Organic Compounds (VOC)	Complying with 40 CFR 60 Subpart IIII	0		
LA-0313	08/31/2016 &nbsp;  ACT	SCPS Emergency Diesel Generator 1	17.11	Diesel	2584 HP		Volatile Organic Compounds (VOC)	Good combustion practices	27.34 LB/H		4.80
LA-0316	02/17/2017 &nbsp;  ACT	emergency generator engines (6 units)	17.11	diesel	3353 hp		Volatile Organic Compounds (VOC)	Complying with 40 CFR 60 Subpart IIII	0		
MI-0423	01/04/2017 &nbsp;  ACT	EUENGINE (Diesel fuel emergency engine)	17.11	Diesel Fuel	22.68 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices.	1.87 LB/H		0.26
NJ-0084	03/10/2016 &nbsp;  ACT	Diesel Fired Emergency Generator	17.11	ULSD	44 H/YR		Volatile Organic Compounds (VOC)	use of ULSD a clean burning fuel, and limited hours of operation	1 LB/H		
NY-0103	02/03/2016 &nbsp;  ACT	Black start generator	17.11	ultra low sulfur diesel	3000 KW		Volatile Organic Compounds (VOC)	Compliance demonstrated with vendor emission certification and adherence to vendor-specified maintenance recommendations.	0.11 G/BHP-H		0.11
OH-0366	08/25/2015 &nbsp;  ACT	Emergency generator (P003)	17.11	Diesel fuel	2346 HP		Volatile Organic Compounds (VOC)		3.1 LB/H		0.60
OH-0367	09/23/2016 &nbsp;  ACT	Emergency generator (P003)	17.11	Diesel fuel	2947 HP		Volatile Organic Compounds (VOC)	State-of-the-art combustion design	3.84 LB/H		0.59

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
OH-0368	04/19/2017 &nbsp;ACT	Emergency Generator (P009)	17.11	Diesel fuel	5000 HP		Volatile Organic Compounds (VOC)	good combustion control and operating practices and engines designed to meet the stands of 40 CFR Part 60, Subpart IIII	1.6 LB/H		0.15
PA-0309	12/23/2015 &nbsp;ACT	2000 kW Emergency Generator	17.11	Ultra-low sulfur Diesel	0		Volatile Organic Compounds (VOC)		0.22 GM/HP-HR		0.22
PA-0311	09/01/2015 &nbsp;ACT	Fire Pump Engine	17.11	diesel	0		Volatile Organic Compounds (VOC)		0.2 G/HP-HR		0.20
*SC-0193	04/15/2016 &nbsp;ACT	Emergency Generators and Fire Pump	17.11	No. 2 Fuel Oil	1500 hp		Volatile Organic Compounds (VOC)	Must meet the standards of 40 CFR 60, Subpart IIII	100 HR/YR		
TX-0728	04/01/2015 &nbsp;ACT	Emergency Diesel Generator	17.11	Diesel	1500 hp		Volatile Organic Compounds (VOC)	Minimized hours of operations Tier II engine	0.7 LB/H		0.21
TX-0799	06/08/2016 &nbsp;ACT	Fire pump engines	17.11	diesel	0		Volatile Organic Compounds (VOC)	Equipment specifications and good combustion practices. Operation limited to 100 hours per year.	0.0007 LB/HP-HR		0.32
VA-0325	06/17/2016 &nbsp;ACT	DIESEL-FIRED EMERGENCY GENERATOR 3000 kW (1)	17.11	DIESEL FUEL	0		Volatile Organic Compounds (VOC)	Good Combustion Practices/Maintenance	6.4 G/KW		4.77
AK-0082	01/23/2015 &nbsp;ACT	Emergency Camp Generators	17.11	Ultra Low Sulfur Diesel	2695 hp		Volatile Organic Compounds (VOC)		0.0007 LB/HP-H		0.32
AK-0082	01/23/2015 &nbsp;ACT	Fine Water Pumps	17.11	Ultra Low Sulfur Diesel	610 hp		Volatile Organic Compounds (VOC)		0.0007 LB/HP-H		0.32
AK-0082	01/23/2015 &nbsp;ACT	Bulk Tank Generator Engines	17.11	Ultra Low Sulfur Diesel	891 hp		Volatile Organic Compounds (VOC)		0.0007 LB/HP-H		0.32
FL-0338	05/30/2012 &nbsp;ACT	Main Propulsion Engines - Development Driller 1	17.11	Diesel	0		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, and additional enhanced work practice standards including an engine performance management system, positive crankcase ventilation, turbocharger with aftercooler, and high pressure fuel injection with aftercooler.	0.62 G/KW-H		0.46
FL-0338	05/30/2012 &nbsp;ACT	Main Propulsion Engines - C.R. Luigs	17.11	Diesel	5875 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, and additional enhanced work practice standards including an engine performance management system and the Diesel Engines with Turbochargers measurement system, positive crankcase ventilation, turbocharger and aftercooler, and high pressure fuel injection with aftercooler.	0.39 G/KW-H		0.29
FL-0338	05/30/2012 &nbsp;ACT	Fast Rescue Craft Diesel Engine - C.R. Luigs	17.11	diesel	142 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines and use of low sulfur diesel fuel	0		
FL-0338	05/30/2012 &nbsp;ACT	Emergency Generator Diesel Engine - Development Driller 1	17.11	Diesel	2229 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	0.04 T/12MO ROLLING TOTAL		
FL-0338	05/30/2012 &nbsp;ACT	Emergency Generator Diesel Engine - C.R. Luigs	17.11	diesel	2064 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	0.04 T/12MO ROLLING TOTAL		

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
FL-0347	09/16/2014 &nbsp;ACT	Main Propulsion Generator Diesel Engines	17.11	Diesel	9910 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0.35 G/KW-H		0.26
FL-0347	09/16/2014 &nbsp;ACT	Emergency Diesel Engine	17.11	Diesel	3300 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0		
FL-0348	05/15/2012 &nbsp;ACT	Source Wide Emission Limit	17.11	Diesel	0		Volatile Organic Compounds (VOC)	PSD Avoidance	39 TONS PER YEAR		
IA-0105	10/26/2012 &nbsp;ACT	Emergency Generator	17.11	diesel fuel	142 GAL/H		Volatile Organic Compounds (VOC)	good combustion practices	0.4 G/KW-H		0.30
IA-0106	07/12/2013 &nbsp;ACT	Emergency Generators	17.11	diesel fuel	180 GAL/H		Volatile Organic Compounds (VOC)	good combustion practices	4 G/KW-H		2.98
IL-0114	09/05/2014 &nbsp;ACT	Emergency Generator	17.11	distillate fuel oil	3755 HP		Volatile Organic Compounds (VOC)	Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7.	0.4 G/KW-H		0.30
IN-0158	12/03/2012 &nbsp;ACT	TWO (2) EMERGENCY DIESEL GENERATORS	17.11	DIESEL	1006 HP EACH		Volatile Organic Compounds (VOC)	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	1.04 LB/H		0.47
IN-0158	12/03/2012 &nbsp;ACT	EMERGENCY DIESEL GENERATOR	17.11	DIESEL	2012 HP		Volatile Organic Compounds (VOC)	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	1.04 LB/H		0.23
IN-0173	06/04/2014 &nbsp;ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	NO. 2, DIESEL	3600 BHP		Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES	0.31 G/BHP-H		0.31
IN-0179	09/25/2013 &nbsp;ACT	DIESEL-FIRED EMERGENCY GENERATOR	17.11	NO. 2 FUEL OIL	4690 B-HP		Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES	0.31 G/B-HP-H		0.31
IN-0180	06/04/2014 &nbsp;ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	NO. 2, DIESEL	3600 BHP		Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES	0.31 G/B-HP-H		0.31
*KS-0036	03/18/2013 &nbsp;ACT	Caterpillar C18DITA Diesel Engine Generator	17.11	No. 2 Distillate Fuel Oil	900 BHP		Volatile Organic Compounds (VOC)	utilize efficient combustion/design technology	0.015 G/BHP-H		0.02
LA-0296	05/23/2014 &nbsp;ACT	Emergency Diesel Generators (EQTs 622, 671, 773, 850, 994, 995, 996, 1033, 1077, 1105, & 1202)	17.11	Diesel	2682 HP		Volatile Organic Compounds (VOC)	Compliance with 40 CFR 60 Subpart IIII; operating the engine in accordance with the engine manufacturer's instructions and/or written procedures (consistent with safe operation) designed to maximize combustion efficiency and minimize fuel usage.	0.85 LB/HR		0.14
*LA-0315	05/23/2014 &nbsp;ACT	Emergency Diesel Generator 1	17.11	Diesel	5364 HP		Volatile Organic Compounds (VOC)	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	3.86 LB/H		4.80
*LA-0315	05/23/2014 &nbsp;ACT	Emergency Diesel Generator 2	17.11	Diesel	5364 HP		Volatile Organic Compounds (VOC)	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	3.86 LB/H		4.80
*LA-0315	05/23/2014 &nbsp;ACT	Fire Pump Diesel Engine 1	17.11	Diesel	751 HP		Volatile Organic Compounds (VOC)	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	0.34 LB/H		4.80
*LA-0315	05/23/2014 &nbsp;ACT	Fire Pump Diesel Engine 2	17.11	Diesel	751 HP		Volatile Organic Compounds (VOC)	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	0.34 LB/H		4.80
MD-0044	06/09/2014 &nbsp;ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	1550 HP		Volatile Organic Compounds (VOC)	USE ONLY ULSD, GOOD COMBUSTION PRACTICES, AND DESIGNED TO ACHIEVE EMISSION LIMIT	4.8 G/HP-H		4.80
NJ-0079	07/25/2012 &nbsp;ACT	Emergency Generator	17.11	Ultra Low Sulfur distillate Diesel	100 H/YR		Volatile Organic Compounds (VOC)	Use of ULSD oil	0.49 LB/H		

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
NJ-0080	11/01/2012 &nbsp;ACT	Emergency Generator	17.11	ULSD	200 H/YR		Volatile Organic Compounds (VOC)	use of ULSD, a low sulfur clean fuel	2.62 LB/H		
NY-0104	08/01/2013 &nbsp;ACT	Emergency generator	17.11	ultra low sulfur diesel	0		Volatile Organic Compounds (VOC)	Good combustion practice.	0.0331 LB/MMBTU		0.01
OH-0352	06/18/2013 &nbsp;ACT	Emergency generator	17.11	diesel	2250 KW		Volatile Organic Compounds (VOC)	Purchased certified to the standards in NSPS Subpart IIII	3.93 LB/H		0.59
OH-0355	05/07/2013 &nbsp;ACT	Test Cell 1 for Aircraft Engines and Turbines	17.11	JET FUEL	0		Volatile Organic Compounds (VOC)		0.7 LB/MMBTU		0.22
OH-0355	05/07/2013 &nbsp;ACT	Test Cell 2 for Aircraft Engines and Turbines	17.11	JET FUEL	0		Volatile Organic Compounds (VOC)		0.7 LB/MMBTU		0.22
OH-0360	11/05/2013 &nbsp;ACT	Emergency generator (P003)	17.11	diesel	1112 KW		Volatile Organic Compounds (VOC)	Purchased certified to the standards in NSPS Subpart IIII	1.93 LB/H		0.59
OK-0154	07/02/2013 &nbsp;ACT	DIESEL-FIRED EMERGENCY GENERATOR ENGINE	17.11	DIESEL	1341 HP		Volatile Organic Compounds (VOC)	COMBUSTION CONTROL.	0.0007 LB/HP-HR		0.32
OK-0156	07/31/2013 &nbsp;ACT	Fire Pump Engine	17.11	Diesel	550 hp		Volatile Organic Compounds (VOC)	Good Combustion	0.35 LB/MMBTU		0.11
OK-0164	01/08/2015 &nbsp;ACT	Jet Engine Testing Cells	17.11	KEROSENE TYPE JET FUEL	65000 FT-LB THRUST		Volatile Organic Compounds (VOC)		1.7 TONS PER YEAR		
PA-0278	10/10/2012 &nbsp;ACT	Emergency Generator	17.11	Diesel	0		Volatile Organic Compounds (VOC)		0.01 G/B-HP-H		0.01
PA-0286	01/31/2013 &nbsp;ACT	EMERGENCY GENERATOR-ENGINE	17.13	Diesel	0		Volatile Organic Compounds (VOC)		0.01 GM/B-HP-H		0.01
PA-0291	04/23/2013 &nbsp;ACT	EMERGENCY GENERATOR	17.11	Ultra Low sulfur Distillate	7.8 MMBTU/H		Volatile Organic Compounds (VOC)		0.7 LB/H		0.28
*PA-0292	06/01/2012 &nbsp;ACT	DIESEL GENERATOR (2.25 MW EACH) - 5 UNITS	17.11	#2 Oil	0		Formaldehyde		0.02 PPMVD AT 15% O2		
PR-0009	04/10/2014 &nbsp;ACT	Emergency Diesel Generator	17.11	ULSD Fuel oil # 2	0		Volatile Organic Compounds (VOC)		0.15 G/B-HP-H		0.15
SC-0113	02/08/2012 &nbsp;ACT	EMERGENCY GENERATORS 1 THRU 8	17.11	DIESEL	757 HP		Volatile Organic Compounds (VOC)	PURCHASE ENGINES CERTIFIED TO COMPLY WITH NSPS, SUBPART IIII.	4 GR/KW-H		2.98
SC-0159	07/09/2012 &nbsp;ACT	EMERGENCY GENERATORS, GEN1, GEN2	17.11	DIESEL	1000 KW		Volatile Organic Compounds (VOC)	BACT HAS BEEN DETERMINED TO BE COMPLIANCE WITH NSPS, SUBPART IIII, 40 CFR60.4202 AND 40 CFR60.4205.	6.4 G/KW-H		4.77
WV-0025	11/21/2014 &nbsp;ACT	Emergency Generator	17.11	Diesel	2015.7 HP		Volatile Organic Compounds (VOC)		1.24 LB/H		0.28
FL-0328	10/27/2011 &nbsp;ACT	Main Propulsion Engines	17.11	Diesel	0		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the current manufacturer's specifications for these engines, and additional enhanced work practice standards including an engine performance management system and the Diesel Engines with Turbochargers (DEWT) measurement system.	0.39 G/KW-H		0.29
FL-0328	10/27/2011 &nbsp;ACT	Crane Engines (units 1 and 2)	17.11	Diesel	0		Volatile Organic Compounds (VOC)	Use of certified EPA Tier 1 engines and good combustion practices based on the current manufacturer's specifications for this engine.	1.3 TONS PER YEAR		

BACT Determinations for Large Internal Combustion Engines (> 500 HP) - VOC (Oil-Fired)

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
FL-0328	10/27/2011 &nbsp;ACT	Crane Engines (units 3 and 4)	17.11	Diesel	0		Volatile Organic Compounds (VOC)	Use of good combustion practices, based on the current manufacturerâ€™s specifications for this engine	1.5 TONS PER YEAR		
FL-0328	10/27/2011 &nbsp;ACT	Emergency Engine	17.11	Diesel	0		Volatile Organic Compounds (VOC)	Use of good combustion practices, based on the current manufacturerâ€™s specifications for this engine	0.03 TONS PER YEAR		
FL-0328	10/27/2011 &nbsp;ACT	Emergency Fire Pump Engine	17.11	Diesel	0		Volatile Organic Compounds (VOC)	Use of good combustion practices, based on the current manufacturerâ€™s specifications for this engine	0.002 TONS PER YEAR		
LA-0254	08/16/2011 &nbsp;ACT	EMERGENCY DIESEL GENERATOR	17.11	DIESEL	1250 HP		Volatile Organic Compounds (VOC)	ULTRA LOW SULFUR DIESEL AND GOOD COMBUSTION PRACTICES	1 G/HP-H		1.00

**Std Units**

Limit  
as  $q \rightarrow 1$



Std Units

Limit

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - GHG (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
*AK-0085	08/13/2020 &nbsp;ACT	One (1) Black Start Generator Engine	17.11	ULSD	186.6 gph		Carbon Dioxide Equivalent (CO2e)	Good combustion practices and limit operation to 500 hours per year	163.6 LB/MMBTU		519.45
AR-0161	09/23/2019 &nbsp;ACT	Emergency Engines	17.11	Diesel	0		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices	164 LB/MMBTU		520.72
AR-0163	06/09/2019 &nbsp;ACT	Emergency Engines	17.11	Diesel	0		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices	163 LB/MMBTU		517.55
IL-0130	12/31/2018 &nbsp;ACT	Emergency Engine	17.11	Ultra-Low Sulfur Diesel	1500 kW		Carbon Dioxide Equivalent (CO2e)		225 TONS/YEAR		
IN-0317	06/11/2019 &nbsp;ACT	Emergency generator EU-6006	17.11	Diesel	2800 HP		Carbon Dioxide Equivalent (CO2e)	Tier II diesel engine	811 TONS		
IN-0317	06/11/2019 &nbsp;ACT	Emergency fire pump EU-6008	17.11	Diesel	750 HP		Carbon Dioxide Equivalent (CO2e)	Engine that complies with Table 4 to Subpart IIII of Part 60	217 TONS		
KY-0110	07/23/2020 &nbsp;ACT	EP 10-02 - North Water System Emergency Generator	17.11	Diesel	2922 HP		Carbon Dioxide Equivalent (CO2e)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0		
KY-0110	07/23/2020 &nbsp;ACT	EP 10-03 - South Water System Emergency Generator	17.11	Diesel	2922 HP		Carbon Dioxide Equivalent (CO2e)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0		
KY-0110	07/23/2020 &nbsp;ACT	EP 10-04 - Emergency Fire Water Pump	17.11	Diesel	920 HP		Carbon Dioxide Equivalent (CO2e)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0		
KY-0110	07/23/2020 &nbsp;ACT	EP 10-07 - Air Separation Plant Emergency Generator	17.11	Diesel	700 HP		Carbon Dioxide Equivalent (CO2e)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0		
KY-0110	07/23/2020 &nbsp;ACT	EP 10-01 - Caster Emergency Generator	17.11	Diesel	2922 HP		Carbon Dioxide Equivalent (CO2e)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0		
*LA-0364	01/06/2020 &nbsp;ACT	Emergency Generator Diesel Engines	17.11	Diesel Fuel	550 hp		Carbon Dioxide Equivalent (CO2e)	Compliance with the limitations imposed by 40 CFR 63 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures designed to maximize combustion efficiency and minimize fuel usage.	0		
*LA-0364	01/06/2020 &nbsp;ACT	Emergency Fire Water Pumps	17.11	Diesel Fuel	550 hp		Carbon Dioxide Equivalent (CO2e)	Compliance with the limitations imposed by 40 CFR 63 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures designed to maximize combustion efficiency and minimize fuel usage.	0		
*MI-0442	08/21/2019 &nbsp;ACT	FGEMENGINE	17.11	Diesel	1100 KW		Carbon Dioxide Equivalent (CO2e)		444 T/YR		
*MI-0445	11/26/2019 &nbsp;ACT	EUENGINE (diesel fuel emergency engine)	17.11	diesel fuel	22.68 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion practices	928 T/YR		
OH-0379	02/06/2019 &nbsp;ACT	Emergency Generators (P005 and P006)	17.11	Diesel fuel	3131 HP		Carbon Dioxide Equivalent (CO2e)	Tier IV engine Good combustion practices	3632 LB/H		526.60
TX-0872	10/31/2019 &nbsp;ACT	Emergency Generators	17.11	ultra low sulfur diesel	0		Carbon Dioxide Equivalent (CO2e)	Limiting duration and frequency of generator use to 100 hr/yr. Good combustion practices will be used to reduce VOC including maintaining proper air-to-fuel ratio.	0		
TX-0876	02/06/2020 &nbsp;ACT	Emergency generator	17.11	DIESEL	0		Carbon Dioxide Equivalent (CO2e)	Tier 4 exhaust emission standards specified in 40 CFR A§ 1039.101, limited to 100 hours per year of non-emergency operation	0		
TX-0882	01/17/2020 &nbsp;ACT	EMERGENCY ENGINES	17.12	DIESEL	0		Carbon Dioxide Equivalent (CO2e)	GOOD COMBUSTION PRACTICES, CLEAN FUEL, 100 HR/YR, ULTRA LOW SULFUR FUEL	114.53 LB/MMBTU		363.65
TX-0888	04/23/2020 &nbsp;ACT	EMERGENCY GENERATORS & FIRE WATER PUMP ENGINES	17.11	Ultra-low Sulfur Diesel	0		Carbon Dioxide Equivalent (CO2e)	well-designed and properly maintained engines and each limited to 100 hours per year of non-emergency use.	0		

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - GHG (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
*TX-0905	09/16/2020 &nbsp;   ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	0		Carbon Dioxide Equivalent (CO2e)	limited to 100 hours per year of non-emergency operation	0		
*TX-0915	03/17/2021 &nbsp;   ACT	DIESEL GENERATOR	17.11	DIESEL	0		Carbon Dioxide Equivalent (CO2e)	LIMITED 500 HR/YR OPERATION	0		
VA-0332	06/24/2019 &nbsp;   ACT	Emergency Diesel Generator - 300 kW	17.11	Ultra Low Sulfur Diesel	500 H/YR		Carbon Dioxide Equivalent (CO2e)	good combustion practices, high efficiency design, and the use of ultra low sulfur diesel (\$15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	1203 T/YR		
*VA-0333	12/09/2020 &nbsp;   ACT	One (1) emergency engine generator	17.11	ULSD	2220 HP		Carbon Dioxide Equivalent (CO2e)		2.543 LB		
AK-0084	06/30/2017 &nbsp;   ACT	Black Start and Emergency Internal Combustion Engines	17.11	Diesel	1500 kW		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices	2781 TPY		
AK-0084	06/30/2017 &nbsp;   ACT	Twelve (12) Large ULSD/Natural Gas-Fired Internal Combustion Engines	17.11	Diesel and Natural Gas	143.5 MMBtu/hr		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices	1299630 TPY (ULSD)		
IL-0129	07/30/2018 &nbsp;   ACT	Emergency Engines	17.11	Ultra-low sulfur diesel	0		Carbon Dioxide Equivalent (CO2e)		0		
*LA-0312	06/30/2017 &nbsp;   ACT	DFP1-13 - Diesel Fire Pump Engine (EQI0013)	17.11	Diesel	650 horsepower		Carbon Dioxide Equivalent (CO2e)	Compliance with NSPS Subpart IIII	37 TPY		
*LA-0312	06/30/2017 &nbsp;   ACT	DEG1-13 - Diesel Fired Emergency Generator Engine (EQI0012)	17.11	Diesel	1474 horsepower		Carbon Dioxide Equivalent (CO2e)	Compliance with NSPS Subpart IIII	84 TPY		
LA-0331	09/21/2018 &nbsp;   ACT	Firewater Pumps	17.11	Diesel Fuel	634 kW		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices and Good Operation and Maintenance Practices.	44 T/YR		
LA-0331	09/21/2018 &nbsp;   ACT	Large Emergency Engines (>50kW)	17.11	Diesel Fuel	5364 HP		Carbon Dioxide Equivalent (CO2e)	Good Combustion of Practices and Good Operation and Maintenance Practices	1481 T/YR		
*MA-0043	06/21/2017 &nbsp;   ACT	Cold Start Engine	17.11	ULSD	19.04 MMBTU/HR		Carbon Dioxide Equivalent (CO2e)		163.61 LB/MMBTU		519.45
MI-0425	05/09/2017 &nbsp;   ACT	EUEMRGRICE1 in FGRICE (Emergency diesel generator engine)	17.11	Diesel	500 H/YR		Carbon Dioxide Equivalent (CO2e)	Good combustion and design practices.	209 T/YR		
MI-0425	05/09/2017 &nbsp;   ACT	EUEMRGRICE2 in FGRICE (Emergency Diesel Generator Engine)	17.11	Diesel	500 H/YR		Carbon Dioxide Equivalent (CO2e)	Good combustion and design practices.	70 T/YR		
MI-0425	05/09/2017 &nbsp;   ACT	EUFIREFPUMP in FGRICE (Diesel fire pump engine)	17.11	Diesel	500 H/YR		Carbon Dioxide Equivalent (CO2e)	Good combustion and design practices.	56 T/YR		
MI-0433	06/29/2018 &nbsp;   ACT	EUENGINE (North Plant): Emergency Engine	17.11	Diesel	1341 HP		Carbon Dioxide Equivalent (CO2e)	Good combustion practices.	383 T/YR		
MI-0433	06/29/2018 &nbsp;   ACT	EUENGINE (South Plant): Emergency Engine	17.11	Diesel	1341 HP		Carbon Dioxide Equivalent (CO2e)	Good combustion practices.	383 T/YR		
MI-0435	07/16/2018 &nbsp;   ACT	EUENGINE: Emergency engine	17.11	Diesel	2 MW		Carbon Dioxide Equivalent (CO2e)	Energy efficient design.	161 T/YR		
*MI-0441	12/21/2018 &nbsp;   ACT	EUEMGD1--A 1500 HP diesel fueled emergency engine	17.11	Diesel	1500 HP		Carbon Dioxide Equivalent (CO2e)	Good combustion practices and energy efficiency measures.	406 T/YR		
*MI-0441	12/21/2018 &nbsp;   ACT	EUEMGD2--A 6000 HP diesel fuel fired emergency engine	17.11	Diesel	6000 HP		Carbon Dioxide Equivalent (CO2e)	Good combustion practices and energy efficiency measures.	1590 T/YR		
OH-0370	09/07/2017 &nbsp;   ACT	Emergency generator (P003)	17.11	Diesel fuel	1529 HP		Carbon Dioxide Equivalent (CO2e)	Efficient design	445 T/YR		
OH-0372	09/27/2017 &nbsp;   ACT	Emergency generator (P003)	17.11	Diesel fuel	1529 HP		Carbon Dioxide Equivalent (CO2e)	state of the art combustion design	445 T/YR		
OH-0374	10/23/2017 &nbsp;   ACT	Emergency Generators (2 identical, P004 and P005)	17.11	Diesel fuel	2206 HP		Carbon Dioxide Equivalent (CO2e)	good operating practices (proper maintenance and operation)	120 T/YR		
OH-0375	11/07/2017 &nbsp;   ACT	Emergency Diesel Generator Engine (P001)	17.11	Diesel fuel	2206 HP		Carbon Dioxide Equivalent (CO2e)	Efficient design	116.8 T/YR		
OH-0375	11/07/2017 &nbsp;   ACT	Emergency Diesel Fire Pump Engine (P002)	17.11	Diesel fuel	700 HP		Carbon Dioxide Equivalent (CO2e)	Efficient design	40.1 T/YR		

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - GHG (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
OH-0376	02/09/2018 &nbsp;ACT	Emergency diesel-fired generator (P007)	17.11	Diesel fuel	2682 HP		Carbon Dioxide Equivalent (CO2e)	Equipment design and maintenance requirements	163.6 LB/MMBTU		519.45
OH-0377	04/19/2018 &nbsp;ACT	Emergency Diesel Generator (P003)	17.11	Diesel fuel	1860 HP		Carbon Dioxide Equivalent (CO2e)	Efficient design and proper maintenance and operation	109.2 T/YR		
OH-0378	12/21/2018 &nbsp;ACT	Emergency Diesel-fired Generator Engine (P007)	17.11	Diesel fuel	3353 HP		Carbon Dioxide Equivalent (CO2e)	good operating practices (proper maintenance and operation)	200 T/YR		
OH-0378	12/21/2018 &nbsp;ACT	1,000 kW Emergency Generators (P008 - P010)	17.11	Diesel fuel	1341 HP		Carbon Dioxide Equivalent (CO2e)	good operating practices (proper maintenance and operation)	80 T/YR		
VA-0328	04/26/2018 &nbsp;ACT	Emergency Diesel GEN	17.11	Ultra Low Sulfur Diesel	500 H/YR		Carbon Dioxide Equivalent (CO2e)	use of S15 ULSD and high efficiency design and operation	981 T/YR		
*WI-0284	04/24/2018 &nbsp;ACT	Diesel-Fired Emergency Generators	17.11	Diesel Fuel	0		Carbon Dioxide Equivalent (CO2e)	The Use of Ultra-Low Sulfur Fuel and Good Combustion Practices	0		
*WI-0286	04/24/2018 &nbsp;ACT	P42 -Diesel Fired Emergency Generator	17.11	Diesel Fuel	0		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices and The Use of Ultra-low Sulfur Fuel	0		
IN-0263	03/23/2017 &nbsp;ACT	EMERGENCY GENERATORS (EU014A AND EU-014B)	17.11	DISTILLATE OIL	3600 HP EACH		Carbon Dioxide	GOOD COMBUSTION PRACTICES	1044 TON/12 CONSEC. MONTH		
LA-0292	01/22/2016 &nbsp;ACT	Emergency Generators No. 1 & No. 2	17.11	Diesel	1341 HP		Carbon Dioxide Equivalent (CO2e)		77 TPY		
LA-0305	06/30/2016 &nbsp;ACT	Diesel Engines (Emergency)	17.11	Diesel	4023 hp		Carbon Dioxide Equivalent (CO2e)	Complying with 40 CFR 60 Subpart IIII	0		
LA-0307	03/21/2016 &nbsp;ACT	Diesel Engines	17.11	Diesel	0		Carbon Dioxide Equivalent (CO2e)	good combustion/operating/ maintenance practices	0		
LA-0309	06/04/2015 &nbsp;ACT	Emergency Generator Engines	17.11	Diesel	2922 hp (each)		Carbon Dioxide Equivalent (CO2e)		0		
LA-0313	08/31/2016 &nbsp;ACT	SCPS Emergency Diesel Generator 1	17.11	Diesel	2584 HP		Carbon Dioxide Equivalent (CO2e)	Good combustion practices	0		526.39
LA-0316	02/17/2017 &nbsp;ACT	emergency generator engines (6 units)	17.11	diesel	3353 hp		Carbon Dioxide Equivalent (CO2e)	good combustion practices	0		
LA-0317	12/22/2016 &nbsp;ACT	Emergency Generator Engines (4 units)	17.11	Diesel	0		Carbon Dioxide Equivalent (CO2e)	complying with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	0		
LA-0317	12/22/2016 &nbsp;ACT	Firewater pump Engines (4 units)	17.11	diesel	896 hp (each)		Carbon Dioxide Equivalent (CO2e)	complying with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	0		
LA-0323	01/09/2017 &nbsp;ACT	Fire Water Diesel Pump No. 3 Engine	17.11	Diesel Fuel	600 hp		Carbon Dioxide Equivalent (CO2e)	Proper operation and limits on hours operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0		
LA-0323	01/09/2017 &nbsp;ACT	Fire Water Diesel Pump No. 4 Engine	17.11	Diesel Fuel	600 hp		Carbon Dioxide Equivalent (CO2e)	Proper operation and limits on hours of operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0		
MI-0421	08/26/2016 &nbsp;ACT	Emergency Diesel Generator Engine (EUEMRGRICE in FGRICE)	17.11	Diesel	500 H/YR		Carbon Dioxide Equivalent (CO2e)	Good combustion and design practices.	223 T/YR		
MI-0421	08/26/2016 &nbsp;ACT	Dieself fire pump engine (EUFIREPUMP in FGRICE)	17.11	Diesel	500 H/YR		Carbon Dioxide Equivalent (CO2e)	Good combustion and design practices.	56 T/YR		
MI-0423	01/04/2017 &nbsp;ACT	EUEMENGINE (Diesel fuel emergency engine)	17.11	Diesel Fuel	22.68 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion practices	928 T/YR		
OH-0366	08/25/2015 &nbsp;ACT	Emergency generator (P003)	17.11	Diesel fuel	2346 HP		Carbon Dioxide Equivalent (CO2e)	Efficient design	683 T/YR		
OH-0367	09/23/2016 &nbsp;ACT	Emergency generator (P003)	17.11	Diesel fuel	2947 HP		Carbon Dioxide Equivalent (CO2e)	Efficient design	858 T/YR		
OH-0368	04/19/2017 &nbsp;ACT	Emergency Generator (P009)	17.11	Diesel fuel	5000 HP		Carbon Dioxide Equivalent (CO2e)	good combustion control and operating practices and engines designed to meet the stands of 40 CFR Part 60, Subpart IIII	1289 T/YR		
PA-0309	12/23/2015 &nbsp;ACT	2000 kW Emergency Generator	17.11	Ultra-low sulfur Diesel	0		Carbon Dioxide Equivalent (CO2e)		81 TONS		
PA-0311	09/01/2015 &nbsp;ACT	Fire Pump Engine	17.11	diesel	0		Carbon Dioxide Equivalent (CO2e)		14 TPY		

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - GHG (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
TX-0766	09/11/2015 &nbsp;ACT	Emergency Engine Generators	17.11	Diesel	750 hp		Carbon Dioxide Equivalent (CO2e)	Equipment specifications & work practices -  Good combustion practices and limited operational hours	40 HR/YR		
TX-0799	06/08/2016 &nbsp;ACT	Fire pump engines	17.11	diesel	0		Carbon Dioxide Equivalent (CO2e)	Equipment specifications and good combustion practices. Operation limited to 100 hours per year.	72.16 T/YR		
VA-0325	06/17/2016 &nbsp;ACT	DIESEL-FIRED EMERGENCY GENERATOR 3000 kW (1)	17.11	DIESEL FUEL	0		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices/Maintenance	163.6 LB/MMBTU		519.45
AK-0076	08/20/2012 &nbsp;ACT	Combustion of Diesel by ICEs	17.11	ULSD	1750 kW		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices and 40 CFR 60 Subpart IIII requirements	0		
AK-0080	06/06/2013 &nbsp;ACT	Combustion	17.13	Ultra Low Sulfur Diesel	2000 ekW		Carbon Dioxide Equivalent (CO2e)	Good Combustion and Operation practices	0		
AK-0081	06/12/2013 &nbsp;ACT	Combustion	17.11	ULSD	610 hp		Carbon Dioxide Equivalent (CO2e)	Good Combustion and Operating Practices	0		
AK-0082	01/23/2015 &nbsp;ACT	Emergency Camp Generators	17.11	Ultra Low Sulfur Diesel	2695 hp		Carbon Dioxide Equivalent (CO2e)		2332 TONS/YEAR		
AK-0082	01/23/2015 &nbsp;ACT	Fine Water Pumps	17.11	Ultra Low Sulfur Diesel	610 hp		Carbon Dioxide Equivalent (CO2e)		565 TONS/YEAR		
AK-0082	01/23/2015 &nbsp;ACT	Bulk Tank Generator Engines	17.11	Ultra Low Sulfur Diesel	891 hp		Carbon Dioxide Equivalent (CO2e)		7194 TONS/YEAR		
CO-0067	06/04/2013 &nbsp;ACT	Emergency Generator	17.11	diesel	19950 gal per year		Carbon Dioxide Equivalent (CO2e)	NSPS IIII compliant.	0		
FL-0338	05/30/2012 &nbsp;ACT	Main Propulsion Engines - Development Driller 1	17.11	Diesel	0		Carbon Dioxide Equivalent (CO2e)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, and additional enhanced work practice standards including an engine performance management system, positive crankcase ventilation, turbocharger with aftercooler, and high pressure fuel injection with aftercooler.	829 G/KW-H		618.19
FL-0338	05/30/2012 &nbsp;ACT	Main Propulsion Engines - C.R. Luigs	17.11	Diesel	5875 hp		Carbon Dioxide Equivalent (CO2e)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, and additional enhanced work practice standards including an engine performance management system and the Diesel Engines with Turbochargers measurement system, positive crankcase ventilation, turbocharger and aftercooler, and high pressure fuel injection with aftercooler.	705 G/KW-H		525.72
FL-0338	05/30/2012 &nbsp;ACT	Fast Rescue Craft Diesel Engine - C.R. Luigs	17.11	diesel	142 hp		Carbon Dioxide Equivalent (CO2e)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines and use of low sulfur diesel fuel	0		
FL-0338	05/30/2012 &nbsp;ACT	Emergency Generator Diesel Engine - Development Driller 1	17.11	Diesel	2229 hp		Carbon Dioxide Equivalent (CO2e)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	77.84 T/12MO ROLLING TOTAL		
FL-0338	05/30/2012 &nbsp;ACT	Emergency Generator Diesel Engine - C.R. Luigs	17.11	diesel	2064 hp		Carbon Dioxide Equivalent (CO2e)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	72.06 T/12MO ROLLING TOTAL		

**BACT Determinations for Large Internal Combustion Engines (> 500 HP) - GHG (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/hp-hr
FL-0347	09/16/2014 &nbsp;   ACT	Source Wide Emissions	17.11	Diesel	0		Carbon Dioxide Equivalent (CO2e)	good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure where applicable	74571 TONS		
IA-0105	10/26/2012 &nbsp;   ACT	Emergency Generator	17.11	diesel fuel	142 GAL/H		Carbon Dioxide Equivalent (CO2e)	good combustion practices	788.5 TONS/YR		
IA-0105	10/26/2012 &nbsp;   ACT	Emergency Generator	17.11	diesel fuel	142 GAL/H		Carbon Dioxide	good combustion practices	1.55 G/KW-H		
IA-0106	07/12/2013 &nbsp;   ACT	Emergency Generators	17.11	diesel fuel	180 GAL/H		Carbon Dioxide	good combustion practices	1.55 LB/KW-H		524.28
IA-0106	07/12/2013 &nbsp;   ACT	Emergency Generators	17.11	diesel fuel	180 GAL/H		Carbon Dioxide Equivalent (CO2e)	good combustion practices	509 TONS/YR		
IL-0114	09/05/2014 &nbsp;   ACT	Emergency Generator	17.11	distillate fuel oil	3755 HP		Carbon Dioxide Equivalent (CO2e)	Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7.	432 TPY		
IN-0158	12/03/2012 &nbsp;   ACT	TWO (2) EMERGENCY DIESEL GENERATORS	17.11	DIESEL	1006 HP EACH		Carbon Dioxide Equivalent (CO2e)	GOOD ENGINEERING DESIGN AND FUEL EFFICIENT DESIGN	1186 TONS		
IN-0158	12/03/2012 &nbsp;   ACT	EMERGENCY DIESEL GENERATOR	17.11	DIESEL	2012 HP		Carbon Dioxide Equivalent (CO2e)	GOOD ENGINEERING DESIGN AND FUEL EFFICIENT DESIGN POST COMBUSTION CARBON CAPTURE	1186 TONS		
IN-0166	06/27/2012 &nbsp;   ACT	TWO (2) EMERGENCY GENERATORS	17.11	DIESEL	1341 HORSEPOWER, EACH		Carbon Dioxide	USE OF GOOD ENGINEERING DESIGN AND EFFICIENT ENGINES MEETING APPLICABLE NSPS AND MACT STANDARDS	84 T/YR		
IN-0166	06/27/2012 &nbsp;   ACT	THREE (3) FIREWATER PUMP ENGINES	17.11	DIESEL	575 HORSEPOWER, EACH		Carbon Dioxide	USE OF GOOD ENGINEERING DESIGN AND EFFICIENT ENGINES MEETING APPLICABLE NSPS AND MACT STANDARDS	84 T/YR		
IN-0173	06/04/2014 &nbsp;   ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	NO. 2, DIESEL	3600 BHP		Carbon Dioxide	GOOD COMBUSTION PRACTICES	526.39 G/BHP-H		526.39
IN-0179	09/25/2013 &nbsp;   ACT	DIESEL-FIRED EMERGENCY GENERATOR	17.11	NO. 2 FUEL OIL	4690 B-HP		Carbon Dioxide	GOOD COMBUSTION PRACTICES	526.39 G/B-HP-H		526.39
IN-0180	06/04/2014 &nbsp;   ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	NO. 2, DIESEL	3600 BHP		Carbon Dioxide	GOOD COMBUSTION PRACTICES	526.39 G/B-HP-H		526.39
IN-0185	04/24/2014 &nbsp;   ACT	DIESEL FIRE PUMP	17.11	DIESEL	300 HP		Carbon Dioxide Equivalent (CO2e)		31.11 CO2E		
LA-0296	05/23/2014 &nbsp;   ACT	Emergency Diesel Generators (EQTs 622, 671, 773, 850, 994, 995, 996, 1033, 1077, 1105, &nbsp;&nbsp; 1202)	17.11	Diesel	2682 HP		Carbon Dioxide Equivalent (CO2e)	Compliance with 40 CFR 60 Subpart IIII; operating the engine in accordance with the engine manufacturer's instructions and/or written procedures (consistent with safe operation) designed to maximize combustion efficiency and minimize fuel usage.	56 TPY		
LA-0308	09/26/2013 &nbsp;   ACT	2000 KW Diesel Fired Emergency Generator Engine	17.11	Diesel	20.4 MMBTU/hr		Carbon Dioxide	Good combustion practices	0		517.55
*LA-0315	05/23/2014 &nbsp;   ACT	Emergency Diesel Generator 1	17.11	Diesel	5364 HP		Carbon Dioxide Equivalent (CO2e)	Proper design and operation; energy efficiency measures	0		
*LA-0315	05/23/2014 &nbsp;   ACT	Emergency Diesel Generator 2	17.11	Diesel	5364 HP		Carbon Dioxide Equivalent (CO2e)	Proper design and operation; energy efficiency measures	0		
*LA-0315	05/23/2014 &nbsp;   ACT	Fire Pump Diesel Engine 1	17.11	Diesel	751 HP		Carbon Dioxide Equivalent (CO2e)	Proper design and operation; use of ultra- low sulfur diesel	0		
*LA-0315	05/23/2014 &nbsp;   ACT	Fire Pump Diesel Engine 2	17.11	Diesel	751 HP		Carbon Dioxide Equivalent (CO2e)	Proper design and operation; use of ultra- low sulfur diesel	0		
MA-0039	01/30/2014 &nbsp;   ACT	Emergency Engine/Generator	17.11	ULSD	7.4 MMBTU/H		Carbon Dioxide Equivalent (CO2e)		162.85 LB/MMBTU		517.07

Std Units	Limit
g/hp-hr	

Appendix C, Page C2-57

**BACT Determinations for Crusher Circuit Sources - Particulates**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit gr/dscf
AK-0084	06/30/2017 &nbsp;  ACT	Ore Crushing and Transfers (Enclosures)	90.021	5100 tph		Particulate matter, total (TPM)	Enclosures	0.0005	GR/DSCF	0.00050
AK-0084	06/30/2017 &nbsp;  ACT	Ore Crushing and Transfers (Dust Collector)	90.021	5100 tph		Particulate matter, total (TPM)	Dust Collector	0.01	GR/DSCF	0.01000
MI-0400	06/29/2011 &nbsp;  ACT	Coal crushers (EUFUELCRUSHER)	90.011	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Fabric filter dust collector	27.6	E-4 LB/H	
MN-0085	05/10/2012 &nbsp;  ACT	SECONDARY SCREENING CRUSHER/COBBER LINE 1	90.031	0		Particulate Matter (PM)	FABRIC FILTER WITH LEAK DETECTION	0.002	GR/DSCF	0.00200
MN-0085	05/10/2012 &nbsp;  ACT	SECONDARY SCREENING CRUSHER/COBBER LINE 2	90.031	0		Particulate Matter (PM)	FABRIC FILTER WITH LEAK DETECTION	0.002	GR/DSCF	0.00200
MN-0085	05/10/2012 &nbsp;  ACT	SECONDARY SCREENING CRUSHER/COBBER LINE 3	90.031	0		Particulate Matter (PM)	FABRIC FILTER WITH LEAK DETECTION	0.002	GR/DSCF	0.00200
MN-0085	05/10/2012 &nbsp;  ACT	SECONDARY SCREENING CRUSHER/COBBER LINE 4	90.031	0		Particulate Matter (PM)	FABRIC FILTER WITH LEAK DETECTION	0.002	GR/DSCF	0.00200
OH-0380	08/07/2019 &nbsp;  ACT	Recycle Prep Crushing (P903)	81.59	5 T/H		Particulate matter, filterable &lt; 10 Åµ (FPM10)	i.Ensure the recycle prep crushing loadout transfer point shall occur within the melt shop feed handling building; ii.Minimize the recycle prep crushing loadout transfer point drop height to the extent possible; and iii.Equip the screener and load-out points with a hood or enclosure vented to a baghouse capable of achieving 90% capture efficiency for partially enclosed transfer points.	0.002	GR/DSCF	0.00200
OH-0380	08/07/2019 &nbsp;  ACT	FeV Crushing and Screening (P908)	81.59	10 T/H		Particulate matter, filterable &lt; 10 Åµ (FPM10)	Baghouse with a 99.9% control efficiency, a 90% capture efficiency for load-in and a 99% capture efficiency for crushing and screening.	0.002	GR/DSCF	0.00200
TX-0869	11/06/2019 &nbsp;  ACT	Stone Handling Area Crusher	90.019	1428 TON/H		Particulate matter, total (TPM)	WATER SPRAYS	0		
TX-0869	11/06/2019 &nbsp;  ACT	Lime Belt Crusher	90.019	0		Particulate matter, total (TPM)	BAGHOUSE	0.009	GR/DSCF	0.00900
WI-0262	06/30/2017 &nbsp;  ACT	Coal crusher house, P06	90.011	1600 tons per hour		Particulate matter, total (TPM)	Building enclosure. New dust collection system, new baghouse.	1.12	LBS/HR	0.00200
*WY-0078	03/27/2017 &nbsp;  ACT	DC-08C Crusher Bldg Screens, 4C-36 and 4C-37A	90.017	0		Particulate matter, filterable (FPM)	baghouse	0.24	LB/H	0.00200
*WY-0078	03/27/2017 &nbsp;  ACT	DC-09A Crusher Bldg, Housekeeping C-24, 4C-28 and 4C-29	90.017	0		Particulate matter, filterable (FPM)	baghouse	0.1	LB/H	0.00200



**BACT Determinations for Crusher Circuit Sources (Conveyors) - Particulates**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit gr/dscf
IN-0166	06/27/2012 &nbsp;ACT	BARGE UNLOADING FROM THE HOPPER TO THE BELT AND BARGE CONVEYOR TRANSFER POINTS	90.011	750	T/H	Particulate matter, total &lt; 10 Åµ (TPM10)	WET DUST EXTRACTION OR A BAGHOUSE	0.003	GR/DSCF	0.00300
IN-0166	06/27/2012 &nbsp;ACT	RAIL HOPPERS UNLOADING TO THE CONVEYOR BELTS AND RAIL CONVEYOR BELT TO THE STACKER	90.011	750	T/H	Particulate matter, total &lt; 10 Åµ (TPM10)	WET DUST EXTRACTION OR BAGHOUSE	0.003	GR/DSCF	0.00300
IN-0166	06/27/2012 &nbsp;ACT	TRANSFER SYSTEMS CONSISTING OF HOPPERS AND CONVEYOR BELTS TRANSFERRING FEED STOCK FROM THE PILES TO CLASSIFICATION TOWERS; CLASSIFICATION TOWERS; AND	90.011	750	T/H	Particulate matter, total &lt; 10 Åµ (TPM10)	WET DUST EXTRACTION OR A BAGHOUSE	0.003	GR/DSCF	0.00300
IN-0166	06/27/2012 &nbsp;ACT	TRUCK/RAIL CONVEYOR TRANSFER TOWER; TRUCK STATIONS UNLOADING TO A TRUCK HOPPER; AND TRUCK HOPPER UNLOADING TO THE CONVEYOR BELTS	90.011	750	T/H	Particulate matter, total &lt; 10 Åµ (TPM10)	ENCLOSED VENT TO A DUST EXTRACTION SYSTEM OR BAGHOUSE	0.003	GR/DSCF	0.00300
IN-0167	04/16/2013 &nbsp;ACT	LIMESTONE CONVEYOR & ENCLOSED STORAGE (PILE)	90.019	495	T/H	Particulate matter, total &lt; 10 Åµ (TPM10)	DEVELOPMENT, MAINTENANCE, AND IMPLEMENTATION OF A SITE-SPECIFIC FUGITIVE DUST CONTROL PLAN AND ENCLOSURE	0.02	LB/H	
IN-0167	04/16/2013 &nbsp;ACT	DOLOMITE CONVEYOR & ENCLOSED STORAGE (PILE)	90.024	495	T/H	Particulate matter, total &lt; 10 Åµ (TPM10)	DEVELOPMENT, MAINTENANCE, AND IMPLEMENTATION OF A SITE-SPECIFIC FUGITIVE DUST CONTROL PLAN	0.01	LB/H	
IN-0317	06/11/2019 &nbsp;ACT	unloading conveyor, transfer station EU-1001	90.011	5000	TONS/H	Particulate matter, total &lt; 10 Åµ (TPM10)	baghouse	0.002	GR/DSCF	0.00200
IN-0317	06/11/2019 &nbsp;ACT	closed coal screw conveyor	90.011	500	TONS/H	Particulate matter, total &lt; 10 Åµ (TPM10)	coal handling system filter EU-2005	0.002	GR/DSCF	0.00200
IN-0317	06/11/2019 &nbsp;ACT	coarse additive conveyor EU-2006	90.999	0	TONS/H	Particulate matter, total &lt; 10 Åµ (TPM10)	Filter EU-2006	0.002	GR/DSCF	0.00200

**BACT Determinations for Crusher Circuit Sources (Conveyors) - Particulates**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit gr/dscf
KY-0110	07/23/2020 &nbsp;ACT	EP 07-06 - DRI Transfer Conveyors	90.021	577500	ton/yr	Particulate matter, total &lt; 10 Åµ (TPM10)	For the DRI Transfer Conveyors (EP 07-06): The permittee shall install, operate, and maintain dust collectors on DRI transfer conveyor #3 and #4, each designed to control particulate grain loading to 0.001 grain/dscf and the flow rate to 1200 dscf/min.	0.001	GR/DSCF	0.00100
LA-0248	01/27/2011 &nbsp;ACT	DRI-105 DRI Unit #1 Furnace Feed Conveyor Baghouse	81.9	3858090	Tons/yr	Particulate matter, filterable &lt; 10 Åµ (FPM10)	Fabric filter baghouse achieving at least 99.5% control of PM10/PM2.5. Additionally, hooded conveyors and enclosed transfer stations will be installed to limit emissions from material handling	0.1	LB/H	0.00200
LA-0248	01/27/2011 &nbsp;ACT	DRI-205 DRI Unit #2 Furnace Feed Conveyor Baghouse	81.9	3858090		Particulate matter, filterable &lt; 10 Åµ (FPM10)	Fabric filter baghouse achieving at least 99.5% control of PM10/PM2.5. Additionally, hooded conveyors and enclosed transfer stations will be installed to limit emissions from material handling	0.1	LB/H	0.00200
*LA-0345	06/13/2019 &nbsp;ACT	material transfers and conveyors	81.49	0		Particulate matter, total &lt; 10 Åµ (TPM10)	baghouses and/or enclosed conveyors	0		
MI-0430	03/30/2017 &nbsp;ACT	EU-10A Sand legs & vibratory mold dumper/conveyor at HCI facility	81.39	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Baghouse #864 (32,000 dscfm dust collector) and baghouse #776 (24,000 dscfm dust collector). Both are reverse air.	0.66	LB/H	0.00241
MI-0430	03/30/2017 &nbsp;ACT	EU-02 A-line shake out sand elevator and conveyor at HCI facility	81.39	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Baghouse #788 20,000 dscfm pulse jet type	0.09	LB/H	0.00053
MN-0084	12/06/2011 &nbsp;ACT	PELLET PRODUCT CONVEYOR & REJECT DISCHARGE, PHASE III	90.031	0		Particulate Matter (PM)	WET SCRUBBER	2.6	LB/H	0.00500
MN-0084	12/06/2011 &nbsp;ACT	FINAL TRANSFER CONVEYORS AND LOADOUT CONVEYOR	90.031	0		Particulate Matter (PM)	BAGHOUSE W/ LEAK DETECTION	0.21	LB/H	0.00200
MN-0084	12/06/2011 &nbsp;ACT	RECLAIM CONVEYOR	90.031	0		Particulate Matter (PM)	BAGHOUSE W/ LEAK DETECTION	0.31	LB/H	0.00200
MN-0084	12/06/2011 &nbsp;ACT	EMERGENCY PELLET CONVEYOR TRANSFER, PHASE III	90.031	0		Particulate Matter (PM)	BAGHOUSE W/ LEAK DETECTION	0.21	LB/H	0.00200
MN-0085	05/10/2012 &nbsp;ACT	OXIDE PELLET STOCKPILE CONVEYOR GALLERY	90.031	0		Particulate Matter (PM)	FABRIC FILTER WITH LEAK DETECTION	0.002	GR/DSCF	0.00200
MN-0085	05/10/2012 &nbsp;ACT	PELLET SCREENINGS TO REGRIND CONVEYORS	90.031	0		Particulate Matter (PM)	FABRIC FILTER WITH LEAK DETECTION	0.002	GR/DSCF	0.00200

**BACT Determinations for Crusher Circuit Sources (Conveyors) - Particulates**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit gr/dscf
OH-0376	02/09/2018 &nbsp;   ACT	HBI Conveyor Transfers with Scrubbers and loadout building (P902)	81.9		0	Particulate matter, filterable &lt; 10 Åµ (FPM10)	Use of venturi scrubbers, use of partial enclosures and use of water/chemical suppressants	0.47 LB/H		0.00250
TX-0725	03/13/2014 &nbsp;   ACT	HBI Cooling Conveyor No. 1 and No. 2	81.9		2205000	Particulate matter, filterable &lt; 10 Åµ (FPM10)	High energy wet scrubber having an OLGL not greater than 0.0079 gr/dscf for control of PM.	0.0079 GR/DSCF		0.00790
TX-0869	11/06/2019 &nbsp;   ACT	Material Handling (Conveyors and Feeders)	90.019		0	Particulate matter, filterable &lt; 10 Åµ (FPM10)	BAGHOUSE	0.005 GR/DSCF		0.00500

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - CO (Gas-Fired)**

**Std Units  
Limit**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/MMBTU
AK-0083	01/06/2015 &nbsp;ACT	Five (5) Waste Heat Boilers	13.31	Natural Gas	50 MMBTU/H		Carbon Monoxide		50 PPMV		0.0370
*AK-0085	08/13/2020 &nbsp;ACT	Two (2) Buyback Gas Bath Heaters and Three (3) Operations Camp Heaters	13.31	Natural Gas	32 MMBtu/hr		Carbon Monoxide	Good Combustion Practices, Clean Fuels, and Limited Operation of 500 hours per year per heater.	0.087 LB/MMBTU		0.0870
AL-0307	10/09/2015 &nbsp;ACT	PACKAGE BOILER	13.31	NATURAL GAS	17.5 MMBTU/H		Carbon Monoxide	GCP	0.08 LB/MMBTU		0.0800
AL-0307	10/09/2015 &nbsp;ACT	2 CALP LINE BOILERS	13.31	NATURAL GAS	24.59 MMBTU/H		Carbon Monoxide	GCP	0.08 LB/MMBTU		0.0800
*AL-0329	09/21/2021 &nbsp;ACT	Three Gas Heaters	13.31	Natural Gas	10 MMBtu/hr		Carbon Monoxide		0.08 LB/MMBTU		0.0800
AR-0138	02/17/2012 &nbsp;ACT	VTD BOILER	13.31	NATURAL GAS	50.4 MMBTU/H		Carbon Monoxide	GOOD COMBUSTION PRACTICE	3.1 LB/H		0.0610
AR-0140	09/18/2013 &nbsp;ACT	BOILER, PICKLE LINE	13.31	NATURAL GAS	67 MMBTU/H		Carbon Monoxide	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0824 LB/MMBTU		0.0824
AR-0140	09/18/2013 &nbsp;ACT	BOILERS SN-26 AND 27, GALVANIZING LINE	13.31	NATURAL GAS	24.5 MMBTU/H		Carbon Monoxide	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0824 LB/MMBTU		0.0824
AR-0140	09/18/2013 &nbsp;ACT	FURNACES SN-40 AND SN-42, DECARBURIZING LINE	13.31	NATURAL GAS	22 MMBTU/H		Carbon Monoxide	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0824 LB/MMBTU		0.0824
AR-0155	11/07/2018 &nbsp;ACT	BOILER, PICKLE LINE	13.31	NATURAL GAS	53.7 MMBTU/HR		Carbon Monoxide	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0824 LB/MMBTU		0.0824
AR-0155	11/07/2018 &nbsp;ACT	BOILER SN-26, GALVANIZING LINE	13.31	NATURAL GAS	53.7 MMBTU/HR		Carbon Monoxide	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0824 LB/MMBTU		0.0824
AR-0155	11/07/2018 &nbsp;ACT	PREHEATER, GALVANIZING LINE SN-28	13.31	NATURAL GAS	78.2 MMBTU/HR		Carbon Monoxide	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0824 LB/MMBTU		0.0824
AR-0159	04/05/2019 &nbsp;ACT	BOILER, PICKLE LINE	13.31	NATURAL GAS	0		Carbon Monoxide	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0824 LB/MMBTU		0.0824
AR-0159	04/05/2019 &nbsp;ACT	PREHEATERS, GALVANIZING LINE SN-28 and SN-29	13.31	NATURAL GAS	0		Carbon Monoxide	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0824 LB/MMBTU		0.0824
AR-0159	04/05/2019 &nbsp;ACT	BOILER, ANNEALING PICKLE LINE	13.31	NATURAL GAS	0		Carbon Monoxide	Combustion of Natural gas and Good Combustion Practice	0.0824 LB/MMBTU		0.0824
AR-0159	04/05/2019 &nbsp;ACT	BOILERS SN-26 AND SN-27, GALVANIZING LINE	13.31	NATURAL GAS	0		Carbon Monoxide	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0824 LB/MMBTU		0.0824
AR-0168	03/17/2021 &nbsp;ACT	Galvanizing Line #2 Furnace	13.31	Natural Gas	150.5 MMBtu/hr		Carbon Monoxide	Combustion of Natural gas and Good Combustion Practice	0.0824 LB/MMBTU		0.0824
AR-0168	03/17/2021 &nbsp;ACT	Decarburizing Line Furnace Section	13.31	Natural Gas	58 MMBtu/hr		Carbon Monoxide	Combustion of Natural gas and Good Combustion Practice	0.0824 LB/MMBTU		0.0824
*AR-0172	09/01/2021 &nbsp;ACT	SN-202, 203, 204 Pickle Line Boilers	13.31	Natural Gas	0		Carbon Monoxide	Good Combustion Practice	0.084 LB/MMBTU		0.0840
CA-1185	06/07/2011 &nbsp;ACT	Boiler, Forced Draft	13.31	Natural gas	3 MMBTU/H		Carbon Monoxide	Forced draft, full modulation, flue gas recirculation	100 PPMVD@3% O2		0.0739
CA-1192	06/21/2011 &nbsp;ACT	AUXILIARY BOILER	13.31	NATURAL GAS	37.4 MMBTU/H		Carbon Monoxide	ULTRA LOW NOX BURNER, USE PUC QUALITY NATURAL GAS, OPERATIONAL RESTRICTION OF 46, 675 MMBTU/YR	50 PPMVD		0.0370
FL-0335	09/05/2012 &nbsp;ACT	Four(4) Natural Gas Boilers - 46 MMBtu/hour	13.31	Natural Gas	46 MMBTU/H		Carbon Monoxide	Good Combustion Practice	0.039 LB/MMBTU		0.0390
FL-0356	03/09/2016 &nbsp;ACT	Auxiliary Boiler, 99.8 MMBtu/hr	13.31	Natural gas	99.8 MMBtu/hr		Carbon Monoxide	Proper combustion prevents CO	0.08 LB/MMBTU		0.0800
*FL-0363	12/04/2017 &nbsp;ACT	99.8 MMBtu/hr auxiliary boiler	13.31	Natural gas	99.8 MMBtu/hr		Carbon Monoxide	Clean fuel	0.08 LB/MMBTU		0.0800
*FL-0367	07/27/2018 &nbsp;ACT	60 MMBtu/hour Auxiliary Boiler	13.31	Natural Gas	60 MMBtu/hour		Carbon Monoxide	Good combustion practices and low-NOx burners	0.08 LB/MMBTU		0.0800
IA-0106	07/12/2013 &nbsp;ACT	Startup Heater	13.31	natural gas	58.8 MMBTU/H		Carbon Monoxide	good operating practices & use of natural gas	0.0194 LB/MMBTU		0.0194
IA-0107	04/14/2014 &nbsp;ACT	dew point heater	13.31	natural gas	13.32 mmBtu/hr		Carbon Monoxide		0.041 LB/MMBTU		0.0410
IA-0107	04/14/2014 &nbsp;ACT	auxiliary boiler	13.31	natural gas	60.1 mmBtu/hr		Carbon Monoxide	CO catalytic oxidizer	0.0164 LB/MMBTU		0.0164

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - CO (Gas-Fired)**

**Std Units  
Limit**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/MMBTU
IL-0129	07/30/2018 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	96 mMBtu/hr		Carbon Monoxide	Good combustion practices	0.037 LB/MMBTU		0.0370
IL-0130	12/31/2018 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	96 mMBtu/hr		Carbon Monoxide	Good combustion practice	0.037 LB/MMBTU		0.0370
IN-0158	12/03/2012 &nbsp;ACT	TWO (2) NATURAL GAS AUXILIARY BOILERS	13.31	NATURAL GAS	80 MMBTU/H		Carbon Monoxide	GOOD COMBUSTION PRACTICES	0.083 LB/MMBTU		0.0830
IN-0263	03/23/2017 &nbsp;ACT	STARTUP HEATER EU-002	13.31	NATURAL GAS	70 MMBTU/HR		Carbon Monoxide	GOOD COMBUSTION PRACTICES	2.556 LB/H		0.0365
IN-0285	08/02/2017 &nbsp;ACT	Space Heaters	13.31		0		Carbon Monoxide		0.038 LB/MMBTU		0.0380
*KS-0030	03/31/2016 &nbsp;ACT	Indirect fuel-gas heater	13.31		2 mMBTU/hr		Carbon Monoxide		0.16 LB/H		0.0800
KY-0110	07/23/2020 &nbsp;ACT	EP 15-01 - Natural Gas Direct-Fired Space Heaters, Process Water Heaters, & Air Makeup Heaters	13.31	Natural Gas	40 MMBtu/hr, combined		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	84 LB/MMSCF		0.0824
KY-0110	07/23/2020 &nbsp;ACT	EP 05-01 - Group 1 Car Bottom Furnaces #1 - #3	13.31	Natural Gas	28 MMBtu/hr, each		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	84 LB/MMSCF		0.0824
KY-0110	07/23/2020 &nbsp;ACT	EP 04-02 - Austenitizing Furnace	13.31	Natural Gas	54 MMBtu/hr		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	84 LB/MMSCF		0.0824
KY-0110	07/23/2020 &nbsp;ACT	EP 05-02 - Group 2 Car Bottom Furnaces A & B	13.31	Natural Gas	60 MMBtu/hr, combined		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	84 LB/MMSCF		0.0824
KY-0110	07/23/2020 &nbsp;ACT	EP 03-02 - Ingot Car Bottom Furnaces #1-#4	13.31	Natural Gas	37 MMBtu/hr, each		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	84 LB/MMSCF		0.0824
KY-0110	07/23/2020 &nbsp;ACT	EP 03-05 - Steckel Mill Coiling Furnaces #1 & #2	13.31	Natural Gas	17.5 MMBtu/hr, each		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	84 LB/MMSCF		0.0824
KY-0110	07/23/2020 &nbsp;ACT	EP 04-03 - Tempering Furnace	13.31	Natural Gas	48 MMBtu/hr		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	84 LB/MMSCF		0.0824
KY-0115	04/19/2021 &nbsp;ACT	Cold Mill Complex Makeup Air Units (EP 21-19)	13.31	Natural Gas	40 MMBtu/hr, total		Carbon Monoxide	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	84 LB/MMSCF		0.0824
KY-0115	04/19/2021 &nbsp;ACT	Vacuum Degasser Boiler (EP 20-13)	13.31	Natural Gas	50.4 MMBtu/hr		Carbon Monoxide	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	61 LB/MMSCF		0.0598
KY-0115	04/19/2021 &nbsp;ACT	Pickle Line #2 6" Boiler #1 & #2 (EP 21-04 & EP 21-05)	13.31	Natural Gas	18 MMBtu/hr, each		Carbon Monoxide	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	84 LB/MMSCF		0.0824
KY-0115	04/19/2021 &nbsp;ACT	Galvanizing Line #2 Alkali Cleaning Section Heater (EP 21-07B)	13.31	Natural Gas	23 MMBtu/hr		Carbon Monoxide	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	84 LB/MMSCF		0.0824
KY-0115	04/19/2021 &nbsp;ACT	Galvanizing Line #2 Radiant Tube Furnace (EP 21-08B)	13.31	Natural Gas	36 MMBtu/hr		Carbon Monoxide	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	84 LB/MMSCF		0.0824
KY-0115	04/19/2021 &nbsp;ACT	Galvanizing Line #2 Annealing Furnaces (15) (EP 21-15)	13.31	Natural Gas	4.8 MMBtu/hr, each		Carbon Monoxide	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	84 LB/MMSCF		0.0824
KY-0115	04/19/2021 &nbsp;ACT	Galvanizing Line #2 Preheat Furnace (EP 21-08A)	13.31	Natural Gas	94 MMBtu/hr		Carbon Monoxide	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan.	84 LB/MMSCF		0.0824
KY-0115	04/19/2021 &nbsp;ACT	Galvanizing Line #2 Zinc Pot Preheater (EP 21-09)	13.31	Natural Gas	3 MMBtu/hr		Carbon Monoxide	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	84 LB/MMSCF		0.0824
KY-0115	04/19/2021 &nbsp;ACT	Heated Transfer Table Furnace (EP 02-03)	13.31	Natural Gas	65.5 MMBtu/hr		Carbon Monoxide	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	84 LB/MMSCF		0.0824

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - CO (Gas-Fired)**

**Std Units  
Limit**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/mmbtu
LA-0305	06/30/2016 &nbsp;   ACT	Gasifier Start-up Preheat Burners	13.31	Natural gas	23 MM BTU/hr (each)		Carbon Monoxide	good engineering practices, good combustion technology, and use of clean fuels	0		
LA-0305	06/30/2016 &nbsp;   ACT	WSA Preheat Burners	13.31	Natural Gas	0		Carbon Monoxide	good engineering design and practices and use of clean fuels	0		
LA-0307	03/21/2016 &nbsp;   ACT	Regenerative Heaters	13.31	natural gas	7.37 mm btu/hr		Carbon Monoxide	good combustion practices	0		
LA-0311	07/15/2013 &nbsp;   ACT	No. 6 Ammonia Plant Start-up Heater (4-13, EQT 158)	13.31	Natural Gas	94.5 MM Btu/hr		Carbon Monoxide	Good combustion practices; proper engineering design	7.78 LB/HR		0.0823
*LA-0315	05/23/2014 &nbsp;   ACT	Reactor Charge Heater - 53B001	13.31	Natural Gas	10.1 MMBTU/HR		Carbon Monoxide	Combustion controls (proper burner design and operation using natural gas)	0.83 LB/H		0.0820
*LA-0315	05/23/2014 &nbsp;   ACT	Regeneraton Heater - 51B001	13.31	Natural Gas	61 MMBTU/HR		Carbon Monoxide	Combustion controls (proper burner design and operation using natural gas)	5 LB/H		0.0820
*LA-0315	05/23/2014 &nbsp;   ACT	Recycle Gas Heater - 51B002A	13.31	Natural Gas	33 MMBTU/HR		Carbon Monoxide	Combustion controls (proper burner design and operation using natural gas)	2.67 LB/H		0.0820
*LA-0315	05/23/2014 &nbsp;   ACT	Recycle Gas Heater - 51B002B	13.31	Natural Gas	33 MMBTU/HR		Carbon Monoxide	Combustion controls (proper burner design and operation using natural gas)	2.67 LB/H		0.0820
*LA-0315	05/23/2014 &nbsp;   ACT	Recycle Gas Heater - 51B002C	13.31	Natural Gas	33 MMBTU/HR		Carbon Monoxide	Combustion controls (proper burner design and operation using natural gas)	2.67 LB/H		0.0820
*LA-0315	05/23/2014 &nbsp;   ACT	Recycle Gas Heater - 51B002D	13.31	Natural Gas	33 MMBTU/HR		Carbon Monoxide	Combustion controls (proper burner design and operation using natural gas)	2.67 LB/H		0.0820
*LA-0315	05/23/2014 &nbsp;   ACT	Recycle Gas Heater - 51B002E	13.31	Natural Gas	33 MMBTU/HR		Carbon Monoxide	Combustion controls (proper burner design and operation using natural gas)	2.67 LB/H		0.0820
*LA-0349	07/10/2018 &nbsp;   ACT	Hot Oil Heaters (5)	13.31	natural gas	16.13 mm btu/hr		Carbon Monoxide	Good Combustion Practices	0		
*LA-0364	01/06/2020 &nbsp;   ACT	Hot Oil Heaters 1 and 2	13.31	Natural Gas	0		Carbon Monoxide	Good combustion practices and compliance with the applicable provisions of 40 CFR 63 Subpart DDDDD.	0.037 LB/MMBTU		0.0370
*LA-0364	01/06/2020 &nbsp;   ACT	PR Waste Heat Boiler	13.31	Natural Gas	94 mm btu/h		Carbon Monoxide	Good combustion practices and oxidation catalyst.	26.21 LB/H		0.2788
MA-0039	01/30/2014 &nbsp;   ACT	Auxiliary Boiler	13.31	Natural Gas	80 MMBTU/H		Carbon Monoxide	Oxidation catalyst	4.7 PPMVD@3% O2		0.0035
MD-0041	04/23/2014 &nbsp;   ACT	AUXILLARY BOILER	13.31	NATURAL GAS	93 MMBTU/H		Carbon Monoxide	GOOD COMBUSTION PRACTICES	0.02 LB/MMBTU		0.0200
MD-0042	04/08/2014 &nbsp;   ACT	AUXILLARY BOILER	13.31	NATURAL GAS	45 MMBTU/H		Carbon Monoxide	EXCLUSIVE USE OF PIPELINE QUALITY NATURAL GAS AND GOOD COMBUSTION PRACTICES	0.036 LB/MMBTU		0.0360
MD-0045	11/13/2015 &nbsp;   ACT	AUXILIARY BOILER	13.31	NATURAL GAS	42 MMBTU/H		Carbon Monoxide	GOOD COMBUSTION PRACTICES	0.037 LB/MMBTU		0.0370
MD-0046	10/31/2014 &nbsp;   ACT	AUXILIARY BOILER	13.31	PIPELINE QUALITY NATURAL GAS	93 MMBTU/H		Carbon Monoxide	EFFICIENT BOILER DESIGN AND APPLICATION OF GOOD COMBUSTION PRACTICES.	0.08 LB/MMBTU		0.0800
MI-0406	11/01/2013 &nbsp;   ACT	FG-AUXBOILER1-2; Two (2) natural gas-fired auxiliary boilers.	13.31	natural gas	40 MMBTU/H		Carbon Monoxide	Good combustion practices	0.036 LB/MMBTU		0.0360
MI-0410	07/25/2013 &nbsp;   ACT	FGAUXBOILERS: Two auxiliary boilers &lt; 100 MMBTU/H heat input each	13.31	natural gas	100 MMBTU/H heat input each		Carbon Monoxide	Efficient combustion.	0.075 LB/MMBTU		0.0750
MI-0412	12/04/2013 &nbsp;   ACT	Fuel pre-heater (EUFUELHTR)	13.31	natural gas	3.7 MMBTU/H		Carbon Monoxide	Good combustion practices	0.41 LB/H		0.1108
MI-0412	12/04/2013 &nbsp;   ACT	Auxiliary Boiler B (EUAUXBOILERB)	13.31	natural gas	95 MMBTU/H		Carbon Monoxide	Good combustion practices.	0.077 LB/MMBTU		0.0770
MI-0412	12/04/2013 &nbsp;   ACT	Auxiliary Boiler A (EUAUXBOILER A)	13.31	natural gas	55 MMBTU/H		Carbon Monoxide	Good combustion practices	0.077 LB/MMBTU		0.0770
MI-0420	06/03/2016 &nbsp;   ACT	FGAUXBOILERS	13.31	Natural gas	6 MMBTU/H		Carbon Monoxide	Good combustion practices and clean burn fuel (pipeline quality natural gas)	0.08 LB/MMBTU		0.0800
MI-0421	08/26/2016 &nbsp;   ACT	EUFLTOS1 in FGTOH (Thermal Oil System for Thermally Fused Lamination Lines)	13.31	Natural gas	34 MMBTU/H		Carbon Monoxide	Good design and operation	0.082 LB/MMBTU		0.0820
MI-0421	08/26/2016 &nbsp;   ACT	EUTOH (In FGTOH)--Thermal Oil Heater	13.31	Natural gas	34 MMBTU/H		Carbon Monoxide	Good design and operation	0.082 LB/MMBTU		0.0820

Std Units  
Limit

Appendix C, Page C2-65

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - CO (Gas-Fired)**

BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - CO (Gas-Fired)											Std Units Limit
RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/MMBtu
OH-0355	05/07/2013 &nbsp;ACT	4 Indirect-Fired Air Preheaters	13.31	Natural gas	0		Carbon Monoxide		0.15 LB/MMBTU		0.1500
OH-0360	11/05/2013 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural Gas	99 MMBtu/H		Carbon Monoxide	Good combustion practices and combustion optimization technology	5.45 LB/H		0.0550
OH-0366	08/25/2015 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	34 MMBTU/H		Carbon Monoxide	Good combustion controls	1.87 LB/H		0.0550
OH-0367	09/23/2016 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	99 MMBTU/H		Carbon Monoxide	Good combustion controls and natural gas/ultra low sulfur diesel	7.92 LB/H		0.0550
OH-0368	04/19/2017 &nbsp;ACT	Startup Heater (B001)	13.31	Natural gas	100 MMBTU/H		Carbon Monoxide	good combustion control (i.e., high temperatures, sufficient excess air, sufficient residence times, and god air/fuel mixing)	8.24 LB/H		0.0824
OH-0370	09/07/2017 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	37.8 MMBTU/H		Carbon Monoxide	Good combustion controls	2.08 LB/H		0.0550
OH-0372	09/27/2017 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	37.8 MMBTU/H		Carbon Monoxide	good combustion controls	2.08 LB/H		0.0550
OH-0374	10/23/2017 &nbsp;ACT	Fuel Gas Heaters (2 identical, P007 and P008)	13.31	Natural gas	15 MMBTU/H		Carbon Monoxide	Combustion control	0.83 LB/H		0.0550
OH-0375	11/07/2017 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	26.8 MMBTU/H		Carbon Monoxide	Good combustion controls	0.99 LB/H		0.0370
OH-0377	04/19/2018 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	44.55 MMBTU/H		Carbon Monoxide	Good combustion practices	1.67 LB/H		0.0375
OH-0377	04/19/2018 &nbsp;ACT	Auxiliary Boiler (B002)	13.31	Natural gas	80 MMBTU/H		Carbon Monoxide	Good combustion practices	2.48 LB/H		0.0310
*OH-0381	09/27/2019 &nbsp;ACT	Tunnel Furnace #2 (P018)	13.31	Natural Gas	88 MMBTU/H		Carbon Monoxide	Use natural gas, use of baffle type burners, good combustion practices and design	6.16 LB/H		0.0700
OK-0142	01/17/2012 &nbsp;ACT	Commercial/Institutiona l Boilers/Furnaces (&lt;100 MMBTUH)	13.31	Natural Gas	5 MMBTUH		Carbon Monoxide		0		
OK-0148	09/12/2012 &nbsp;ACT	Commercial/Institutiona l Boilers (&lt;100 MMBTUH)	13.31	Natural Gas	11.04 MMBTUH		Carbon Monoxide		0.074 LB/MMBTU		0.0740
OK-0153	03/01/2013 &nbsp;ACT	REGENERATION HEATERS	13.31	NATURAL GAS	5.61 MMBTUH		Carbon Monoxide	GOOD COMBUSTION PRACTICES.	0.0824 LB/MMBTU		0.0824
OK-0153	03/01/2013 &nbsp;ACT	HOT OIL HEATER	13.31	NATURAL GAS	17.4 MMBTUH		Carbon Monoxide	Efficient design and combustion.	0.0824 LB/MMBTU		0.0824
OK-0156	07/31/2013 &nbsp;ACT	Gas-fired Boiler	13.31	Natural Gas	95 MMBTUH		Carbon Monoxide	Economizer, Insulation, O2 train control, Energy recapture from blowdowns, and Condensate return system	146 LB CO2/1000 LB STEAM		
OK-0168	05/05/2015 &nbsp;ACT	NATURAL GAS-FIRED BOILER (&lt;100MMBTUH)	13.31	NATURAL GAS	40.4 MMBTUH		Carbon Monoxide	NO CONTROLS FEASIBLE;GOOD COMBUSTION PRACTICES	0.0075 LB/MMBTU		0.0075
OK-0173	01/19/2016 &nbsp;ACT	Heaters (Gas-Fired)	13.31	Natural Gas	0		Carbon Monoxide	Natural Gas Fuel.	0.084 LB/MMBTU		0.0840
OR-0050	03/05/2014 &nbsp;ACT	Auxiliary boiler	13.31	natural gas	39.8 MMBTU/H		Carbon Monoxide	Utilize Low-NOx burners and FGR.	0.04 LB/MMBTU		0.0400
PA-0291	04/23/2013 &nbsp;ACT	AUXILIARY BOILER	13.31	Natural Gas	40 MMBTU/H		Carbon Monoxide		0.036 LB/MMBTU		0.0360
PA-0296	12/17/2013 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	40 MMBTU/H		Carbon Monoxide		3.31 T/YR		
PA-0307	06/15/2015 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	62.04 MCF/hr		Carbon Monoxide	Good combustion practices	0.06 LB/MMBTU		0.0600
PA-0309	12/23/2015 &nbsp;ACT	Auxiliary Boiler	13.31	Natural gas	13.31 MMBtu/hr		Carbon Monoxide		0.037 LB/MMBTU		0.0370
PA-0310	09/02/2016 &nbsp;ACT	Auxiliary boiler	13.31	Natural Gas	92.4 MMBtu/hr		Carbon Monoxide	ULSD and good combustion practices	0.037 LB/MMBTU		0.0370
PA-0311	09/01/2015 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	55.4 MMBtu/hr		Carbon Monoxide		0.037 LB/MMBTU		0.0370
*PA-0316	01/26/2018 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	118800 MMBtu/12 month period		Carbon Monoxide		0.036 LB		
*PA-0319	08/27/2018 &nbsp;ACT	NATURAL GAS FIRED AUXILIARY BOILER	13.31	Natural Gas	88 MMBtu/hr		Carbon Monoxide	Lo-NOx burners, Flue Gas Recirculation, good combustion practices, proper operation and maintainance.	0.055 LB/MMBTU		0.0550
SC-0113	02/08/2012 &nbsp;ACT	BOILERS	13.31	NATURAL GAS	5 MMBTU/H		Carbon Monoxide	GOOD COMBUSTION PRACTICES. CONSUMPTION OF NATURAL GAS AND PROPANE.	0		
SC-0149	01/03/2013 &nbsp;ACT	NATURAL GAS BOILER EU004	13.31	NATURAL GAS	46 MMBTU/H		Carbon Monoxide		0.039 LB/MMBTU		0.0390
SC-0149	01/03/2013 &nbsp;ACT	NATURAL GAS BOILER EU005	13.31	NATURAL GAS	46 MMBTU/H		Carbon Monoxide		0.039 LB/MMBTU		0.0390



Std Units  
Limit

Appendix C, Page C2-67

Std Units  
Limit

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/MMBTU
WY-0070	08/28/2012 &nbsp;    ACT	Inlet Air Heater (EP08)	13.31	Natural Gas	16.1	MMBTU/H	Carbon Monoxide	good combustion practices	0.08	LB/MMBTU	0.0800
WY-0070	08/28/2012 &nbsp;    ACT	Inlet Air Heater (EP09)	13.31	Natural Gas	16.1	MMBTU/H	Carbon Monoxide	good combustion practices	0.08	LB/MMBTU	0.0800
WY-0070	08/28/2012 &nbsp;    ACT	Inlet Air Heater (EP10)	13.31	Natural Gas	16.1	MMBTU/H	Carbon Monoxide	good combustion practices	0.08	LB/MMBTU	0.0800
WY-0070	08/28/2012 &nbsp;    ACT	Inlet Air Heater (EP11)	13.31	Natural Gas	16.1	MMBTU/H	Carbon Monoxide	good combustion practices	0.08	LB/MMBTU	0.0800
WY-0075	07/16/2014 &nbsp;    ACT	Auxiliary Boiler	13.31	natural gas	25.06	MMBTU/h	Carbon Monoxide	good combustion	0.0375	LB/MMBTU	0.0375

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - NO<sub>x</sub> (Gas-Fired)**
**Std Units  
Limit**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/mmbtu
AK-0083	01/06/2015 &nbsp;ACT	Five (5) Waste Heat Boilers	13.31	Natural Gas	50 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Selective Catalytic Reduction	7 PPMV		0.0258
*AK-0085	08/13/2020 &nbsp;ACT	Two (2) Buyback Gas Bath Heaters and Three (3) Operations Camp Heaters	13.31	Natural Gas	32 MMBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> Burners, Good Combustion Practices, Limited Operation of 500 hours per year per heater.	0.036 LB/MMBTU		0.0360
*AL-0329	09/21/2021 &nbsp;ACT	Three Gas Heaters	13.31	Natural Gas	10 MMBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )		0.011 LB/MMBTU		0.0110
AL-0307	10/09/2015 &nbsp;ACT	PACKAGE BOILER	13.31	NATURAL GAS	17.5 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	LOW NOX BURNER FLUE GAS RECIRCULATION GCP	30 PPMVD		0.0364
AL-0307	10/09/2015 &nbsp;ACT	2 CALP LINE BOILERS	13.31	NATURAL GAS	24.59 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	LOW NOX BURNER FLUE GAS RECIRCULATION (FGR) GOOD COMBUSTION PRACTICES (GCP)	30 PPMVD		0.0364
AR-0140	09/18/2013 &nbsp;ACT	BOILER, PICKLE LINE	13.31	NATURAL GAS	67 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	LOW NOX BURNERS COMBUSTION OF CLEAN FUEL GOOD COMBUSTION PRACTICES	0.035 LB/MMBTU		0.0350
AR-0140	09/18/2013 &nbsp;ACT	BOILERS SN-26 AND 27, GALVANIZING LINE	13.31	NATURAL GAS	24.5 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	LOW NOX BURNERS COMBUSTION OF CLEAN FUEL GOOD COMBUSTION PRACTICES	0.035 LB/MMBTU		0.0350
AR-0140	09/18/2013 &nbsp;ACT	FURNACES SN-40 AND SN-42, DECARBURIZING LINE	13.31	NATURAL GAS	22 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	LOW NOX BURNERS SCR COMBUSTION OF CLEAN FUEL GOOD COMBUSTION PRACTICES	0.1 LB/MMBTU		0.1000
AR-0155	11/07/2018 &nbsp;ACT	BOILER, PICKLE LINE	13.31	NATURAL GAS	53.7 MMBTU/HR		Nitrogen Oxides (NO <sub>x</sub> )	LOW NOX BURNERS COMBUSTION OF CLEAN FUEL GOOD COMBUSTION PRACTICES	0.035 LB/MMBTU		0.0350
AR-0155	11/07/2018 &nbsp;ACT	BOILER SN-26, GALVANIZING LINE	13.31	NATURAL GAS	53.7 MMBTU/HR		Nitrogen Oxides (NO <sub>x</sub> )	LOW NOX BURNERS COMBUSTION OF CLEAN FUEL GOOD COMBUSTION PRACTICES	0.035 LB/MMBTU		0.0350
AR-0155	11/07/2018 &nbsp;ACT	PREHEATER, GALVANIZING LINE SN-28	13.31	NATURAL GAS	78.2 MMBTU/HR		Nitrogen Oxides (NO <sub>x</sub> )	SCR, LOW NOX BURNERS, AND COMBUSTION OF CLEAN FUEL AND GOOD COMBUSTION PRACTICES	0.035 LB/MMBTU		0.0350
AR-0159	04/05/2019 &nbsp;ACT	BOILER, PICKLE LINE	13.31	NATURAL GAS	0		Nitrogen Oxides (NO <sub>x</sub> )	LOW NOX BURNERS COMBUSTION OF CLEAN FUEL GOOD COMBUSTION PRACTICES	0.035 LB/MMBTU		0.0350
AR-0159	04/05/2019 &nbsp;ACT	PREHEATERS, GALVANIZING LINE SN-28 and SN-29	13.31	NATURAL GAS	0		Nitrogen Oxides (NO <sub>x</sub> )	SCR, LOW NOX BURNERS, AND COMBUSTION OF CLEAN FUEL AND GOOD COMBUSTION PRACTICES	0.035 LB/MMBTU		0.0350
AR-0159	04/05/2019 &nbsp;ACT	BOILER, ANNEALING PICKLE LINE	13.31	NATURAL GAS	0		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners, Combustion of clean fuel, and Good Combustion Practices	0.035 LB/MMBTU		0.0350
AR-0159	04/05/2019 &nbsp;ACT	BOILERS SN-26 AND SN-27, GALVANIZING LINE	13.31	NATURAL GAS	0		Nitrogen Oxides (NO <sub>x</sub> )	LOW NOX BURNERS COMBUSTION OF CLEAN FUEL GOOD COMBUSTION PRACTICES	0.035 LB/MMBTU		0.0350
AR-0167	12/01/2020 &nbsp;ACT	SN-803 - #4 Pre-Flash Column Reboiler	13.31	Natural Gas	40 MMBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )	Ultra-low NO <sub>x</sub> burners and good combustion practice	1.9 LB/HR		0.0475
AR-0167	12/01/2020 &nbsp;ACT	SN-805 - #4 Pre-Flash Reboiler	13.31	Natural Gas	75 MMBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )	Ultra-low NO <sub>x</sub> burners and good combustion practice	3.5 LB/HR		0.0467
AR-0167	12/01/2020 &nbsp;ACT	SN-808 - #7 FCCU Furnace	13.31	Natural Gas	56 MMBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practice	2.8 LB/HR		0.0500
AR-0167	12/01/2020 &nbsp;ACT	SN-810 - #9 Hydrotreater Furnace/Reboiler	13.31	Natural Gas	70 MMBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )		12.7 LB/HR		0.1814

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - NO<sub>x</sub> (Gas-Fired)**
**Std Units  
Limit**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/mmbtu
AR-0167	12/01/2020 &nbsp;ACT	SN-842 - #12 Unit Distillate Hydrotreater	13.31	Natural Gas	50 MMBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practice	5.3 LB/HR		0.1060
AR-0168	03/17/2021 &nbsp;ACT	Galvanizing Line #2 Furnace	13.31	Natural Gas	150.5 MMBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )	SCR, Low NO <sub>x</sub> burners Combustion of clean fuel Good Combustion Practices	0.035 LB/MMBTU		0.0350
AR-0168	03/17/2021 &nbsp;ACT	Decarburizing Line Furnace Section	13.31	Natural Gas	58 MMBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners SCR Combustion of clean fuel Good Combustion Practices	0.1 LB/MMBTU		0.1000
*AR-0172	09/01/2021 &nbsp;ACT	SN-202, 203, 204 Pickle Line Boilers	13.31	Natural Gas	0		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners	0.035 LB/MMBTU		0.0350
CA-1185	06/07/2011 &nbsp;ACT	Boiler, Forced Draff	13.31	Natural gas	3 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Forced draft, full modulation, flue gas recirculation	12 PPMVD@3% O <sub>2</sub>		0.0146
CA-1189	01/24/2012 &nbsp;ACT	Boiler	13.31	Propane, field gas, PUC natural gas	2 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> Burner	20 PPMVD@3% O <sub>2</sub>		0.0243
CA-1190	01/24/2012 &nbsp;ACT	Heater	13.31	Propane, field gas, PUC natural gas	3 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burner	12 PPMVD@3% O <sub>2</sub>		0.0146
CA-1192	06/21/2011 &nbsp;ACT	AUXILIARY BOILER	13.31	NATURAL GAS	37.4 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	ULTRA LOW NOX BURNER, USE PUC QUALITY NATURAL GAS, OPERATIONAL RESTRICTION OF 46, 675 MMBTU/YR	9 PPMVD		0.0109
CT-0159	11/30/2015 &nbsp;ACT	Aux Boiler	13.31	Natural Gas	359.6 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Boiler permit does not specify any add-on control other than ultra-low NO <sub>x</sub> burner. Unit may be required to use additional control options to meet emissions limit.	7 PPMVD @3% O <sub>2</sub>		0.0085
FL-0335	09/05/2012 &nbsp;ACT	Four(4) Natural Gas Boilers - 46 MMBtu/hour	13.31	Natural Gas	46 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> Burner and Flue Gas Recirculation	0.036 LB/MMBTU		0.0360
FL-0356	03/09/2016 &nbsp;ACT	Auxiliary Boiler, 99.8 MMBtu/hr	13.31	Natural gas	99.8 MMBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )	Low-NO <sub>x</sub> burners	0.05 LB/MMBTU		0.0500
FL-0356	03/09/2016 &nbsp;ACT	Two natural gas heaters	13.31	Natural gas	10 MMBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )	Must have NO <sub>x</sub> emission design value less than 0.1 lb/MMBtu	0.1 LB/MMBTU		0.1000
*FL-0363	12/04/2017 &nbsp;ACT	Two natural gas heaters	13.31	Natural gas	9.9 MMBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )	Manufacturer certification	0.1 LB/MMBTU		0.1000
*FL-0367	07/27/2018 &nbsp;ACT	60 MMBtu/hour Auxiliary Boiler	13.31	Natural Gas	60 MMBtu/hour		Nitrogen Oxides (NO <sub>x</sub> )	low-NO <sub>x</sub> burners	0.05 LB/MMBTU		0.0500
IA-0107	04/14/2014 &nbsp;ACT	dew point heater	13.31	natural gas	13.32 mmBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )		0.013 LB/MMBTU		0.0130
IA-0107	04/14/2014 &nbsp;ACT	auxiliary boiler	13.31	natural gas	60.1 mmBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )		0.013 LB/MMBTU		0.0130
IL-0129	07/30/2018 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	96 mmBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )	Ultra-low NO <sub>x</sub> burners and flue gas recirculation, air preheater, automated combustion management system with O <sub>2</sub> trim system and automated water blowdown, and good combustion practices.	0.011 LB/MMBTU		0.0110
IL-0130	12/31/2018 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	96 mmBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )	Ultra low-NO <sub>x</sub> burners and flue gas recirculation air preheater, automated combustion management systems, automated water blowdown, good combustion practices	0.01 LB/MMBTU		0.0100
IN-0158	12/03/2012 &nbsp;ACT	TWO (2) NATURAL GAS AUXILIARY BOILERS	13.31	NATURAL GAS	80 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	LOW NOX BURNER WITH FLUE GAS RECIRCULATION	0.032 LB/MMBTU		0.0320
IN-0263	03/23/2017 &nbsp;ACT	STARTUP HEATER EU-002	13.31	NATURAL GAS	70 MMBTU/HR		Nitrogen Oxides (NO <sub>x</sub> )	GOOD COMBUSTION PRACTICES	12.611 LB/H		0.1802
IN-0285	08/02/2017 &nbsp;ACT	Space Heaters	13.31		0		Nitrogen Oxides (NO <sub>x</sub> )		0.05 LB/MMBTU		0.0500

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - NO<sub>x</sub> (Gas-Fired)**

BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - NO <sub>x</sub> (Gas-Fired)											Std Units Limit
RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/mmbtu
*KS-0030	03/31/2016 &nbsp;    ACT	Indirect fuel-gas heater	13.31			2 mmbTU/hr	Nitrogen Oxides (NO <sub>x</sub> )		0.2 LB/H		0.1000
KY-0110	07/23/2020 &nbsp;    ACT	EP 15-01 - Natural Gas Direct-Fired Space Heaters, Process Water Heaters, & Air Makeup Heaters	13.31	Natural Gas		40 MMBtu/hr, combined	Nitrogen Oxides (NO <sub>x</sub> )	Low-Nox Burner (Designed to maintain 0.07 lb/MMBtu); and a Good Combustion and Operating Practices (GCOP) Plan.	70 LB/MMSCF		0.0686
KY-0110	07/23/2020 &nbsp;    ACT	EP 05-01 - Group 1 Car Bottom Furnaces #1 - #3	13.31	Natural Gas		28 MMBtu/hr, each	Nitrogen Oxides (NO <sub>x</sub> )	Low-Nox Burner (Designed to maintain 0.08 lb/MMBtu); and a Good Combustion and Operating Practices (GCOP) Plan.	81.6 LB/MMSCF		0.0800
KY-0110	07/23/2020 &nbsp;    ACT	EP 04-02 - Austenitizing Furnace	13.31	Natural Gas		54 MMBtu/hr	Nitrogen Oxides (NO <sub>x</sub> )	Low-Nox Burner (Designed to maintain 0.15 lb/MMBtu in flameless mode and 0.25 lb/MMBtu in flame mode); and a Good Combustion and Operating Practices (GCOP) Plan.	158 LB/MMSCF		0.1549
KY-0110	07/23/2020 &nbsp;    ACT	EP 05-02 - Group 2 Car Bottom Furnaces A & B	13.31	Natural Gas		60 MMBtu/hr, combined	Nitrogen Oxides (NO <sub>x</sub> )	Low-Nox Burner (Designed to maintain 0.08 lb/MMBtu); and a Good Combustion and Operating Practices (GCOP) Plan.	81.6 LB/MMSCF		0.0800
KY-0110	07/23/2020 &nbsp;    ACT	EP 03-02 - Ingot Car Bottom Furnaces #1- #4	13.31	Natural Gas		37 MMBtu/hr, each	Nitrogen Oxides (NO <sub>x</sub> )	Low-Nox Burner (Designed to maintain 0.18 lb/MMBtu); and a Good Combustion and Operating Practices (GCOP) Plan.	181.6 LB/MMSCF		0.1780
KY-0110	07/23/2020 &nbsp;    ACT	EP 03-05 - Steckel Mill Coiling Furnaces #1 & #2	13.31	Natural Gas		17.5 MMBtu/hr, each	Nitrogen Oxides (NO <sub>x</sub> )	Low-Nox Burner (Designed to maintain 0.08 lb/MMBtu); and a Good Combustion and Operating Practices (GCOP) Plan.	81.6 LB/MMSCF		0.0800
KY-0110	07/23/2020 &nbsp;    ACT	EP 04-03 - Tempering Furnace	13.31	Natural Gas		48 MMBtu/hr	Nitrogen Oxides (NO <sub>x</sub> )	Low-Nox Burner (Designed to maintain 0.07 lb/MMBtu); and a Good Combustion and Operating Practices (GCOP) Plan.	70 LB/MMSCF		0.0686
KY-0115	04/19/2021 &nbsp;    ACT	Cold Mill Complex Makeup Air Units (EP 21-19)	13.31	Natural Gas		40 MMBtu/hr, total	Nitrogen Oxides (NO <sub>x</sub> )	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	100 LB/MMSCF		0.0980
KY-0115	04/19/2021 &nbsp;    ACT	Vacuum Degasser Boiler (EP 20-13)	13.31	Natural Gas		50.4 MMBtu/hr	Nitrogen Oxides (NO <sub>x</sub> )	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan. Also equipped with low-NOx burners.	35 LB/MMSCF		0.0343
KY-0115	04/19/2021 &nbsp;    ACT	Pickle Line #2 6" Boiler #1 & #2 (EP 21-04 & #2 21-05)	13.31	Natural Gas		18 MMBtu/hr, each	Nitrogen Oxides (NO <sub>x</sub> )	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan. Equipped with low-NOx burners.	50 LB/MMSCF		0.0490
KY-0115	04/19/2021 &nbsp;    ACT	Galvanizing Line #2 Alkali Cleaning Section Heater (EP 21-07B)	13.31	Natural Gas		23 MMBtu/hr	Nitrogen Oxides (NO <sub>x</sub> )	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan. This unit is also required to be equipped with low-NOx burners (0.07 lb/MMBtu).	50 LB/MMSCF		0.0490
KY-0115	04/19/2021 &nbsp;    ACT	Galvanizing Line #2 Radiant Tube Furnace (EP 21-08B)	13.31	Natural Gas		36 MMBtu/hr	Nitrogen Oxides (NO <sub>x</sub> )	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan. This unit is also equipped with a SCR/SNCR system to control emissions. During a cold start, SCR does not reach operating temperature for approximately 30 minutes. During this time, only low-NOx burners are controlling emissions of NOx. NSG estimates the unit may undergo 1 cold start every two (2) weeks.	7.5 LB/MMSCF		0.0074

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - NO<sub>x</sub> (Gas-Fired)**
**Std Units  
Limit**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/mmmbtu
KY-0115	04/19/2021 &nbsp;   ACT	Galvanizing Line #2 Annealing Furnaces (15) (EP 21-15)	13.31	Natural Gas	4.8 MMBtu/hr, each		Nitrogen Oxides (NO <sub>x</sub> )	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan. This unit is equipped with low-NO <sub>x</sub> burners.	50 LB/MMSCF		0.0490
KY-0115	04/19/2021 &nbsp;   ACT	Galvanizing Line #2 Preheat Furnace (EP 21-08A)	13.31	Natural Gas	94 MMBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan. This unit is also equipped with a SCR/SNCR system to control emissions. During a cold start, SCR does not reach operating temperature for approximately 30 minutes. During this time, only low-NO <sub>x</sub> burners are controlling emissions of NO <sub>x</sub> . NSG estimates the unit may undergo 1 cold start every two (2) weeks.	7.5 LB/MMSCF		0.0074
KY-0115	04/19/2021 &nbsp;   ACT	Galvanizing Line #2 Zinc Pot Preheater (EP 21-09)	13.31	Natural Gas	3 MMBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan. This unit is equipped with a low-NO <sub>x</sub> burner.	70 LB/MMSCF		0.0686
KY-0115	04/19/2021 &nbsp;   ACT	Heated Transfer Table Furnace (EP 02-03)	13.31	Natural Gas	65.5 MMBtu/hr		Nitrogen Oxides (NO <sub>x</sub> )	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan. Equipped with low NO <sub>x</sub> burners (0.07 lb/MMBtu).	70 LB/MMSCF		0.0686
LA-0305	06/30/2016 &nbsp;   ACT	Gasifier Start-up Preheat Burners	13.31	Natural gas	23 MM BTU/hr (each)		Nitrogen Oxides (NO <sub>x</sub> )	good engineering practices, good combustion technology, and use of clean fuels	0		
LA-0305	06/30/2016 &nbsp;   ACT	WSA Preheat Burners	13.31	Natural Gas	0		Nitrogen Oxides (NO <sub>x</sub> )	good engineering design and practices and use of clean fuels	0		
LA-0307	03/21/2016 &nbsp;   ACT	Regenerative Heaters	13.31	natural gas	7.37 mm btu/hr		Nitrogen Oxides (NO <sub>x</sub> )	good combustion practices	0		
*LA-0315	05/23/2014 &nbsp;   ACT	Reactor Charge Heater - 53B001	13.31	Natural Gas	10.1 MMBTU/HR		Nitrogen Oxides (NO <sub>x</sub> )	Ultra-Low NO <sub>x</sub> Burners (ULNB)	0.4 LB/H		0.0400
*LA-0315	05/23/2014 &nbsp;   ACT	Regeneration Heater - 51B001	13.31	Natural Gas	61 MMBTU/HR		Nitrogen Oxides (NO <sub>x</sub> )	Ultra-Low NO <sub>x</sub> Burners (ULNB)	2.44 LB/H		0.0400
*LA-0315	05/23/2014 &nbsp;   ACT	Recycle Gas Heater - 51B002A	13.31	Natural Gas	33 MMBTU/HR		Nitrogen Oxides (NO <sub>x</sub> )	Ultra-Low NO <sub>x</sub> Burners (ULNB)	1.3 LB/H		0.0400
*LA-0315	05/23/2014 &nbsp;   ACT	Recycle Gas Heater - 51B002B	13.31	Natural Gas	33 MMBTU/HR		Nitrogen Oxides (NO <sub>x</sub> )	Ultra-Low NO <sub>x</sub> Burners (ULNB)	1.3 LB/H		0.0400
*LA-0315	05/23/2014 &nbsp;   ACT	Recycle Gas Heater - 51B002C	13.31	Natural Gas	33 MMBTU/HR		Nitrogen Oxides (NO <sub>x</sub> )	Ultra-Low NO <sub>x</sub> Burners (ULNB)	1.3 LB/H		0.0400
*LA-0315	05/23/2014 &nbsp;   ACT	Recycle Gas Heater - 51B002D	13.31	Natural Gas	33 MMBTU/HR		Nitrogen Oxides (NO <sub>x</sub> )	Ultra-Low NO <sub>x</sub> Burners (ULNB)	1.3 LB/H		0.0400
*LA-0315	05/23/2014 &nbsp;   ACT	Recycle Gas Heater - 51B002E	13.31	Natural Gas	33 MMBTU/HR		Nitrogen Oxides (NO <sub>x</sub> )	Ultra-Low NO <sub>x</sub> Burners (ULNB)	1.3 LB/H		0.0400
*LA-0349	07/10/2018 &nbsp;   ACT	Hot Oil Heaters (5)	13.31	natural gas	16.13 mm btu/hr		Nitrogen Oxides (NO <sub>x</sub> )	ULNB and Good Combustion Practices	0		
*LA-0364	01/06/2020 &nbsp;   ACT	Hot Oil Heaters 1 and 2	13.31	Natural Gas	0		Nitrogen Oxides (NO <sub>x</sub> )	LNB	0.06 LB/MMBTU		0.0600
*LA-0364	01/06/2020 &nbsp;   ACT	PR Waste Heat Boiler	13.31	Natural Gas	94 mm btu/h		Nitrogen Oxides (NO <sub>x</sub> )	SCR and LNB	14.41 LB/H		0.1533
MA-0039	01/30/2014 &nbsp;   ACT	Auxiliary Boiler	13.31	Natural Gas	80 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	ultra low NO <sub>x</sub> burners	0.011 LB/MMBTU		0.0110
MD-0041	04/23/2014 &nbsp;   ACT	AUXILLARY BOILER	13.31	NATURAL GAS	93 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	EXCLUSIVE USE OF NATURAL GAS, ULTRA LOW-NOX BURNERS, AND FLUE GAS RECIRCULATION (FGR)	0.011 LB/MMBTU		0.0110
MD-0042	04/08/2014 &nbsp;   ACT	AUXILLARY BOILER	13.31	NATURAL GAS	45 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	EXCLUSIVE USE OF PIPELINE QUALITY NATURAL GAS AND GOOD COMBUSTION PRACTICES	0.01 LB/MMBTU		0.0100

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - NO<sub>x</sub> (Gas-Fired)**

BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - NO <sub>x</sub> (Gas-Fired)											Std Units Limit
RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/mmbtu
MD-0045	11/13/2015 &nbsp;ACT	AUXILIARY BOILER	13.31	NATURAL GAS	42 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	EXCLUSIVE USE OF PIPELINE QUALITY NATURAL GAS, ULTRA LOW-NOX BURNERS, AND GOOD COMBUSTION PRACTICES	0.01 LB/MMBTU		0.0100
MD-0046	10/31/2014 &nbsp;ACT	AUXILIARY BOILER	13.31	PIPELINE QUALITY NATURAL GAS	93 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	EFFICIENT BOILER DESIGN WITH ULTRA LOW NOX BURNER, EXCLUSIVE USE OF PIPELINE QUALITY NATURAL GAS, AND APPLICATION OF GOOD COMBUSTION PRACTICES	0.01 LB/MMBTU		0.0100
MI-0406	11/01/2013 &nbsp;ACT	FG-AUXBOILER1-2; Two (2) natural gas-fired auxiliary boilers.	13.31	natural gas	40 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices.	0.035 LB/MMBTU		0.0350
MI-0410	07/25/2013 &nbsp;ACT	FGAUXBOILERS: Two auxiliary boilers &lt; 100 MMBTU/H heat input each	13.31	natural gas	100 MMBTU/H heat input each		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners and flue gas recirculation.	0.05 LB/MMBTU		0.0500
MI-0412	12/04/2013 &nbsp;ACT	Fuel pre-heater (EUFUELHTR)	13.31	natural gas	3.7 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices.	0.55 LB/H		0.1486
MI-0412	12/04/2013 &nbsp;ACT	Auxiliary Boiler B (EUAUXBOILERB)	13.31	natural gas	95 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Dry low NO <sub>x</sub> burners, flue gas recirculation and good combustion practices.	0.05 LB/MMBTU		0.0500
MI-0412	12/04/2013 &nbsp;ACT	Auxiliary Boiler A (EUAUXBOILER A)	13.31	natural gas	55 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners and good combustion practices	0.05 LB/MMBTU		0.0500
MI-0420	06/03/2016 &nbsp;ACT	FGAUXBOILERS	13.31	Natural gas	6 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Ultra low NO <sub>x</sub> burners and good combustion practices.	14 PPMVOL		0.0516
MI-0421	08/26/2016 &nbsp;ACT	EUFLTOS1 in FGTOH (Thermal Oil System for Thermally Fused Lamination Lines)	13.31	Natural gas	34 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners and good design and combustion practices.	0.05 LB/MMBTU		0.0500
MI-0421	08/26/2016 &nbsp;ACT	EUTOH (In FGTOH)--Thermal Oil Heater	13.31	Natural gas	34 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners and good design and combustion practices.	0.05 LB/MMBTU		0.0500
MI-0423	01/04/2017 &nbsp;ACT	FGFUELHTR (Two fuel pre-heaters identified as EUFUELHTR1 & EUFUELHTR2)	13.31	Natural gas	27 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices.	2.65 LB/H		0.0981
MI-0424	12/05/2016 &nbsp;ACT	EUFUELHTR (Fuel pre-heater)	13.31	Natural gas	3.7 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices.	0.55 LB/H		0.1486
MI-0424	12/05/2016 &nbsp;ACT	EUAUXBOILER (Auxiliary boiler)	13.31	natural gas	83.5 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners/Internal flue gas recirculation and good combustion practices.	0.05 LB/MMBTU		0.0500
MI-0425	05/09/2017 &nbsp;ACT	EUTOH in FGTOH	13.31	Natural gas	38 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Good design and combustion practices, Low NO <sub>x</sub> burners.	0.05 LB/MMBTU		0.0500
MI-0425	05/09/2017 &nbsp;ACT	EUFLTOS1 in FGTOH	13.31	Natural gas	10.2 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Good design and combustion practices, low NO <sub>x</sub> burners.	0.05 LB/MMBTU		0.0500
MI-0426	03/24/2017 &nbsp;ACT	FGAUXBOILERS (6 auxiliary boilers EUAUXBOIL2A, EUAUXBOIL3A, EUAUXBOIL2B, EUAUXBOIL3B, EUAUXBOIL2C, EUAUXBOIL3C)	13.31	Natural gas	3 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Ultra-low NO <sub>x</sub> burners and good combustion practices.	20 PPM AT 3% O2		0.0243

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - NO<sub>x</sub> (Gas-Fired)**
**Std Units  
Limit**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/mmmbtu
MI-0433	06/29/2018 &nbsp;ACT	EUAUXBOILER (North Plant): Auxiliary Boiler	13.31	Natural gas	61.5 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners/flue gas recirculation and good combustion practices.	0.04 LB/MMBTU		0.0400
MI-0433	06/29/2018 &nbsp;ACT	EUAUXBOILER (South Plant): Auxiliary Boiler	13.31	Natural gas	61.5 MMBTU/h		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners/flue gas recirculation and good combustion practices.	0.04 LB/MMBTU		0.0400
MI-0435	07/16/2018 &nbsp;ACT	EUAUXBOILER: Auxiliary Boiler	13.31	Natural gas	99.9 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners/Flue gas recirculation.	0.036 LB/MMBTU		0.0360
MI-0435	07/16/2018 &nbsp;ACT	EUFUELHTR1: Natural gas fired fuel heater	13.31	Natural gas	20.8 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burner	0.75 LB/H		0.0361
MI-0435	07/16/2018 &nbsp;ACT	EUFUELHTR2: Natural gas fired fuel heater	13.31	Natural gas	3.8 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burner	0.14 LB/H		0.0368
*MI-0440	05/22/2019 &nbsp;ACT	FGFUELHEATERS	13.31	natural gas	25 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners and good combustion practices.	0.05 LB/MMBTU		0.0500
*MI-0441	12/21/2018 &nbsp;ACT	EUAUXBOILER-- natural gas fired auxiliary boiler rated at &lt;= 99MMBTU/H	13.31	Natural gas	99 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners (LNB) or flue gas recirculation along with good combustion practices.	30 PPM		0.0364
*MI-0442	08/21/2019 &nbsp;ACT	FGAUXBOILER	13.31	Natural gas	80 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices and low NO <sub>x</sub> burners.	0.036 LB/MMBTU		0.0360
*MI-0442	08/21/2019 &nbsp;ACT	FGPREHEAT	13.31	natural gas	7 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices and low NO <sub>x</sub> burners	0.036 LB/MMBTU		0.0360
*MI-0445	11/26/2019 &nbsp;ACT	FGFUELHTR (2 fuel pre-heaters)	13.31	Natural gas	27 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion practices	1.32 LB/H		0.0489
NJ-0079	07/25/2012 &nbsp;ACT	Commercial/Instituti onal size boilers less than 100 MMBtu/hr	13.31	natural gas	2000 hours/year		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners	0.01 LB/MMBTU		0.0100
NJ-0080	11/01/2012 &nbsp;ACT	Boiler less than 100 MMBTu/hr	13.31	Natural Gas	51.9 mmcubic ft/year		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners and flue gas recirculation	0.01 LB/MMBTU		0.0100
NJ-0084	03/10/2016 &nbsp;ACT	Auxiliary Boiler firing natural gas	13.31	natural gas	687 MMCFT/YR		Nitrogen Oxides (NO <sub>x</sub> )	low NO <sub>x</sub> burners and flue gas recirculation (FGR)	0.8 LB/H		0.0100
NJ-0085	07/19/2016 &nbsp;ACT	AUXILIARY BOILER	13.31	Natural GAS	4000 H/YR		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners and Flue Gas Recirculation (FGR) and use of natural gas a clean burning fuel	0.975 LB/H		0.0100
NY-0103	02/03/2016 &nbsp;ACT	Auxiliary boiler	13.31	natural gas	60 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	flue gas recirculation with low NO <sub>x</sub> burners	0.0085 LB/MMBTU		0.0085
NY-0104	08/01/2013 &nbsp;ACT	Auxiliary boiler	13.31	natural gas	0		Nitrogen Oxides (NO <sub>x</sub> )	Flue gas recirculation with low NO <sub>x</sub> burners.	0.045 LB/MMBTU		0.0450
OH-0350	07/18/2012 &nbsp;ACT	Steam Boiler	13.31	Natural Gas	65 MMBtu/H		Nitrogen Oxides (NO <sub>x</sub> )		0.07 LB/MMBTU		0.0700
OH-0352	06/18/2013 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	99 MMBtu/H		Nitrogen Oxides (NO <sub>x</sub> )	low NO <sub>x</sub> burners and flue gas recirculation	1.98 LB/H		0.0200
OH-0355	05/07/2013 &nbsp;ACT	4 Indirect-Fired Air Preheaters	13.31	Natural gas	0		Nitrogen Oxides (NO <sub>x</sub> )		0.14 LB/MMBTU		0.1400
OH-0360	11/05/2013 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural Gas	99 MMBtu/H		Nitrogen Oxides (NO <sub>x</sub> )	low NO <sub>x</sub> burners and flue gas recirculation	1.98 LB/H		0.0200
OH-0366	08/25/2015 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	34 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Flue gas recirculation (FGR) and low NO <sub>x</sub> burner	0.68 LB/H		0.0200
OH-0367	09/23/2016 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	99 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Flue gas recirculation (FGR), low NO <sub>x</sub> burner, and natural gas/ultra low sulfur diesel	9.9 LB/H		0.0200
OH-0368	04/19/2017 &nbsp;ACT	Startup Heater (B001)	13.31	Natural gas	100 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Good combustion control (i.e., high temperatures, sufficient excess air, sufficient residence times, and god air/fuel mixing).	10 LB/H		0.1000



**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - NO<sub>x</sub> (Gas-Fired)**
**Std Units  
Limit**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/mmmbtu
OH-0370	09/07/2017 &nbsp;   ACT	Auxiliary Boiler (B001)	13.31	Natural gas	37.8 MMBTU/H		Nitrogen Oxides (NOx)	Flue gas recirculation (FGR), low NOx burner	0.76 LB/H		0.0200
OH-0372	09/27/2017 &nbsp;   ACT	Auxiliary Boiler (B001)	13.31	Natural gas	37.8 MMBTU/H		Nitrogen Oxides (NOx)	low NOx burners and flue gas recirculation	0.76 LB/H		0.0200
OH-0374	10/23/2017 &nbsp;   ACT	Fuel Gas Heaters (2 identical, P007 and P008)	13.31	Natural gas	15 MMBTU/H		Nitrogen Oxides (NOx)	Low-NOx gas burner	0.3 LB/H		0.0200
OH-0375	11/07/2017 &nbsp;   ACT	Auxiliary Boiler (B001)	13.31	Natural gas	26.8 MMBTU/H		Nitrogen Oxides (NOx)	Flue gas recirculation and low NOx burner	0.29 LB/H		0.0110
OH-0377	04/19/2018 &nbsp;   ACT	Auxiliary Boiler (B001)	13.31	Natural gas	44.55 MMBTU/H		Nitrogen Oxides (NOx)	Good combustion practices and low NOx burner	1.56 LB/H		0.0350
OH-0377	04/19/2018 &nbsp;   ACT	Auxiliary Boiler (B002)	13.31	Natural gas	80 MMBTU/H		Nitrogen Oxides (NOx)	Good combustion practices and low NOx burner	2.19 LB/H		0.0270
OH-0379	02/06/2019 &nbsp;   ACT	Startup boiler (B001)	13.31	Natural gas	15.17 MMBTU/H		Nitrogen Oxides (NOx)	Low-NOx burners, good combustion practices and the use of natural gas	0.634 LB/H		0.0418
OH-0379	02/06/2019 &nbsp;   ACT	Ladle Preheaters (P002, P003 and P004)	13.31	Natural gas	15 MMBTU/H		Nitrogen Oxides (NOx)	Good combustion practices and the use of natural gas	2.12 LB/H		0.1410
*OH-0381	09/27/2019 &nbsp;   ACT	Tunnel Furnace #2 (P018)	13.31	Natural Gas	88 MMBTU/H		Nitrogen Oxides (NOx)	Use of natural gas, use of low NOx burners, good combustion practices and design	6.16 LB/H		0.0700
OK-0148	09/12/2012 &nbsp;   ACT	Commercial/Institutional Boilers (<100 MMBTUH)	13.31	Natural Gas	11.04 MMBTUH		Nitrogen Oxides (NOx)	Low-NOx burners	0.045 LB/MMBTU		0.0450
OK-0153	03/01/2013 &nbsp;   ACT	REGENERATION HEATERS	13.31	NATURAL GAS	5.61 MMBTUH		Nitrogen Oxides (NOx)	LOW-NOx BURNERS	0.045 LB/MMBTU		0.0450
OK-0153	03/01/2013 &nbsp;   ACT	HOT OIL HEATER	13.31	NATURAL GAS	17.4 MMBTUH		Nitrogen Oxides (NOx)	LOW-NOx BURNERS.	0.045 LB/MMBTU		0.0450
OK-0156	07/31/2013 &nbsp;   ACT	Refinery Boiler	13.31	Natural Gas	5 MMBTUH		Nitrogen Oxides (NOx)	Good Combustion	0.0075 LB/MMBTU		0.0075
OK-0173	01/19/2016 &nbsp;   ACT	Heaters (Gas-Fired)	13.31	Natural Gas	0		Nitrogen Oxides (NOx)	Natural Gas Fuel	0.1 LB/MMBTU		0.1000
OR-0050	03/05/2014 &nbsp;   ACT	Auxiliary boiler	13.31	natural gas	39.8 MMBTU/H		Nitrogen Oxides (NOx)	Utilize Low-NOx burners and FGR.	0.035 LB/MMBTU		0.0350
PA-0291	04/23/2013 &nbsp;   ACT	AUXILIARY BOILER	13.31	Natural Gas	40 MMBTU/H		Nitrogen Oxides (NOx)		0.011 LB/MMBTU		0.0110
PA-0296	12/17/2013 &nbsp;   ACT	Auxiliary Boiler	13.31	Natural Gas	40 MMBTU/H		Nitrogen Oxides (NOx)		1.01 T/YR		
PA-0307	06/15/2015 &nbsp;   ACT	Auxiliary Boiler	13.31	Natural Gas	62.04 MCF/hr		Nitrogen Oxides (NOx)	Good combustion practices, Ultra-Low NOx burners, FGR	0.0086 LB/MMBTU		0.0086
PA-0309	12/23/2015 &nbsp;   ACT	Auxillary Boiler	13.31	Natural gas	13.31 MMBtu/hr		Nitrogen Oxides (NOx)	SCR and ultra low NOx burners, Fired only on natural gas supplied by a public utility.	0.006 LB/MMBTU		0.0060
PA-0310	09/02/2016 &nbsp;   ACT	Auxiliary boiler	13.31	Natural Gas	92.4 MMBtu/hr		Nitrogen Oxides (NOx)	Ultra low NOx burners, FGR, good combustion practices	0.011 LB/MMBTU		0.0110
PA-0311	09/01/2015 &nbsp;   ACT	Auxiliary Boiler	13.31	Natural Gas	55.4 MMBtu/hr		Nitrogen Oxides (NOx)		0.006 LB/MMBTU		0.0060
*PA-0316	01/26/2018 &nbsp;   ACT	Auxiliary Boiler	13.31	Natural Gas	118800 MMBtu/12 month period		Nitrogen Oxides (NOx)	&ldquo;&ldquo;ultra-low NOx burners and flue gas re-circulation&ldquo;&ldquo; operated in accordance with the manufacturer&rsquo;s specifications and good operating practices	0.011 LB		0.0110
*PA-0319	08/27/2018 &nbsp;   ACT	NATURAL GAS FIRED AUXILIARY BOILER	13.31	Natural Gas	88 MMBtu/hr		Nitrogen Oxides (NOx)	Lo-NOx burners, Flue Gas Recirculation, good combustion practices, proper operation and maintenance.	0.02 LB/MMBTU		0.0200

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - NO<sub>x</sub> (Gas-Fired)**
**Std Units  
Limit**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/mmbtu
SC-0113	02/08/2012 &nbsp;ACT	BOILERS	13.31	NATURAL GAS	5 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	GOOD DESIGN AND COMBUSTION PRACTICES, LOW NOX BURNERS, COMBUSTION OF NATURAL GAS/PROPANE.	0		
SC-0149	01/03/2013 &nbsp;ACT	NATURAL GAS BOILER EU004	13.31	NATURAL GAS	46 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )		0.036 LB/MMBTU		0.0360
SC-0149	01/03/2013 &nbsp;ACT	NATURAL GAS BOILER EU005	13.31	NATURAL GAS	46 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )		0.036 LB/MMBTU		0.0360
SC-0149	01/03/2013 &nbsp;ACT	NATURAL GAS BOILER EU006	13.31	NATURAL GAS	46 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )		0.036 LB/MMBTU		0.0360
TX-0656	05/16/2014 &nbsp;ACT	Heaters	13.31	natural gas	45 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	ultra low NO <sub>x</sub> burners	0.036 LB/MMBTU		0.0360
TX-0656	05/16/2014 &nbsp;ACT	heaters (5)	13.31	natural gas	24.3 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	ultra low NO <sub>x</sub> burners	0.036 LB/MMBTU		0.0360
TX-0663	05/25/2012 &nbsp;ACT	Heaters	13.31	Natural Gas	17 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )		0		
TX-0663	05/25/2012 &nbsp;ACT	8 Inlet Compressors	13.31	Natural Gas or electricity	4.5 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Ultra lean burn and Dual Drive (electric/gas) technology	0.5 G/HP		
TX-0663	05/25/2012 &nbsp;ACT	Residue Compressors	13.31	Natural Gas	4735 hp		Nitrogen Oxides (NO <sub>x</sub> )	SCR	0.05 G/BHP		
TX-0663	05/25/2012 &nbsp;ACT	Heaters	13.31	Natural Gas	48 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Flue Gas Recirculation	7.62 TON		
TX-0663	05/25/2012 &nbsp;ACT	Heaters	13.31	Natural Gas	10 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Flue Gas Recirculation	0		
TX-0663	05/25/2012 &nbsp;ACT	Heaters	13.31	Natural Gas	3 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Flue Gas recirculation	0		
TX-0680	06/14/2013 &nbsp;ACT	Heater	13.31	natural gas	10 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	low-NO <sub>x</sub> burners	0.01 LB/MMBTU		0.0100
TX-0680	06/14/2013 &nbsp;ACT	2 Heaters	13.31	natural gas	5 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )		0.1 LB/MMBTU		0.1000
TX-0691	05/20/2014 &nbsp;ACT	fuel gas heater	13.31	natural gas	18 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )		0.1 LB/MMBTU		0.1000
TX-0693	04/22/2014 &nbsp;ACT	heater	13.31	natural gas	5.5 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )		0.036 LB/MMBTU		0.0360
TX-0694	02/02/2015 &nbsp;ACT	heater	13.31	natural gas	3 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )		0.1 LB/MMBTU		0.1000
TX-0713	04/29/2014 &nbsp;ACT	boiler	13.31	natural gas	90 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	ultra low-NO <sub>x</sub> burners, limited use	9 PPMVD		0.0332
TX-0714	12/19/2014 &nbsp;ACT	boiler	13.31	natural gas	80 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	low-NO <sub>x</sub> burners	0.036 LB/MMBTU		0.0360
TX-0751	06/18/2015 &nbsp;ACT	Commercial/Institutional Size Boilers (&lt;100 MMBtu) &#x201c; natural gas	13.31	natural gas	73.3 MMBTU/H		Nitrogen Dioxide (NO <sub>2</sub> )		0.01 MMBTU/H		
TX-0755	05/21/2015 &nbsp;ACT	Hot Oil Heaters and Regeneration Heaters	13.31	Residue gas equivalent to natural gas	60 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	low NO <sub>x</sub> burners	0.045 LB/MMBTU		0.0450
TX-0772	11/06/2015 &nbsp;ACT	Commercial/Institutional-Size Boilers/Furnaces	13.31	natural gas	40 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners	0.036 LB/MMBTU		0.0360
TX-0772	11/06/2015 &nbsp;ACT	Commercial/Institutional-Size Boilers/Furnaces	13.31	natural gas	95.7 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners and flue gas recirculation	0.011 LB/MMBTU		0.0110
TX-0772	11/06/2015 &nbsp;ACT	Commercial/Institutional-Size Boilers/Furnaces	13.31	natural gas	13.2 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )		0.1 LB/MMBTU		0.1000
TX-0845	08/24/2018 &nbsp;ACT	HEATERS	13.31	NATL GAS	31 BTU/HR		Nitrogen Oxides (NO <sub>x</sub> )	LOW NOX BURNERS, CLEAN FUEL	0.04 LB/MMBTU		0.0400
TX-0851	12/17/2018 &nbsp;ACT	Thermal Oxidizer	13.31	NATL GAS	71.3 MMBTU/HR		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners and good combustion practices.	0.162 LB/MMBTU		0.1620

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - NO<sub>x</sub> (Gas-Fired)**

BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - NO <sub>x</sub> (Gas-Fired)											Std Units Limit
RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/mmbtu
TX-0888	04/23/2020 &nbsp;ACT	Heaters	13.31	natural gas	100 MMBtu		Nitrogen Oxides (NOx)	Low NOx burners and good combustion practice.	0.04 LB/MMBTU		0.0400
VA-0321	03/12/2013 &nbsp;ACT	AUXILIARY BOILER	13.31	Natural Gas	66.7 MMBTU/H		Nitrogen Oxides (NOx)	Dry Low NOx burner.	9 PPMVD		0.0109
*WI-0283	04/24/2018 &nbsp;ACT	B01-B12, Boilers	13.31	Natural Gas	28 mmBTU/hr		Nitrogen Oxides (NOx)	Ultra-low NOx Burners, Flue Gas Recirculation and Good Combustion Practices	0.0105 LB/MMBTU		0.0105
*WI-0284	04/24/2018 &nbsp;ACT	B13-B24 & B25-B36 Natural Gas-Fired Boilers	13.31	Natural Gas	28 mmBTU		Nitrogen Oxides (NOx)	Ultra-Low NOx Burners, Flue Gas Recirculation, and Good Combustion Practices.	0.0105 LB/MMBTU		0.0105
*WI-0291	01/28/2019 &nbsp;ACT	P05 Natural Gas Fired Line Heater	13.31	Natural Gas	1.5 mmBTU/hr		Nitrogen Oxides (NOx)	Good Combustion Practices	0.1 LB/MMBTU		0.1000
*WV-0029	03/27/2018 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	77.8 mmBtu/hr		Nitrogen Oxides (NOx)	LNB, FGR, Good Combustion Practices	0.86 LB/HR		0.0011
*WV-0032	09/18/2018 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas/Ethane	111.9 mmBtu/hr		Nitrogen Oxides (NOx)	LNB, Good Combustion Practices	1.23 LB/HR		0.0110
WY-0070	08/28/2012 &nbsp;ACT	Inlet Air Heater (EP06)	13.31	Natural Gas	16.1 MMBTU/H		Nitrogen Oxides (NOx)	Ultra Low-NOx Burners	0.012 LB/MMBTU		0.0120
WY-0070	08/28/2012 &nbsp;ACT	Inlet Air Heater (EP07)	13.31	Natural Gas	16.1 MMBTU/H		Nitrogen Oxides (NOx)	Ultra Low NOx Burners	0.012 LB/MMBTU		0.0120
WY-0070	08/28/2012 &nbsp;ACT	Inlet Air Heater (EP08)	13.31	Natural Gas	16.1 MMBTU/H		Nitrogen Oxides (NOx)	Ultra Low NOx Burners	0.012 LB/MMBTU		0.0120
WY-0070	08/28/2012 &nbsp;ACT	Inlet Air Heater (EP09)	13.31	Natural Gas	16.1 MMBTU/H		Nitrogen Oxides (NOx)	Ultra Low NOx Burners	0.012 LB/MMBTU		0.0120
WY-0070	08/28/2012 &nbsp;ACT	Inlet Air Heater (EP10)	13.31	Natural Gas	16.1 MMBTU/H		Nitrogen Oxides (NOx)	Ultra Low NOx Burners	0.012 LB/MMBTU		0.0120
WY-0070	08/28/2012 &nbsp;ACT	Inlet Air Heater (EP11)	13.31	Natural Gas	16.1 MMBTU/H		Nitrogen Oxides (NOx)	Ultra Low NOx Burners	0.012 LB/MMBTU		0.0120
WY-0075	07/16/2014 &nbsp;ACT	Auxiliary Boiler	13.31	natural gas	25.06 MMBtu/h		Nitrogen Oxides (NOx)	Ultra low NOx burners and flue gas recirculation	0.0175 LB/MMBTU		0.0175

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - PM (Gas-Fired)**

BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - PM (Gas-Fired)											Std Units Limit
RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/MMBTU
AK-0083	01/06/2015 &nbsp;ACT	Five (5) Waste Heat Boilers	13.31	Natural Gas	50 MMBTU/H		Particulate matter, total (TPM)		0.0074 LB/MMBTU		0.0074
*AK-0085	08/13/2020 &nbsp;ACT	Two (2) Buyback Gas Bath Heaters and Three (3) Operations Camp Heaters	13.31	Natural Gas	32 MMBtu/hr		Particulate matter, total (TPM)	Good Combustion Practices, Clean Fuels, and Limited Operation of 500 hours per year per heater.	0.0079 LB/MMBTU		0.0079
AL-0280	12/06/2011 &nbsp;ACT	Natural Gas Fired Broiler #3	13.31	Natural Gas	100 MMBTU/Hr		Particulate matter, filterable (FPM)	Good Combustion Practices	7.6 LB/MMSCF		0.0075
AL-0282	01/22/2014 &nbsp;ACT	Natural Gas Fired Boilers (3)	13.31	Natural Gas	100 mm btu/hr		Particulate matter, filterable (FPM)	Good combustion Practices.	0.0075		
*AL-0329	09/21/2021 &nbsp;ACT	Three Gas Heaters	13.31	Natural Gas	10 MMBtu/hr		Particulate matter, filterable &lt; 10 Åµ (FPM10)		0.008 LB/MMBTU		0.0080
AR-0140	09/18/2013 &nbsp;ACT	BOILER, PICKLE LINE	13.31	NATURAL GAS	67 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	5.2 X10^-4 LB/MMBTU		0.0005
AR-0140	09/18/2013 &nbsp;ACT	BOILERS SN-26 AND 27, GALVANIZING LINE	13.31	NATURAL GAS	24.5 MMBTU/H		Particulate matter, filterable (FPM)	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	5.2 X10^-4 GR/DSCF		
AR-0140	09/18/2013 &nbsp;ACT	FURNACES SN-40 AND SN-42, DECARBURIZING LINE	13.31	NATURAL GAS	22 MMBTU/H		Particulate matter, filterable (FPM)	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	5.2 X10^-4 LB/MMBTU		0.0005
AR-0155	11/07/2018 &nbsp;ACT	BOILER, PICKLE LINE	13.31	NATURAL GAS	53.7 MMBTU/HR		Particulate matter, filterable (FPM)	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0019 LB/MMBTU		0.0019
AR-0155	11/07/2018 &nbsp;ACT	BOILER SN-26, GALVANIZING LINE	13.31	NATURAL GAS	53.7 MMBTU/HR		Particulate matter, filterable (FPM)	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	6.8 X10^-4 LB/MMBTU		0.0007
AR-0155	11/07/2018 &nbsp;ACT	PREHEATER, GALVANIZING LINE SN-28	13.31	NATURAL GAS	78.2 MMBTU/HR		Particulate matter, filterable (FPM)	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0012 LB/MMBTU		0.0012
AR-0159	04/05/2019 &nbsp;ACT	BOILER, PICKLE LINE	13.31	NATURAL GAS	0		Particulate matter, filterable (FPM)	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0019 LB/MMBTU		0.0019
AR-0159	04/05/2019 &nbsp;ACT	PREHEATERS, GALVANIZING LINE SN-28 and SN-29	13.31	NATURAL GAS	0		Particulate matter, filterable (FPM)	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0012 LB/MMBTU		0.0012
AR-0159	04/05/2019 &nbsp;ACT	BOILER, ANNEALING PICKLE LINE	13.31	NATURAL GAS	0		Particulate matter, filterable (FPM)	Combustion of Natural gas and Good Combustion Practice	0.0019 LB/MMBTU		0.0019
AR-0159	04/05/2019 &nbsp;ACT	BOILERS SN-26 AND SN-27, GALVANIZING LINE	13.31	NATURAL GAS	0		Particulate matter, filterable (FPM)	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0007 LB/MMBTU		0.0007
AR-0168	03/17/2021 &nbsp;ACT	Galvanizing Line #2 Furnace	13.31	Natural Gas	150.5 MMBtu/hr		Particulate matter, total (TPM)	Combustion of Natural gas and Good Combustion Practice	0.0012 LB/MMBTU		0.0012
AR-0168	03/17/2021 &nbsp;ACT	Decarburizing Line Furnace Section	13.31	Natural Gas	58 MMBtu/hr		Particulate matter, total (TPM)	Combustion of Natural gas and Good Combustion Practice	0.013 LB/MMBTU		0.0130

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - PM (Gas-Fired)**

BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - PM (Gas-Fired)											Std Units Limit
RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/MMBtu
*AR-0172	09/01/2021 &nbsp;ACT	SN-202, 203, 204 Pickle Line Boilers	13.31	Natural Gas	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Good Combustion Practice	0.0076 GR/DSCF		
CA-1192	06/21/2011 &nbsp;ACT	AUXILIARY BOILER	13.31	NATURAL GAS	37.4 MMBTU/H		Particulate matter, total (TPM)	USE PUC QUALITY NATURAL GAS, OPERATIONAL LIMIT OF 46,675 MMBTU/YR	0.0034 GR/DSCF		
FL-0335	09/05/2012 &nbsp;ACT	Four(4) Natural Gas Boilers - 46 MMBtu/hour	13.31	Natural Gas	46 MMBTU/H		Particulate matter, total (TPM)	Good Combustion Practice	2 GR OF S/100 SCF		
FL-0356	03/09/2016 &nbsp;ACT	Auxiliary Boiler, 99.8 MMBtu/hr	13.31	Natural gas	99.8 MMBtu/hr		Particulate matter, total (TPM)	Use of clean fuels	10 % OPACITY		
*FL-0363	12/04/2017 &nbsp;ACT	99.8 MMBtu/hr auxiliary boiler	13.31	Natural gas	99.8 MMBtu/hr		Particulate matter, filterable (FPM)	Clean fuels	0		
*FL-0367	07/27/2018 &nbsp;ACT	60 MMBtu/hour Auxiliary Boiler	13.31	Natural Gas	60 MMBtu/hour		Particulate matter, filterable (FPM)	Clean fuels	0		
IA-0106	07/12/2013 &nbsp;ACT	Startup Heater	13.31	natural gas	58.8 MMBTU/H		Particulate matter, total (TPM)	good operating practices and use of natural gas	0.0024 LB/MMBTU		0.0024
IA-0107	04/14/2014 &nbsp;ACT	dew point heater	13.31	natural gas	13.32 mmBtu/hr		Particulate matter, total (TPM)		0.008 LB/MMBTU		0.0080
IA-0107	04/14/2014 &nbsp;ACT	auxiliary boiler	13.31	natural gas	60.1 mmBtu/hr		Particulate matter, total (TPM)		0.008 LB/MMBTU		0.0080
*IA-0117	03/17/2021 &nbsp;ACT	Natural Gas Boiler A	13.31	natural gas	82 MMBtu/hr		Particulate matter, total (TPM)	Low NOx Burner and Flue Gas Recirculation	0.026 LB/HR		0.0003
*IA-0117	03/17/2021 &nbsp;ACT	Natural Gas Boiler B	13.31	natural gas	82 MMBtu/hr		Particulate matter, total (TPM)	Low NOx Burner and Flue Gas Recirculation	0.26 LB/HR		0.0032
IL-0129	07/30/2018 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	96 mmBtu/hr		Particulate matter, total (TPM)	Good combustion practices	0.0075		
IL-0130	12/31/2018 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	96 mmBtu/hr		Particulate matter, total (TPM)	Good combustion practice	0.0075 LB/MMBTU		0.0075
IN-0158	12/03/2012 &nbsp;ACT	TWO (2) NATURAL GAS AUXILIARY BOILERS	13.31	NATURAL GAS	80 MMBTU/H		Particulate matter, filterable (FPM)	GOOD COMBUSTION PRACTICES AND FUEL SPECIFICATIONS	0.0075 LB/MMBTU		0.0075
IN-0263	03/23/2017 &nbsp;ACT	STARTUP HEATER EU-002	13.31	NATURAL GAS	70 MMBTU/HR		Particulate matter, total &lt; 10 Åµ (TPM10)	GOOD COMBUSTION PRACTICES	0.522 LB/H		0.0075
IN-0285	08/02/2017 &nbsp;ACT	Space Heaters	13.31		0		Particulate matter, total (TPM)		0.0072 LB/MMBTU		0.0072
KS-0029	07/14/2015 &nbsp;ACT	Auxiliary boiler	13.31	Natural gas	18.6 MMBTU/HR		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)		0.005 LB PER MMBTU		0.0050
*KS-0030	03/31/2016 &nbsp;ACT	Indirect fuel-gas heater	13.31		2 mmBTU/hr		Particulate matter, total (TPM)		0.015 LB/H		0.0075
KY-0110	07/23/2020 &nbsp;ACT	EP 15-01 - Natural Gas Direct-Fired Space Heaters, Process Water Heaters, & Air Makeup Heaters	13.31	Natural Gas	40 MMBtu/hr, combined		Particulate matter, total &lt; 10 Åµ (TPM10)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	7.6 LB/MMSCF		0.0075

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - PM (Gas-Fired)**

BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - PM (Gas-Fired)											Std Units Limit
RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/mmbtu
KY-0110	07/23/2020 &nbsp;   &nbsp										

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - PM (Gas-Fired)**

BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - PM (Gas-Fired)											Std Units Limit
RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/mmbtu
*LA-0315	05/23/2014 &nbsp;ACT	Regeneration Heater - 51B001	13.31	Natural Gas	61 MMBTU/HR		Particulate matter, total &lt; 10 Åµ (TPM10)	Combustion controls (proper burner design and operation using natural gas)	0.45 LB/H		0.0075
*LA-0315	05/23/2014 &nbsp;ACT	Recycle Gas Heater - 51B002A	13.31	Natural Gas	33 MMBTU/HR		Particulate matter, total &lt; 10 Åµ (TPM10)	Combustion controls (proper burner design and operation using natural gas)	0.24 LB/H		0.0075
*LA-0315	05/23/2014 &nbsp;ACT	Recycle Gas Heater - 51B002B	13.31	Natural Gas	33 MMBTU/HR		Particulate matter, total &lt; 10 Åµ (TPM10)	Combustion controls (proper burner design and operation using natural gas)	0.24 LB/H		0.0075
*LA-0315	05/23/2014 &nbsp;ACT	Recycle Gas Heater - 51B002C	13.31	Natural Gas	33 MMBTU/HR		Particulate matter, total &lt; 10 Åµ (TPM10)	Combustion controls (proper burner design and operation using natural gas)	0.24 LB/H		0.0075
*LA-0315	05/23/2014 &nbsp;ACT	Recycle Gas Heater - 51B002D	13.31	Natural Gas	33 MMBTU/HR		Particulate matter, total &lt; 10 Åµ (TPM10)	Combustion controls (proper burner design and operation using natural gas)	0.24 LB/H		0.0075
*LA-0315	05/23/2014 &nbsp;ACT	Recycle Gas Heater - 51B002E	13.31	Natural Gas	33 MMBTU/HR		Particulate matter, total &lt; 10 Åµ (TPM10)	Combustion controls (proper burner design and operation using natural gas)	0.24 LB/H		0.0075
*LA-0349	07/10/2018 &nbsp;ACT	Hot Oil Heaters (5)	13.31	natural gas	16.13 mm btu/hr		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Good Combustion Practices and Use of low sulfur facility fuel gas	0.0075 LB/MM BTU		0.0075
*LA-0364	01/06/2020 &nbsp;ACT	Hot Oil Heaters 1 and 2	13.31	Natural Gas	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Use of pipeline quality natural gas or fuel gas and good combustion practices.	0.03 LB/H		
*LA-0364	01/06/2020 &nbsp;ACT	PR Waste Heat Boiler	13.31	Natural Gas	94 mm btu/h		Particulate matter, total &lt; 10 Åµ (TPM10)	Use of pipeline quality natural gas or fuel gas and good combustion practices.	0.61 LB/H		0.0065
MA-0039	01/30/2014 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	80 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)		0.005 LB/MMBTU		0.0050
MD-0041	04/23/2014 &nbsp;ACT	AUXILLARY BOILER	13.31	NATURAL GAS	93 MMBTU/H		Particulate matter, filterable (FPM)	USE OF PIPELINE QUALITY NATURAL GAS AND GOOD COMBUSTION PRACTICES	0.005 LB/MMBTU		0.0050
MD-0042	04/08/2014 &nbsp;ACT	AUXILLARY BOILER	13.31	NATURAL GAS	45 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	EXCLUSIVE USE OF PIPELINE QUALITY NATURAL GAS AND GOOD COMBUSTION PRACTICES	0.0075 LB/MMBTU		0.0075
MD-0045	11/13/2015 &nbsp;ACT	AUXILIARY BOILER	13.31	NATURAL GAS	42 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	USE OF PIPELINE QUALITY NATURAL GAS AND GOOD COMBUSTION PRACTICES	0.0075 LB/MMBTU		0.0075
MD-0046	10/31/2014 &nbsp;ACT	AUXILIARY BOILER	13.31	PIPELINE QUALITY NATURAL GAS	93 MMBTU/H		Particulate matter, filterable (FPM)	EFFICIENT BOILER DESIGN, EXCLUSIVE USE OF PIPELINE QUALITY NATURAL GAS, AND APPLICATION OF GOOD COMBUSTION PRACTICES	0.0075 LB/MMBTU		0.0075
MI-0406	11/01/2013 &nbsp;ACT	FG-AUXBOILER1-2; Two (2) natural gas-fired auxiliary boilers.	13.31	natural gas	40 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices.	0.005 LB/MMBTU		0.0050
MI-0410	07/25/2013 &nbsp;ACT	FGAUXBOILERS: Two auxiliary boilers &lt; 100 MMBTU/H heat input each	13.31	natural gas	100 MMBTU/H heat input each		Particulate matter, total &lt; 10 Åµ (TPM10)	Efficient combustion; natural gas fuel.	0.007 LB/MMBTU		0.0070
MI-0412	12/04/2013 &nbsp;ACT	Fuel pre-heater (EUFUELHTR)	13.31	natural gas	3.7 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices	0.0075 LB/MMBTU		0.0075
MI-0412	12/04/2013 &nbsp;ACT	Auxiliary Boiler B (EUAUXBOILERB)	13.31	natural gas	95 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices	0.007 LB/MMBTU		0.0070

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - PM (Gas-Fired)**

BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - PM (Gas-Fired)											Std Units Limit
RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/mmmbtu
MI-0412	12/04/2013 &nbsp;ACT	Auxiliary Boiler A (EUAUXBOILER A)	13.31	natural gas	55 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices	0.007 LB/MMBTU		0.0070
MI-0420	06/03/2016 &nbsp;ACT	FGAUXBOILERS	13.31	Natural gas	6 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices and low sulfur fuel (pipeline quality natural gas).	0.0075 LB/MMBTU		0.0075
MI-0421	08/26/2016 &nbsp;ACT	EUFLTOS1 in FGTOH (Thermal Oil System for Thermally Fused Lamination Lines)	13.31	Natural gas	34 MMBTU/H		Particulate matter, filterable (FPM)	Good combustion practices.	0.0075 LB/MMBTU		0.0075
MI-0421	08/26/2016 &nbsp;ACT	EUTOH (In FGTOH)--Thermal Oil Heater	13.31	Natural gas	34 MMBTU/H		Particulate matter, filterable (FPM)	Good combustion practices	0.0075 LB/MMBTU		0.0075
MI-0423	01/04/2017 &nbsp;ACT	FGFUELHTR (Two fuel pre-heaters identified as EUFUELHTR1 & EUFUELHTR2)	13.31	Natural gas	27 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices.	0.2 LB/H		0.0074
MI-0424	12/05/2016 &nbsp;ACT	EUFUELHTR (Fuel pre-heater)	13.31	Natural gas	3.7 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices.	0.0075 LB/MMBTU		0.0075
MI-0424	12/05/2016 &nbsp;ACT	EUAUXBOILER (Auxiliary boiler)	13.31	natural gas	83.5 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices.	0.007 LB/MMBTU		0.0070
MI-0425	05/09/2017 &nbsp;ACT	EUTOH in FGTOH	13.31	Natural gas	38 MMBTU/H		Particulate matter, filterable (FPM)	Good combustion practices	0.0075 LB/MMBTU		0.0075
MI-0425	05/09/2017 &nbsp;ACT	EUFLTOS1 in FGTOH	13.31	Natural gas	10.2 MMBTU/H		Particulate matter, filterable (FPM)	Good combustion practices	0.0075 LB/MMBTU		0.0075
MI-0426	03/24/2017 &nbsp;ACT	FGAUXBOILERS (6 auxiliary boilers EUAUXBOIL2A, EUAUXBOIL3A, EUAUXBOIL2B, EUAUXBOIL3B, EUAUXBOIL2C, EUAUXBOIL3C)	13.31	Natural gas	3 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices and low sulfur fuel (pipeline quality natural gas).	0.52 LB/MMSCF		0.0005
MI-0433	06/29/2018 &nbsp;ACT	EUAUXBOILER (North Plant): Auxiliary Boiler	13.31	Natural gas	61.5 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices	0.46 LB/H		0.0075
MI-0433	06/29/2018 &nbsp;ACT	EUAUXBOILER (South Plant): Auxiliary Boiler	13.31	Natural gas	61.5 MMBTU/h		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices.	0.46 LB/H		0.0075
MI-0435	07/16/2018 &nbsp;ACT	EUAUXBOILER: Auxiliary Boiler	13.31	Natural gas	99.9 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices, low sulfur fuel	0.007 LB/MMBTU		0.0070
MI-0435	07/16/2018 &nbsp;ACT	EUFUELHTR1: Natural gas fired fuel heater	13.31	Natural gas	20.8 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Low sulfur fuel	0.15 LB/H		0.0072
MI-0435	07/16/2018 &nbsp;ACT	EUFUELHTR2: Natural gas fired fuel heater	13.31	Natural gas	3.8 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Low sulfur fuel	0.03 LB/H		0.0079
*MI-0440	05/22/2019 &nbsp;ACT	FGFUELHEATERS	13.31	natural gas	25 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices	0.008 LB/MMBTU		0.0080



**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - PM (Gas-Fired)**

BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - PM (Gas-Fired)											Std Units Limit
RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/mmbtu
*MI-0441	12/21/2018 &nbsp;ACT	EUAUXBOILER-- natural gas fired auxiliary boiler rated at &lt;= 99MMBTU/H	13.31	Natural gas	99 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices	0.74 LB/H		0.0075
*MI-0442	08/21/2019 &nbsp;ACT	FGAUXBOILER	13.31	Natural gas	80 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Low sulfur fuel (natural gas) and good combustion practices (efficient combustion).	7.6 LB/MMSCF		0.0075
*MI-0442	08/21/2019 &nbsp;ACT	FGPREHEAT	13.31	natural gas	7 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Low sulfur fuel (natural gas) and good combustion practices (efficient combustion)	7.6 LB/MMSCF		0.0075
*MI-0445	11/26/2019 &nbsp;ACT	FGFUELHTR (2 fuel pre-heaters)	13.31	Natural gas	27 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices	0.1 LB/H		0.0037
MS-0092	05/08/2014 &nbsp;ACT	Regeneration Heater, methanol to gasoline	13.31	NATURAL GAS	13 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)		0		
MS-0092	05/08/2014 &nbsp;ACT	Reactor Heater, 5	13.31	NATURAL GAS	12 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)		0		
NJ-0079	07/25/2012 &nbsp;ACT	Commercial/Instituti onal size boilers less than 100 MMBtu/hr	13.31	natural gas	2000 hours/year		Particulate matter, total &lt; 10 Åµ (TPM10)		0.46 LB/H		0.0050
NJ-0080	11/01/2012 &nbsp;ACT	Boiler less than 100 MMBtu/hr	13.31	Natural Gas	51.9 mmcubic ft/year		Particulate matter, filterable &lt; 10 Åµ (FPM10)	use of natural gas a clean fuel	0.33 LB/H		
NJ-0084	03/10/2016 &nbsp;ACT	Auxiliary Boiler firing natural gas	13.31	natural gas	687 MMCFT/YR		Particulate matter, total &lt; 10 Åµ (TPM10)	use of natural gas a clean burning fuel	0.4 LB/H		0.0050
NJ-0085	07/19/2016 &nbsp;ACT	AUXILIARY BOILER	13.31	Natural GAS	4000 H/YR		Particulate matter, total &lt; 10 Åµ (TPM10)	USE OF NATURAL GAS A CLEAN BURNING FUEL	0.488 LB/H		
NY-0103	02/03/2016 &nbsp;ACT	Auxiliary boiler	13.31	natural gas	60 MMBTU/H		Particulate matter, filterable (FPM)	good combustion practiced and pipeline quality natural gas	0.005 LB/MMBTU		0.0050
NY-0104	08/01/2013 &nbsp;ACT	Auxiliary boiler	13.31	natural gas	0		Particulate matter, filterable (FPM)	Natural gas.	0.0063 LB/MMBTU		0.0063
OH-0350	07/18/2012 &nbsp;ACT	Steam Boiler	13.31	Natural Gas	65 MMBtu/H		Particulate matter, total &lt; 10 Åµ (TPM10)		0.48 LB/H		0.0074
OH-0352	06/18/2013 &nbsp;ACT	Auxillary Boiler	13.31	Natural Gas	99 MMBtu/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Clean burning fuel, only burning natural gas	0.79 LB/H		0.0080
OH-0355	05/07/2013 &nbsp;ACT	4 Indirect-Fired Air Preheaters	13.31	Natural gas	0		Particulate matter, total &lt; 10 Åµ (TPM10)		0.007 LB/MMBTU		0.0070
OH-0360	11/05/2013 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural Gas	99 MMBtu/H		Particulate matter, total &lt; 10 Åµ (TPM10)	natural gas only	0.79 LB/H		0.0080
OH-0366	08/25/2015 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	34 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Low sulfur fuel	0.27 LB/H		0.0080
OH-0367	09/23/2016 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	99 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	natural gas/ultra low sulfur diesel	5.94 LB/H		0.0080

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - PM (Gas-Fired)**

BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - PM (Gas-Fired)											Std Units Limit
RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/mmbtu
OH-0368	04/19/2017 &nbsp;   &										

Std Units  
Limit

1b/mmhtu

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - PM (Gas-Fired)**

BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - PM (Gas-Fired)											Std Units Limit
RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/MMBtu
TX-0772	11/06/2015 &nbsp;ACT	Commercial/Institutional-Size Boilers/Furnaces	13.31	natural gas	95.7 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Use of gaseous fuel with efficient combustion.	7.49 T/YR		
TX-0772	11/06/2015 &nbsp;ACT	Commercial/Institutional-Size Boilers/Furnaces	13.31	natural gas	13.2 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practice to ensure complete combustion.	0.4 T/YR		
TX-0851	12/17/2018 &nbsp;ACT	Thermal Oxidizer	13.31	NATL GAS	71.3 MMBTU/HR		Particulate matter, total &lt; 10 Åµ (TPM10)	Natural Gas / Clean Fuel, good combustion practices.	0.0075 LB/MMBTU		0.0075
TX-0888	04/23/2020 &nbsp;ACT	Heaters	13.31	natural gas	100 MMBtu		Particulate matter, filterable &lt; 10 Åµ (FPM10)	Good combustion practice, clean fuel, and proper design	0.0075 LB/MMBTU		0.0075
VA-0321	03/12/2013 &nbsp;ACT	AUXILIARY BOILER	13.31	Natural Gas	66.7 MMBTU/H		Particulate matter, filterable &lt; 10 Åµ (FPM10)	Low sulfur/carbon fuel and good combustion practices	0.007 LB/MMBTU		0.0070
*VA-0333	12/09/2020 &nbsp;ACT	Three (3) boilers	13.31	Natural Gas	76.6 MMBtu/hr		Particulate matter, total &lt; 10 Åµ (TPM10)		0.0078 LB		0.0078
*WI-0283	04/24/2018 &nbsp;ACT	B01-B12, Boilers	13.31	Natural Gas	28 mmBTU/hr		Particulate matter, total (TPM)	Good Combustion Practices	0.0075 LB/MMBTU		0.0075
*WI-0284	04/24/2018 &nbsp;ACT	B13-B24 & B25-B36 Natural Gas-Fired Boilers	13.31	Natural Gas	28 mmBTU		Particulate matter, total (TPM)	Good Combustion Practices and The Use of Pipeline Quality Natural Gas	0.0075 LB/MMBTU		0.0075
*WV-0029	03/27/2018 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	77.8 mmBtu/hr		Particulate matter, total (TPM)	Use of Natural Gas, Good Combustion Practices	0.6 LB/HR		0.0080
*WV-0031	06/14/2018 &nbsp;ACT	WH-1 - Boiler	13.31	Natural Gas	8.72 mmBtu/hr		Particulate matter, total (TPM)	Limited to natural gas.	0		
*WV-0032	09/18/2018 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas/Ethane	111.9 mmBtu/hr		Particulate matter, total (TPM)	Use of Natural Gas, Good Combustion Practices	0.87 LB/HR		0.0080
WY-0075	07/16/2014 &nbsp;ACT	Auxiliary Boiler	13.31	natural gas	25.06 MMBtu/h		Particulate matter, total (TPM)	good combustion practices	0.0175 LB/MMBTU		0.0175

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - VOC (Gas-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit lb/MMBtu
AK-0083	01/06/2015 &nbsp;ACT	Five (5) Waste Heat Boilers	13.31	Natural Gas	50 MMBTU/H		Volatile Organic Compounds (VOC)		0.0054 LB/MMBTU		0.0054
*AK-0085	08/13/2020 &nbsp;ACT	Two (2) Buyback Gas Bath Heaters and Three (3) Operations Camp Heaters	13.31	Natural Gas	32 MMBtu/hr		Volatile Organic Compounds (VOC)	Good Combustion Practices, Clean Fuels, and Limited Operation of 500 hours per year per heater.	0.0057 LB/MMBTU		0.0057
AL-0280	12/06/2011 &nbsp;ACT	Natural Gas Fired Broiler #3	13.31	Natural Gas	100 MMBTU/Hr		Volatile Organic Compounds (VOC)	Good combustion practices	5.5 LB/MMSCF		0.0054
AL-0282	01/22/2014 &nbsp;ACT	Natural Gas Fired Boilers (3)	13.31	Natural Gas	100 mm btu/hr		Volatile Organic Compounds (VOC)	Good combustion Practices.	0.0054 LB/MMBTU		0.0054
AL-0307	10/09/2015 &nbsp;ACT	PACKAGE BOILER	13.31	NATURAL GAS	17.5 MMBTU/H		Volatile Organic Compounds (VOC)	GCP	0.006 LB/MMBTU		0.0060
AL-0307	10/09/2015 &nbsp;ACT	2 CALP LINE BOILERS	13.31	NATURAL GAS	24.59 MMBTU/H		Volatile Organic Compounds (VOC)	GCP	0.006 LB/MMBTU		0.0060
AL-0312	05/26/2016 &nbsp;ACT	60 MMBTU/HR NATURAL GAS-FIRED BOILER (ES-008)	13.31	NATURAL GAS	60 MMBTU/H		Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES	0.0054 LB/MMBTU INPUT		0.0054
AR-0140	09/18/2013 &nbsp;ACT	BOILERS SN-26 AND 27, GALVANIZING LINE	13.31	NATURAL GAS	24.5 MMBTU/H		Volatile Organic Compounds (VOC)	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0054 LB/MMBTU		0.0054
AR-0140	09/18/2013 &nbsp;ACT	FURNACES SN-40 AND SN-42, DECARBURIZING LINE	13.31	NATURAL GAS	22 MMBTU/H		Volatile Organic Compounds (VOC)	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0054 LB/MMBTU		0.0054
AR-0155	11/07/2018 &nbsp;ACT	BOILER, PICKLE LINE	13.31	NATURAL GAS	53.7 MMBTU/HR		Volatile Organic Compounds (VOC)	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0054 LB/MMBTU		0.0054
AR-0155	11/07/2018 &nbsp;ACT	BOILER SN-26, GALVANIZING LINE	13.31	NATURAL GAS	53.7 MMBTU/HR		Volatile Organic Compounds (VOC)	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.054 LB/MMBTU		0.0540
AR-0155	11/07/2018 &nbsp;ACT	PREHEATER, GALVANIZING LINE SN-28	13.31	NATURAL GAS	78.2 MMBTU/HR		Volatile Organic Compounds (VOC)	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0054 LB/MMBTU		0.0054
AR-0159	04/05/2019 &nbsp;ACT	BOILER, PICKLE LINE	13.31	NATURAL GAS	0		Volatile Organic Compounds (VOC)	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0054 LB/MMBTU		0.0054
AR-0159	04/05/2019 &nbsp;ACT	PREHEATERS, GALVANIZING LINE SN-28 and SN-29	13.31	NATURAL GAS	0		Volatile Organic Compounds (VOC)	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0054 LB/MMBTU		0.0054
AR-0159	04/05/2019 &nbsp;ACT	BOILER, ANNEALING PICKLE LINE	13.31	NATURAL GAS	0		Volatile Organic Compounds (VOC)	Combustion of Natural gas and Good Combustion Practice	0.0054 LB/MMBTU		0.0054
AR-0159	04/05/2019 &nbsp;ACT	BOILERS SN-26 AND SN-27, GALVANIZING LINE	13.31	NATURAL GAS	0		Volatile Organic Compounds (VOC)	COMBUSTION OF NATURAL GAS AND GOOD COMBUSTION PRACTICE	0.0054 LB/MMBTU		0.0054
AR-0168	03/17/2021 &nbsp;ACT	Galvanizing Line #2 Furnace	13.31	Natural Gas	150.5 MMBtu/hr		Volatile Organic Compounds (VOC)	Combustion of Natural gas and Good Combustion Practice	0.0054 LB/MMBTU		0.0054
AR-0168	03/17/2021 &nbsp;ACT	Decarburizing Line Furnace Section	13.31	Natural Gas	58 MMBtu/hr		Volatile Organic Compounds (VOC)	Combustion of Natural gas and Good Combustion Practice	0.0054 LB/MMBTU		0.0054
*AR-0172	09/01/2021 &nbsp;ACT	SN-202, 203, 204 Pickle Line Boilers	13.31	Natural Gas	0		Volatile Organic Compounds (VOC)	Good Combustion Practice	0.0055 LB/MMBTU		0.0055
FL-0335	09/05/2012 &nbsp;ACT	Four(4) Natural Gas Boilers - 46 MMBtu/hour	13.31	Natural Gas	46 MMBTU/H		Volatile Organic Compounds (VOC)	Good Combustion Practice	0.003 LB/MMBTU		0.0030
FL-0364	03/21/2018 &nbsp;ACT	Two natural gas heaters (&lt; 10 MMBtu/hr each)	13.31	Natural gas	9.9 MMBtu/hr		Volatile Organic Compounds (VOC)		0.005 LB/MMBTU		0.0050
IA-0102	02/01/2012 &nbsp;ACT	Pusher Preheat Furnace	13.31	natural gas	60 MMBTU/h		Volatile Organic Compounds (VOC)	The company is required to limit the amount of oils & coolants used in earlier processes and apply good combustion practices to the furnace. There are no numerical limits for VOCs.	0		

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - VOC (Gas-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit lb/MMBTU
IA-0102	02/01/2012 &nbsp;ACT	Annealing Furnace	13.31	natural gas	12 MMBTU/h		Volatile Organic Compounds (VOC)	The company is required to limit the amount of oils & coolants used in earlier processes and apply good combustion practices to the furnace. There are no numerical limits for VOCs.	0		
IA-0102	02/01/2012 &nbsp;ACT	88" Continuous Heat Treat Line	13.31	natural gas	20.4 MMBTU/h		Volatile Organic Compounds (VOC)	The company is required to limit the amount of oils & coolants used in earlier processes and apply good combustion practices to the furnace. There are no numerical limits for VOCs.	0		
IA-0106	07/12/2013 &nbsp;ACT	Startup Heater	13.31	natural gas	58.8 MMBTU/H		Volatile Organic Compounds (VOC)	good operating practices & use of natural gas	0.0014 LB/MMBTU		0.0014
IA-0107	04/14/2014 &nbsp;ACT	auxiliary boiler	13.31	natural gas	60.1 mmBtu/hr		Volatile Organic Compounds (VOC)		0.005 LB/MMBTU		0.0050
IL-0127	10/05/2018 &nbsp;ACT	Heating Units	13.31	natural gas	1 mmBtu/hr		Volatile Organic Compounds (VOC)	Units shall be operated in accordance with good combustion practices.	0		
IN-0158	12/03/2012 &nbsp;ACT	TWO (2) NATURAL GAS AUXILIARY BOILERS	13.31	NATURAL GAS	80 MMBTU/H		Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES	0.005 LB/MMBTU		0.0050
IN-0263	03/23/2017 &nbsp;ACT	STARTUP HEATER EU-002	13.31	NATURAL GAS	70 MMBTU/HR		Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES	0.378 LB/H		0.0054
IN-0285	08/02/2017 &nbsp;ACT	Space Heaters	13.31		0		Volatile Organic Compounds (VOC)		0.0053 LB/MMBTU		0.0053
*KS-0030	03/31/2016 &nbsp;ACT	Indirect fuel-gas heater	13.31		2 mmBTU/hr		Volatile Organic Compounds (VOC)		0.011 LB/H		0.0055
KY-0110	07/23/2020 &nbsp;ACT	EP 15-01 - Natural Gas Direct-Fired Space Heaters, Process Water Heaters, & Air Makeup Heaters	13.31	Natural Gas	40 MMBtu/hr, combined		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	5.5 LB/MMSCF		0.0054
KY-0110	07/23/2020 &nbsp;ACT	EP 05-01 - Group 1 Car Bottom Furnaces #1 - #3	13.31	Natural Gas	28 MMBtu/hr, each		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	5.5 LB/MMSCF		0.0054
KY-0110	07/23/2020 &nbsp;ACT	EP 04-02 - Austenitizing Furnace	13.31	Natural Gas	54 MMBtu/hr		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	5.5 LB/MMSCF		0.0054
KY-0110	07/23/2020 &nbsp;ACT	EP 05-02 - Group 2 Car Bottom Furnaces A & B	13.31	Natural Gas	60 MMBtu/hr, combined		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	5.5 LB/MMSCF		0.0054
KY-0110	07/23/2020 &nbsp;ACT	EP 03-02 - Ingot Car Bottom Furnaces #1-#4	13.31	Natural Gas	37 MMBtu/hr, each		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	5.5 LB/MMSCF		0.0054
KY-0110	07/23/2020 &nbsp;ACT	EP 03-05 - Steckel Mill Coiling Furnaces #1 & #2	13.31	Natural Gas	17.5 MMBtu/hr, each		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	5.5 LB/MMSCF		0.0054
KY-0110	07/23/2020 &nbsp;ACT	EP 04-03 - Tempering Furnace	13.31	Natural Gas	48 MMBtu/hr		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	5.5 LB/MMSCF		0.0054
KY-0115	04/19/2021 &nbsp;ACT	Cold Mill Complex Makeup Air Units (EP 21-19)	13.31	Natural Gas	40 MMBtu/hr, total		Volatile Organic Compounds (VOC)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	5.5 LB/MMSCF		0.0054
KY-0115	04/19/2021 &nbsp;ACT	Vacuum Degasser Boiler (EP 20-13)	13.31	Natural Gas	50.4 MMBtu/hr		Volatile Organic Compounds (VOC)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	5.5 LB/MMSCF		0.0054
KY-0115	04/19/2021 &nbsp;ACT	Pickle Line #2 48" Boiler #1 & #2 (EP 21-04 & EP 21-05)	13.31	Natural Gas	18 MMBtu/hr, each		Volatile Organic Compounds (VOC)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	5.5 LB/MMSCF		0.0054
KY-0115	04/19/2021 &nbsp;ACT	Galvanizing Line #2 Alkali Cleaning Section Heater (EP 21-07B)	13.31	Natural Gas	23 MMBtu/hr		Volatile Organic Compounds (VOC)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	5.5 LB/MMSCF		0.0054

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - VOC (Gas-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit lb/MMBTU
KY-0115	04/19/2021 &nbsp;ACT	Galvanizing Line #2 Radiant Tube Furnace (EP 21-08B)	13.31	Natural Gas	36 MMBtu/hr		Volatile Organic Compounds (VOC)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	5.5 LB/MMSCF		0.0054
KY-0115	04/19/2021 &nbsp;ACT	Galvanizing Line #2 Annealing Furnaces (15) (EP 21-15)	13.31	Natural Gas	4.8 MMBtu/hr, each		Volatile Organic Compounds (VOC)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	5.5 LB/MMSCF		0.0054
KY-0115	04/19/2021 &nbsp;ACT	Galvanizing Line #2 Preheat Furnace (EP 21- 08A)	13.31	Natural Gas	94 MMBtu/hr		Volatile Organic Compounds (VOC)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	5.5 LB/MMSCF		0.0054
KY-0115	04/19/2021 &nbsp;ACT	Galvanizing Line #2 Zinc Pot Preheater (EP 21-09)	13.31	Natural Gas	3 MMBtu/hr		Volatile Organic Compounds (VOC)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	5.5 LB/MMSCF		0.0054
KY-0115	04/19/2021 &nbsp;ACT	Heated Transfer Table Furnace (EP 02-03)	13.31	Natural Gas	65.5 MMBtu/hr		Volatile Organic Compounds (VOC)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	5.5 LB/MMSCF		0.0054
LA-0307	03/21/2016 &nbsp;ACT	Regenerative Heaters	13.31	natural gas	7.37 mm btu/hr		Volatile Organic Compounds (VOC)	good combustion practices	0		
*LA-0315	05/23/2014 &nbsp;ACT	Reactor Charge Heater - 53B001	13.31	Natural Gas	10.1 MMBTU/HR		Volatile Organic Compounds (VOC)	Combustion controls (proper burner design and operation using natural gas)	0.05 LB/H		0.0050
*LA-0315	05/23/2014 &nbsp;ACT	Regeneration Heater - 51B001	13.31	Natural Gas	61 MMBTU/HR		Volatile Organic Compounds (VOC)	Combustion controls (proper burner design and operation using natural gas)	0.33 LB/H		0.0054
*LA-0315	05/23/2014 &nbsp;ACT	Recycle Gas Heater - 51B002A	13.31	Natural Gas	33 MMBTU/HR		Volatile Organic Compounds (VOC)	Combustion controls (proper burner design and operation using natural gas)	0.18 LB/H		0.0055
*LA-0315	05/23/2014 &nbsp;ACT	Recycle Gas Heater - 51B002B	13.31	Natural Gas	33 MMBTU/HR		Volatile Organic Compounds (VOC)	Combustion controls (proper burner design and operation using natural gas)	0.18 LB/H		0.0055
*LA-0315	05/23/2014 &nbsp;ACT	Recycle Gas Heater - 51B002C	13.31	Natural Gas	33 MMBTU/HR		Volatile Organic Compounds (VOC)	Combustion controls (proper burner design and operation using natural gas)	0.18 LB/H		0.0055
*LA-0315	05/23/2014 &nbsp;ACT	Recycle Gas Heater - 51B002D	13.31	Natural Gas	33 MMBTU/HR		Volatile Organic Compounds (VOC)	Combustion controls (proper burner design and operation using natural gas)	0.18 LB/H		0.0055
*LA-0315	05/23/2014 &nbsp;ACT	Recycle Gas Heater - 51B002E	13.31	Natural Gas	33 MMBTU/HR		Volatile Organic Compounds (VOC)	Combustion controls (proper burner design and operation using natural gas)	0.18 LB/H		0.0055
*LA-0349	07/10/2018 &nbsp;ACT	Hot Oil Heaters (5)	13.31	natural gas	16.13 mm btu/hr		Volatile Organic Compounds (VOC)	Good Combustion Practices and Use of low sulfur facility fuel gas	0.0054 LB/MM BTU		0.0054
*LA-0364	01/06/2020 &nbsp;ACT	Hot Oil Heaters 1 and 2	13.31	Natural Gas	0		Volatile Organic Compounds (VOC)	Good combustion practices and compliance with the applicable provisions of 40 CFR 63 Subpart DDDDD.	4.02 LB/H		
*LA-0364	01/06/2020 &nbsp;ACT	PR Waste Heat Boiler	13.31	Natural Gas	94 mm btu/h		Volatile Organic Compounds (VOC)	Good combustion practices and oxidation catalyst	13.37 LB/H		0.1422
MA-0039	01/30/2014 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	80 MMBTU/H		Volatile Organic Compounds (VOC)	oxidation catalyst	11.8 PPMVD@3% O2		0.0050
MD-0041	04/23/2014 &nbsp;ACT	AUXILLARY BOILER	13.31	NATURAL GAS	93 MMBTU/H		Volatile Organic Compounds (VOC)	EXCLUSIVE USE OF NATURAL GAS, AND GOOD COMBUSTION PRACTICES	0.002 LB/MMBTU		0.0020
MD-0042	04/08/2014 &nbsp;ACT	AUXILLARY BOILER	13.31	NATURAL GAS	45 MMBTU/H		Volatile Organic Compounds (VOC)	THE EXCLUSIVE USE OF PIPELINE QUALITY NATURAL GAS, LIMITED HOURS OF OPERATION, AND GOOD COMBUSTION PRACTICES	0.0033 LB/MMBTU		0.0033
MD-0045	11/13/2015 &nbsp;ACT	AUXILIARY BOILER	13.31	NATURAL GAS	42 MMBTU/H		Volatile Organic Compounds (VOC)	EXCLUSIVE USE OF NATURAL GAS, AND GOOD COMBUSTION PRACTICES	0.003 LB/MMBTU		0.0030
MD-0046	10/31/2014 &nbsp;ACT	AUXILIARY BOILER	13.31	PIPELINE QUALITY NATURAL GAS	93 MMBTU/H		Volatile Organic Compounds (VOC)	EFFICIENT BOILER DESIGN, EXCLUSIVE USE OF PIPELINE QUALITY NATURAL GAS, THE USE OF ULTRA-LOW NOX BURNERS, AND GOOD COMBUSTION PRACTICES	0.002 LB/MMBTU		0.0020
MI-0406	11/01/2013 &nbsp;ACT	FG-AUXBOILER1-2; Two (2) natural gas-fired auxiliary boilers.	13.31	natural gas	40 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices.	0.005 LB/MMBTU		0.0050

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - VOC (Gas-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit lb/MMBTU
MI-0410	07/25/2013 &nbsp;ACT	FGAUXBOILERS: Two auxiliary boilers &lt; 100 MMBTU/H heat input each	13.31	natural gas	100 MMBTU/H heat input each		Volatile Organic Compounds (VOC)	Efficient combustion; natural gas fuel.	0.008 LB/MMBTU		0.0080
MI-0412	12/04/2013 &nbsp;ACT	Fuel pre-heater (EUFUELHTR)	13.31	natural gas	3.7 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices	0.03 LB/H		0.0081
MI-0412	12/04/2013 &nbsp;ACT	Auxiliary Boiler B (EUAUXBOILERB)	13.31	natural gas	95 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices	0.008 LB/MMBTU		0.0080
MI-0412	12/04/2013 &nbsp;ACT	Auxiliary Boiler A (EUAUXBOILER A)	13.31	natural gas	55 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion control	0.008 LB/MMBTU		0.0080
MI-0421	08/26/2016 &nbsp;ACT	EUFLTOS1 in FGTOH (Thermal Oil System for Thermally Fused Lamination Lines)	13.31	Natural gas	34 MMBTU/H		Volatile Organic Compounds (VOC)	Good design and operating/combustion practices.	0.0054 LB/MMBTU		0.0054
MI-0421	08/26/2016 &nbsp;ACT	EUTOH (In FGTOH)--Thermal Oil Heater	13.31	Natural gas	34 MMBTU/H		Volatile Organic Compounds (VOC)	Good design and operating/combustion practices.	0.0054 LB/MMBTU		0.0054
MI-0423	01/04/2017 &nbsp;ACT	FGFUELHTR (Two fuel pre-heaters identified as EUFUELHTR1 & EUFUELHTR2)	13.31	Natural gas	27 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices.	0.15 LB/H		0.0056
MI-0424	12/05/2016 &nbsp;ACT	EUFUELHTR (Fuel pre-heater)	13.31	Natural gas	3.7 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices.	0.03 LB/H		0.0081
MI-0424	12/05/2016 &nbsp;ACT	EUAUXBOILER (Auxiliary boiler)	13.31	natural gas	83.5 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices.	0.008 LB/MMBTU		0.0080
MI-0425	05/09/2017 &nbsp;ACT	EUTOH in FGTOH	13.31	Natural gas	38 MMBTU/H		Volatile Organic Compounds (VOC)	Good design and operating/combustion practices.	0.0054 LB/MMBTU		0.0054
MI-0425	05/09/2017 &nbsp;ACT	EUFLTOS1 in FGTOH	13.31	Natural gas	10.2 MMBTU/H		Volatile Organic Compounds (VOC)	Good design and operating/combustion practices.	0.0054 LB/MMBTU		0.0054
MI-0433	06/29/2018 &nbsp;ACT	EUAUXBOILER (North Plant): Auxiliary Boiler	13.31	Natural gas	61.5 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices.	0.004 LB/MMBTU		0.0040
MI-0433	06/29/2018 &nbsp;ACT	EUAUXBOILER (South Plant): Auxiliary Boiler	13.31	Natural gas	61.5 MMBTU/h		Volatile Organic Compounds (VOC)	Good combustion practices.	0.004 LB/MMBTU		0.0040
MI-0435	07/16/2018 &nbsp;ACT	EUAUXBOILER: Auxiliary Boiler	13.31	Natural gas	99.9 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices	0.008 LB/MMBTU		0.0080
MI-0435	07/16/2018 &nbsp;ACT	EUFUELHTR1: Natural gas fired fuel heater	13.31	Natural gas	20.8 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion controls	0.17 LB/H		0.0082
MI-0435	07/16/2018 &nbsp;ACT	EUFUELHTR2: Natural gas fired fuel heater	13.31	Natural gas	3.8 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion controls.	0.03 LB/H		0.0079
*MI-0440	05/22/2019 &nbsp;ACT	FGFUELHEATERS	13.31	natural gas	25 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices	0.005 LB/MMBTU		0.0050
*MI-0441	12/21/2018 &nbsp;ACT	EUAUXBOILER--natural gas fired auxiliary boiler rated at &lt;= 99MMBTU/H	13.31	Natural gas	99 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices.	0.5 LB/H		0.0051
*MI-0442	08/21/2019 &nbsp;ACT	FGAUXBOILER	13.31	Natural gas	80 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices.	0.0054 LB/MMBTU		0.0054
*MI-0442	08/21/2019 &nbsp;ACT	FGPREHEAT	13.31	natural gas	7 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices	0.025 LB/MMBTU		0.0250
*MI-0445	11/26/2019 &nbsp;ACT	FGFUELHTR (2 fuel pre-heaters)	13.31	Natural gas	27 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices	0.07 LB/H		0.0026
MS-0092	05/08/2014 &nbsp;ACT	Regeneration Heater, methanol to gasoline	13.31	NATURAL GAS	13 MMBTU/H		Volatile Organic Compounds (VOC)		0		
MS-0092	05/08/2014 &nbsp;ACT	Reactor Heater, 5	13.31	NATURAL GAS	12 MMBTU/H		Volatile Organic Compounds (VOC)		0		
NJ-0079	07/25/2012 &nbsp;ACT	Commercial/Institutional size boilers less than 100 MMBtu/hr	13.31	natural gas	2000 hours/year		Volatile Organic Compounds (VOC)	Use of Natural Gas	0.14 LB/H		0.0015



**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - VOC (Gas-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit lb/MMBTU
NJ-0080	11/01/2012 &nbsp;ACT	Boiler less than 100 MMBtu/hr	13.31	Natural Gas	51.9 mmcubic ft/year		Volatile Organic Compounds (VOC)	use of natural gas a clean fuel	0.27 LB/H		
NJ-0084	03/10/2016 &nbsp;ACT	Auxiliary Boiler firing natural gas	13.31	natural gas	687 MMCFT/YR		Volatile Organic Compounds (VOC)	Use of good combustion practices and use of natural gas a clean burning fuel	0.32 LB/H		0.0040
NJ-0085	07/19/2016 &nbsp;ACT	AUXILIARY BOILER	13.31	Natural GAS	4000 H/YR		Volatile Organic Compounds (VOC)	USE OF NATURAL GAS A CLEAN BURNING FUEL AND GOOD COMBUSTION PRACTICES	0.488 LB/H		
NY-0103	02/03/2016 &nbsp;ACT	Auxiliary boiler	13.31	natural gas	60 MMBTU/H		Volatile Organic Compounds (VOC)	good combustion practice	0.0015 LB/MMBTU		0.0015
NY-0104	08/01/2013 &nbsp;ACT	Auxiliary boiler	13.31	natural gas	0		Volatile Organic Compounds (VOC)	Good combustion practice.	0.0038 LB/MMBTU		0.0038
OH-0350	07/18/2012 &nbsp;ACT	Steam Boiler	13.31	Natural Gas	65 MMBtu/H		Volatile Organic Compounds (VOC)	Proper burner design and good combustion practices	0.35 LB/H		0.0054
OH-0352	06/18/2013 &nbsp;ACT	Auxillary Boiler	13.31	Natural Gas	99 MMBtu/H		Volatile Organic Compounds (VOC)	Good combustion practices and using combustion optimization technologies	0.59 LB/H		0.0060
OH-0355	05/07/2013 &nbsp;ACT	4 Indirect-Fired Air Preheaters	13.31	Natural gas	0		Volatile Organic Compounds (VOC)		0.005 LB/MMBTU		0.0050
OH-0360	11/05/2013 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural Gas	99 MMBtu/H		Volatile Organic Compounds (VOC)	Good combustion practices and using combustion optimization technologies.	0.59 LB/H		0.0060
OH-0366	08/25/2015 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	34 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion controls	0.2 LB/H		0.0060
OH-0367	09/23/2016 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	99 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion controls and natural gas/ultra low sulfur diesel	0.59 LB/H		0.0060
OH-0368	04/19/2017 &nbsp;ACT	Startup Heater (B001)	13.31	Natural gas	100 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion control (i.e., high temperatures, sufficient excess air, sufficient residence times, and god air/fuel mixing).	0.54 LB/H		0.0054
OH-0370	09/07/2017 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	37.8 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion controls	0.23 LB/H		0.0060
OH-0372	09/27/2017 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	37.8 MMBTU/H		Volatile Organic Compounds (VOC)	good combustion controls	0.23 LB/H		0.0060
OH-0374	10/23/2017 &nbsp;ACT	Fuel Gas Heaters (2 identical, P007 and P008)	13.31	Natural gas	15 MMBTU/H		Volatile Organic Compounds (VOC)	Combustion control	0.075 LB/H		0.0050
OH-0375	11/07/2017 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	26.8 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion controls	0.13 LB/H		0.0050
OH-0377	04/19/2018 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	44.55 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices	0.16 LB/H		0.0036
OH-0377	04/19/2018 &nbsp;ACT	Auxiliary Boiler (B002)	13.31	Natural gas	80 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices	0.248 LB/H		0.0031
*OH-0381	09/27/2019 &nbsp;ACT	Tunnel Furnace #2 (P018)	13.31	Natural Gas	88 MMBTU/H		Volatile Organic Compounds (VOC)	Use of natural gas, good combustion practices and design	0.48 LB/H		0.0055
OK-0148	09/12/2012 &nbsp;ACT	Commercial/Institutional Boilers (&lt;100 MMBTUH)	13.31	Natural Gas	11.04 MMBTUH		Volatile Organic Compounds (VOC)		0.0054 LB/MMBTU		0.0054
OK-0156	07/31/2013 &nbsp;ACT	Gas-fired Boiler	13.31	Natural Gas	95 MMBTUH		Volatile Organic Compounds (VOC)	Good Combustion	0.006 LB/MMBTU		0.0060
OK-0156	07/31/2013 &nbsp;ACT	Refinery Boiler	13.31	Natural Gas	5 MMBTUH		Volatile Organic Compounds (VOC)	Good Combustion	0.0054 LB/MMBTU		0.0054
OK-0164	01/08/2015 &nbsp;ACT	Heaters/Boilers	13.31	Natural Gas	0 MMBTUH		Volatile Organic Compounds (VOC)	1. Use pipeline-quality natural gas. 2. Good Combustion Practices w/emission rate limit of 0.005 lb/MMBTU based on AP-42 (7/1998).	7.1 TONS PER YEAR		
OK-0173	01/19/2016 &nbsp;ACT	Heaters (Gas-Fired)	13.31	Natural Gas	0		Volatile Organic Compounds (VOC)	Natural Gas Fuel.	0.0055 LB/MMBTU		0.0055
OR-0050	03/05/2014 &nbsp;ACT	Auxiliary boiler	13.31	natural gas	39.8 MMBTU/H		Volatile Organic Compounds (VOC)	Utilize Low-NOx burners and FGR.	0.005 LB/MMBTU		0.0050
PA-0291	04/23/2013 &nbsp;ACT	AUXILIARY BOILER	13.31	Natural Gas	40 MMBTU/H		Volatile Organic Compounds (VOC)		0.0015 LB/MMBTU		0.0015
PA-0296	12/17/2013 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	40 MMBTU/H		Volatile Organic Compounds (VOC)		0.14 T/YR		

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - VOC (Gas-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit lb/MMBtu
PA-0307	06/15/2015 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	62.04 MCF/hr		Volatile Organic Compounds (VOC)	Good combustion practices and FGR	0.004 LB/MMBTU		0.0040
PA-0309	12/23/2015 &nbsp;ACT	Auxiliary Boiler	13.31	Natural gas	13.31 MMBtu/hr		Volatile Organic Compounds (VOC)		0.005 LB/MMBTU		0.0050
PA-0310	09/02/2016 &nbsp;ACT	Auxiliary boiler	13.31	Natural Gas	92.4 MMBtu/hr		Volatile Organic Compounds (VOC)	ULSD and good combustion practices	0.004 LB/MMBTU		0.0040
PA-0311	09/01/2015 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	55.4 MMBtu/hr		Volatile Organic Compounds (VOC)		0.005 LB/MMBTU		0.0050
*PA-0316	01/26/2018 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	118800 MMBtu/12 month period		Volatile Organic Compounds (VOC)		0.005 LB		0.0050
SC-0113	02/08/2012 &nbsp;ACT	BOILERS	13.31	NATURAL GAS	5 MMBTU/H		Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES, CONSUMPTION OF NATURAL GAS AND PROPANE AS FUEL.	0		
SC-0149	01/03/2013 &nbsp;ACT	NATURAL GAS BOILER EU004	13.31	NATURAL GAS	46 MMBTU/H		Volatile Organic Compounds (VOC)		0.003 LB/MMBTU		0.0030
SC-0149	01/03/2013 &nbsp;ACT	NATURAL GAS BOILER EU005	13.31	NATURAL GAS	46 MMBTU/H		Volatile Organic Compounds (VOC)		0.003 LB/MMBTU		0.0030
SC-0149	01/03/2013 &nbsp;ACT	NATURAL GAS BOILER EU006	13.31	NATURAL GAS	46 MMBTU/H		Volatile Organic Compounds (VOC)		0.003 LB/MMBTU		0.0030
SC-0160	12/13/2012 &nbsp;ACT	BOILERS (BL01) & (BL02)	13.31	NATURAL GAS	33.6 MMBTU/H		Volatile Organic Compounds (VOC)		0.18 LB/H		0.0054
SC-0179	03/18/2015 &nbsp;ACT	THERMAL OIL HEATER #2	13.31	NATURAL GAS	1.83 MMBTU/H		Volatile Organic Compounds (VOC)	NATURAL GAS USAGE AND GOOD COMBUSTION PRACTICES.	0.01 LB/H		0.0055
SC-0192	05/21/2019 &nbsp;ACT	Boiler No. 2	13.31	Natural Gas	0		Volatile Organic Compounds (VOC)	Work Practice Standards	0.0054 LB/MMBTU		0.0054
*SC-0193	04/15/2016 &nbsp;ACT	Energy Center Boilers	13.31	Natural Gas	14.27 MMBTU/hr		Volatile Organic Compounds (VOC)	Annual tune ups per 40 CFR 63.7540(a)(10) are required.	5.5 LB/MMSCF		0.0054
TX-0656	05/16/2014 &nbsp;ACT	Heaters	13.31	natural gas	45 MMBTU/H		Volatile Organic Compounds (VOC)	clean fuel and good combustion practices	0.59 T/YR		
TX-0656	05/16/2014 &nbsp;ACT	heaters (5)	13.31	natural gas	24.3 MMBTU/H		Volatile Organic Compounds (VOC)	clean fuel and good combustion practices	2.44 T/YR		
TX-0663	05/25/2012 &nbsp;ACT	Heaters	13.31	Natural Gas	17 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices	0		
TX-0663	05/25/2012 &nbsp;ACT	8 Inlet Compressors	13.31	Natural Gas or electricity	4.5 MMBTU/H		Volatile Organic Compounds (VOC)	Oxidation catalyst and Dual Drive (electric/gas) technology	0.27 G/HP		
TX-0663	05/25/2012 &nbsp;ACT	Residue Compressors	13.31	Natural Gas	4735 hp		Volatile Organic Compounds (VOC)	Oxidation Catalyst	0.27 G/BHP		
TX-0663	05/25/2012 &nbsp;ACT	Heaters	13.31	Natural Gas	48 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices	0		
TX-0663	05/25/2012 &nbsp;ACT	Heaters	13.31	Natural Gas	10 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices	0		
TX-0663	05/25/2012 &nbsp;ACT	Heaters	13.31	Natural Gas	3 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practice	0		
TX-0663	05/25/2012 &nbsp;ACT	Amine Units	13.31	Natural Gas	9 MMscfd		Volatile Organic Compounds (VOC)	Thermal Oxidizer	0		
TX-0663	05/25/2012 &nbsp;ACT	Glycol Dehy Units	13.31	Natural Gas	3700 T/YR		Volatile Organic Compounds (VOC)	Thermal Oxidizer	0		
TX-0751	06/18/2015 &nbsp;ACT	Commercial/Institutional Size Boilers (<100 MMBtu) at natural gas	13.31	natural gas	73.3 MMBTU/H		Volatile Organic Compounds (VOC)		4 PPM		
TX-0772	11/06/2015 &nbsp;ACT	Commercial/Institutional-Size Boilers/Furnaces	13.31	natural gas	40 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practice to ensure complete combustion.	0.94 T/YR		
TX-0772	11/06/2015 &nbsp;ACT	Commercial/Institutional-Size Boilers/Furnaces	13.31	natural gas	95.7 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practice to ensure complete combustion.	5.42 T/YR		
TX-0772	11/06/2015 &nbsp;ACT	Commercial/Institutional-Size Boilers/Furnaces	13.31	natural gas	13.2 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practice to ensure complete combustion.	0.3 T/YR		
TX-0813	11/22/2016 &nbsp;ACT	small Boiler	13.31	natural gas	39.9 MMBtu/hr		Volatile Organic Compounds (VOC)	best combustion practices	0.0005 MMBTU/HR		

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - VOC (Gas-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units
											Limit
TX-0851	12/17/2018 &nbsp;ACT	Thermal Oxidizer	13.31	NATL GAS	71.3 MMBTU/HR		Volatile Organic Compounds (VOC)	Natural Gas / Clean Fuel, good combustion practices.	0.0054 LB/MMBTU		0.0054
TX-0877	01/08/2020 &nbsp;ACT	Isostripper Reboiler (heater)	13.31	natural gas	0		Volatile Organic Compounds (VOC)	Good combustion practices, use of natural gas fuel for the project heater	0.0054 LB/MMBTU		0.0054
TX-0888	04/23/2020 &nbsp;ACT	Heaters	13.31	natural gas	100 MMBtu		Volatile Organic Compounds (VOC)	Good combustion practice and proper design.	0.0054 LB/MMBTU		0.0054
VA-0321	03/12/2013 &nbsp;ACT	AUXILIARY BOILER	13.31	Natural Gas	66.7 MMBTU/H		Volatile Organic Compounds (VOC)	Clean fuel and good combustion practices	0.005 LB/MMBTU		0.0050
VA-0327	07/12/2017 &nbsp;ACT	(4) 27 MMBtu/hr boilers, Natural gas and No. 2 fuel oi	13.31	Natural Gas	0		Volatile Organic Compounds (VOC)		0.1 LB/HR		
WI-0266	09/06/2018 &nbsp;ACT	Natural gas-fired boiler (Boiler B01)	13.31	Natural Gas	35 mmBtu/hr		Volatile Organic Compounds (VOC)	Good combustion practices, use only natural gas, equip boiler with Low NOx burners and flue gas recirculation	0.0055 LB/MMBTU		0.0055
*WI-0283	04/24/2018 &nbsp;ACT	B01-B12, Boilers	13.31	Natural Gas	28 mmBTU/hr		Volatile Organic Compounds (VOC)	Ultra-low NOx Burners, Flue Gas Recirculation and Good Combustion Practices	0.0036 LB/MMBTU		0.0036
*WI-0284	04/24/2018 &nbsp;ACT	B13-B24 & B25-B36 Natural Gas-Fired Boilers	13.31	Natural Gas	28 mmBTU		Volatile Organic Compounds (VOC)	Ultra-Low NOx Burners, Flue Gas Recirculation, and Good Combustion Practices.	0.0036 LB/MMBTU		0.0036
*WI-0289	04/01/2019 &nbsp;ACT	B98 & B99 Natural Gas Fired Temporary Boilers	13.31	Natural Gas	95 mmBTU/hr		Volatile Organic Compounds (VOC)	Good Combustion Practices	0.0055 LB/MMBTU		0.0055
*WI-0292	04/01/2019 &nbsp;ACT	P44 Space Heaters	13.31	Natural Gas	20 mmBTU/hr		Volatile Organic Compounds (VOC)	Good Combustion Practices, the Use of Low-NOx Burners	0.0055 LB/MMBTU		0.0055
*WV-0029	03/27/2018 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	77.8 mmBtu/hr		Volatile Organic Compounds (VOC)	Use of Natural Gas, Good Combustion Practices	0.62 LB/HR		0.0080
*WV-0032	09/18/2018 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas/Ethane	111.9 mmBtu/hr		Volatile Organic Compounds (VOC)	Use of Natural Gas, Good Combustion Practices	0.9 LB/HR		0.0080
WY-0075	07/16/2014 &nbsp;ACT	Auxiliary Boiler	13.31	natural gas	25.06 MMBtu/h		Volatile Organic Compounds (VOC)	good combustion practices	0.0017 LB/MMBTU		0.0017

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - GHG (Gas-Fired)**

RBLCD	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT
AK-0083	01/06/2015 &nbsp;ACT	Five (5) Waste Heat Boilers	13.31	Natural Gas	50 MMBTU/H		Carbon Dioxide Equivalent (CO2e)		59.61 TONS/MMCF	
*AK-0085	08/13/2020 &nbsp;ACT	Two (2) Buyback Gas Bath Heaters and Three (3) Operations Camp Heaters	13.31	Natural Gas	32 MMBtu/hr		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices, Clean Fuels, and Limited Operation of 500 hours per year per heater.	117.1 LB/MMBTU	
AL-0282	01/22/2014 &nbsp;ACT	Natural Gas Fired Boilers (3)	13.31	Natural Gas	100 mm btu/hr		Carbon Dioxide Equivalent (CO2e)	Good combustion practices	112508 TPY	
AL-0307	10/09/2015 &nbsp;ACT	PACKAGE BOILER	13.31	NATURAL GAS	17.5 MMBTU/H		Carbon Dioxide Equivalent (CO2e)		34189 T/YR	
AL-0307	10/09/2015 &nbsp;ACT	2 CALP LINE BOILERS	13.31	NATURAL GAS	24.59 MMBTU/H		Carbon Dioxide Equivalent (CO2e)		34189 T/YR	
*AL-0329	09/21/2021 &nbsp;ACT	Three Gas Heaters	13.31	Natural Gas	10 MMBtu/hr		Carbon Dioxide Equivalent (CO2e)		117.1 LB/MMBTU	
AR-0140	09/18/2013 &nbsp;ACT	BOILER, PICKLE LINE	13.31	NATURAL GAS	67 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	GOOD OPERATING PRACTICES  MINIMUM BOILER EFFICIENCY 75%	117 LB/MMBTU	
AR-0140	09/18/2013 &nbsp;ACT	BOILERS SN-26 AND 27, GALVANIZING LINE	13.31	NATURAL GAS	24.5 MMBTU/H		Carbon Dioxide	GOOD OPERATING PRACTICES  MINIMUM BOILER EFFICIENCY 75%	117 LB/MMBTU	
AR-0140	09/18/2013 &nbsp;ACT	FURNACES SN-40 AND SN-42, DECARBURIZING LINE	13.31	NATURAL GAS	22 MMBTU/H		Carbon Dioxide	GOOD OPERATING PRACTICES	117 LB/MMBTU	
AR-0155	11/07/2018 &nbsp;ACT	BOILER, PICKLE LINE	13.31	NATURAL GAS	53.7 MMBTU/HR		Carbon Dioxide	GOOD OPERATING PRACTICES MINIMUM BOILER EFFICIENCY 75%	117 LB/MMBTU	
AR-0155	11/07/2018 &nbsp;ACT	BOILER SN-26, GALVANIZING LINE	13.31	NATURAL GAS	53.7 MMBTU/HR		Carbon Dioxide	GOOD OPERATING PRACTICES MINIMUM BOILER EFFICIENCY 75%	117 LB/MMBTU	
AR-0155	11/07/2018 &nbsp;ACT	PREHEATER, GALVANIZING LINE SN-28	13.31	NATURAL GAS	78.2 MMBTU/HR		Carbon Dioxide	GOOD OPERATING PRACTICES	117 LB/MMBTU	
AR-0159	04/05/2019 &nbsp;ACT	BOILER, PICKLE LINE	13.31	NATURAL GAS	0		Carbon Dioxide	GOOD OPERATING PRACTICES MINIMUM BOILER EFFICIENCY 75%	117 LB/MMBTU	
AR-0159	04/05/2019 &nbsp;ACT	PREHEATERS, GALVANIZING LINE SN-28 and SN-29	13.31	NATURAL GAS	0		Carbon Dioxide	GOOD OPERATING PRACTICES	117 LB/MMBTU	
AR-0159	04/05/2019 &nbsp;ACT	BOILER, ANNEALING PICKLE LINE	13.31	NATURAL GAS	0		Carbon Dioxide	GOOD OPERATING PRACTICES MINIMUM BOILER EFFICIENCY 75%	117 LB/MMBTU	
AR-0159	04/05/2019 &nbsp;ACT	BOILERS SN-26 AND SN-27, GALVANIZING LINE	13.31	NATURAL GAS	0		Carbon Dioxide	GOOD OPERATING PRACTICES MINIMUM BOILER EFFICIENCY 75%	117 LB/MMBTU	
AR-0168	03/17/2021 &nbsp;ACT	Galvanizing Line #2 Furnace	13.31	Natural Gas	150.5 MMBtu/hr		Carbon Dioxide	Good operating practices	117 LB/MMBTU	
*AR-0172	09/01/2021 &nbsp;ACT	SN-202, 203, 204 Pickle Line Boilers	13.31	Natural Gas	0		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practice	121 LB/MMBTU	
FL-0356	03/09/2016 &nbsp;ACT	Auxiliary Boiler, 99.8 MMBtu/hr	13.31	Natural gas	99.8 MMBtu/hr		Carbon Dioxide Equivalent (CO2e)	Use of natural gas only	0	
IA-0106	07/12/2013 &nbsp;ACT	Startup Heater	13.31	natural gas	58.8 MMBTU/H		Carbon Dioxide	good operating practices & use of natural gas	117 LB/MMBTU	
IA-0106	07/12/2013 &nbsp;ACT	Startup Heater	13.31	natural gas	58.8 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	good operating practices & use of natural gas	345 TONS/YR	

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - GHG (Gas-Fired)**

RBLCHD	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT
IA-0107	04/14/2014 &nbsp;ACT	dew point heater	13.31	natural gas	13.32 mmBtu/hr		Carbon Dioxide Equivalent (CO2e)		6860 TONS	
IA-0107	04/14/2014 &nbsp;ACT	dew point heater	13.31	natural gas	13.32 mmBtu/hr		Carbon Dioxide Equivalent (CO2e)		6860 TONS	
IA-0107	04/14/2014 &nbsp;ACT	auxiliary boiler	13.31	natural gas	60.1 mmBtu/hr		Carbon Dioxide Equivalent (CO2e)		17313 TON/YR	
IA-0107	04/14/2014 &nbsp;ACT	auxiliary boiler	13.31	natural gas	60.1 mmBtu/hr		Carbon Dioxide Equivalent (CO2e)		17313 TON/YR	
IL-0129	07/30/2018 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	96 mmBtu/hr		Carbon Dioxide Equivalent (CO2e)	Good combustion practice	22500 TON/YR	
IL-0130	12/31/2018 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	96 mmBtu/hr		Carbon Dioxide Equivalent (CO2e)	Good combustion practice	11250 TONS/YEAR	
IN-0158	12/03/2012 &nbsp;ACT	TWO (2) NATURAL GAS AUXILIARY BOILERS	13.31	NATURAL GAS	80 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	OPERATION AND MAINTENANCE PRACTICES; COMBUSTION TURNING; OXYGEN TRIM CONTROLS & ANALYZERS; ECONOMIZER; ENERGY EFFICIENT REFRACTORY; CONDENSATE RETURN SYSTEM, INSULATE STEAM AND HOT LINES.	81996 TONS	
IN-0263	03/23/2017 &nbsp;ACT	STARTUP HEATER EU-002	13.31	NATURAL GAS	70 MMBTU/HR		Carbon Dioxide	GOOD COMBUSTION PRACTICES AND THE USE OF INLET AIR CONTROL SENSORS THAT LIMIT EXCESS AIR	8184 LB/H	
KS-0029	07/14/2015 &nbsp;ACT	Auxiliary boiler	13.31	Natural gas	18.6 MMBTU/HR		Carbon Dioxide Equivalent (CO2e)		9521.5 TONS PER YEAR	
KY-0110	07/23/2020 &nbsp;ACT	EP 15-01 - Natural Gas Direct-Fired Space Heaters, Process Water Heaters, & Air Makeup Heaters	13.31	Natural Gas	40 MMBtu/hr, combined		Carbon Dioxide Equivalent (CO2e)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan and meet design requirements.	20734 TON/YR	
KY-0110	07/23/2020 &nbsp;ACT	EP 05-01 - Group 1 Car Bottom Furnaces #1 - #3	13.31	Natural Gas	28 MMBtu/hr, each		Carbon Dioxide Equivalent (CO2e)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan and meet design requirements.	43542 TON/YR	
KY-0110	07/23/2020 &nbsp;ACT	EP 04-02 - Austenitizing Furnace	13.31	Natural Gas	54 MMBtu/hr		Carbon Dioxide Equivalent (CO2e)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan and implement design standards.	27991 TON/YR	
KY-0110	07/23/2020 &nbsp;ACT	EP 05-02 - Group 2 Car Bottom Furnaces A & B	13.31	Natural Gas	60 MMBtu/hr, combined		Carbon Dioxide Equivalent (CO2e)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan and meet design requirements.	31101 TON/YR	
KY-0110	07/23/2020 &nbsp;ACT	EP 03-02 - Ingot Car Bottom Furnaces #1-#4	13.31	Natural Gas	37 MMBtu/hr, each		Carbon Dioxide Equivalent (CO2e)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan and meet design standards.	76717 TON/YR	
KY-0110	07/23/2020 &nbsp;ACT	EP 03-05 - Steckel Mill Coiling Furnaces #1 & #2	13.31	Natural Gas	17.5 MMBtu/hr, each		Carbon Dioxide Equivalent (CO2e)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	18142 TON/YR	
KY-0110	07/23/2020 &nbsp;ACT	EP 04-03 - Tempering Furnace	13.31	Natural Gas	48 MMBtu/hr		Carbon Dioxide Equivalent (CO2e)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan and meet design requirements.	24881 TON/YR	

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - GHG (Gas-Fired)**

RBLCHD	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT
KY-0115	04/19/2021 &nbsp;ACT	Cold Mill Complex Makeup Air Units (EP 21-19)	13.31	Natural Gas	40 MMBtu/hr, total		Carbon Dioxide Equivalent (CO2e)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan and implement various design and operational efficiency requirements.	20734 TONS/YR	
KY-0115	04/19/2021 &nbsp;ACT	Vacuum Degasser Boiler (EP 20-13)	13.31	Natural Gas	50.4 MMBtu/hr		Carbon Dioxide Equivalent (CO2e)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan and implement various design and operational efficiency requirements.	26125 TONS/YR	
KY-0115	04/19/2021 &nbsp;ACT	Pickle Line #2 &#34;Boiler #1 &#34; #2 (EP 21-04 &#34; EP 21-05)	13.31	Natural Gas	18 MMBtu/hr, each		Carbon Dioxide Equivalent (CO2e)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan and implement various design and operational efficiency requirements.	12675 TONS/YR	
KY-0115	04/19/2021 &nbsp;ACT	Galvanizing Line #2 Alkali Cleaning Section Heater (EP 21-07B)	13.31	Natural Gas	23 MMBtu/hr		Carbon Dioxide Equivalent (CO2e)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan and implement various design and operational efficiency requirements.	11922 TONS/YR	
KY-0115	04/19/2021 &nbsp;ACT	Galvanizing Line #2 Radiant Tube Furnace (EP 21-08B)	13.31	Natural Gas	36 MMBtu/hr		Carbon Dioxide Equivalent (CO2e)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan and implement various design and operational efficiency requirements.	18660 TONS/YR	
KY-0115	04/19/2021 &nbsp;ACT	Galvanizing Line #2 Annealing Furnaces (15) (EP 21-15)	13.31	Natural Gas	4.8 MMBtu/hr, each		Carbon Dioxide Equivalent (CO2e)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan and implement various design and operational efficiency requirements.	37581 TONS/YR	
KY-0115	04/19/2021 &nbsp;ACT	Galvanizing Line #2 Preheat Furnace (EP 21-08A)	13.31	Natural Gas	94 MMBtu/hr		Carbon Dioxide Equivalent (CO2e)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan and implement various design and operational efficiency requirements.	48725 TONS/YR	
KY-0115	04/19/2021 &nbsp;ACT	Galvanizing Line #2 Zinc Pot Preheater (EP 21-09)	13.31	Natural Gas	3 MMBtu/hr		Carbon Dioxide Equivalent (CO2e)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan and implement various design and operational efficiency requirements.	30 TONS/YR	
KY-0115	04/19/2021 &nbsp;ACT	Heated Transfer Table Furnace (EP 02-03)	13.31	Natural Gas	65.5 MMBtu/hr		Carbon Dioxide Equivalent (CO2e)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan and implement various design and operational efficiency requirements.	33952 TONS/YR	
LA-0268	09/25/2013 &nbsp;ACT	Cracking Furnace E (2M-17) (EQT 0233)	13.31	Natural gas	90 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Improved combustion measures (i.e., combustion tuning, optimization, and installation of instrumentation and controls); insulation; and operational monitoring and proper maintenance to minimize air infiltration.	46123 TPY	
LA-0269	09/25/2013 &nbsp;ACT	Cracking Furnace E (M-17) (EQT 0242)	13.31	Natural Gas	90 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Improved combustion measures (i.e., combustion tuning, optimization, and installation of instrumentation and controls); insulation; and operational monitoring and proper maintenance to minimize air infiltration.	46123 TPY	

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - GHG (Gas-Fired)**

RBLCHD	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT
LA-0271	05/24/2013 &nbsp;ACT	Mol Sieve Dehy Regen Heater (H-01)	13.31	Natural gas	30 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Improved combustion measures: heater tuning, optimization, and installation of instrumentation and controls; insulation installed according to the heater manufacturer's specifications; operational monitoring as well as proper maintenance in order to minimize air infiltration.	0	
LA-0305	06/30/2016 &nbsp;ACT	Gasifier Start-up Preheat Burners	13.31	Natural gas	23 MM BTU/hr (each)		Carbon Dioxide Equivalent (CO2e)	good equipment design and good combustion practices	0	
LA-0305	06/30/2016 &nbsp;ACT	WSA Preheat Burners	13.31	Natural Gas	0		Carbon Dioxide Equivalent (CO2e)	good equipment design and good combustion practices	0	
LA-0307	03/21/2016 &nbsp;ACT	Regenerative Heaters	13.31	natural gas	7.37 mm btu/hr		Carbon Dioxide Equivalent (CO2e)	good combustion/operating/maintenance practices and fueled by natural gas	0	
LA-0311	07/15/2013 &nbsp;ACT	No. 6 Ammonia Plant Start-up Heater (4-13, EQT 158)	13.31	Natural Gas	94.5 MM Btu/hr		Carbon Dioxide Equivalent (CO2e)	Use of natural gas as fuel, good combustion practices, and good heater design with appropriate instrumentation.	117 LB/MM BTU	
LA-0311	07/15/2013 &nbsp;ACT	No. 6 Ammonia Plant Start-up Heater (4-13, EQT 158)	13.31	Natural Gas	94.5 MM Btu/hr		Carbon Dioxide	Use of natural gas as fuel, good combustion practices, and good heater design with appropriate instrumentation.	116.89 LB/MM BTU	
*LA-0315	05/23/2014 &nbsp;ACT	Reactor Charge Heater - 53B001	13.31	Natural Gas	10.1 MMBTU/HR		Carbon Dioxide Equivalent (CO2e)	Energy Efficiency Measures	0	
*LA-0315	05/23/2014 &nbsp;ACT	Regeneration Heater - 51B001	13.31	Natural Gas	61 MMBTU/HR		Carbon Dioxide Equivalent (CO2e)	Energy Efficiency Measures	0	
*LA-0315	05/23/2014 &nbsp;ACT	Recycle Gas Heater - 51B002A	13.31	Natural Gas	33 MMBTU/HR		Carbon Dioxide Equivalent (CO2e)	Energy Efficiency Measures	0	
*LA-0315	05/23/2014 &nbsp;ACT	Recycle Gas Heater - 51B002B	13.31	Natural Gas	33 MMBTU/HR		Carbon Dioxide Equivalent (CO2e)	Energy Efficiency Measures	0	
*LA-0315	05/23/2014 &nbsp;ACT	Recycle Gas Heater - 51B002C	13.31	Natural Gas	33 MMBTU/HR		Carbon Dioxide Equivalent (CO2e)	Energy Efficiency Measures	0	
*LA-0315	05/23/2014 &nbsp;ACT	Recycle Gas Heater - 51B002D	13.31	Natural Gas	33 MMBTU/HR		Carbon Dioxide Equivalent (CO2e)	Energy Efficiency Measures	0	
*LA-0315	05/23/2014 &nbsp;ACT	Recycle Gas Heater - 51B002E	13.31	Natural Gas	33 MMBTU/HR		Carbon Dioxide Equivalent (CO2e)	Energy Efficiency Measures	0	
*LA-0349	07/10/2018 &nbsp;ACT	Hot Oil Heaters (5)	13.31	natural gas	16.13 mm btu/hr		Carbon Dioxide Equivalent (CO2e)	Use Low Carbon Fuel, Energy Efficiency Measures, and Good Combustion Practices	0	
*LA-0364	01/06/2020 &nbsp;ACT	Hot Oil Heaters 1 and 2	13.31	Natural Gas	0		Carbon Dioxide Equivalent (CO2e)	Use of fuel gas as fuel, energy-efficient design options, and operational/maintenance practices.	5858 TONS/YR	
*LA-0364	01/06/2020 &nbsp;ACT	PR Waste Heat Boiler	13.31	Natural Gas	94 mm btu/h		Carbon Dioxide Equivalent (CO2e)	Use of natural gas or fuel gas as fuel, energy-efficient design options, and operational/maintenance practices.	455475 T/YR	
MA-0039	01/30/2014 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	80 MMBTU/H		Carbon Dioxide Equivalent (CO2e)		119 LB/MMBTU	
MI-0406	11/01/2013 &nbsp;ACT	FG-AUXBOILER1-2; Two (2) natural gas-fired auxiliary boilers.	13.31	natural gas	40 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion practices.	11503.7 T/YR	
MI-0410	07/25/2013 &nbsp;ACT	FGAUXBOILERS: Two auxiliary boilers &lt; 100 MMBTU/H heat input each	13.31	natural gas	100 MMBTU/H heat input each		Carbon Dioxide Equivalent (CO2e)	Efficient combustion; energy efficiency.	24304 T/YR	
MI-0412	12/04/2013 &nbsp;ACT	Fuel pre-heater (EUFUELHTR)	13.31	natural gas	3.7 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion practices	1934 T/YR	

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - GHG (Gas-Fired)**

RBLCD	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT
MI-0412	12/04/2013 &nbsp;ACT	Auxiliary Boiler B (EUAUXBOILERB)	13.31	natural gas	95 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion practices	49251 T/YR	
MI-0412	12/04/2013 &nbsp;ACT	Auxiliary Boiler A (EUAUXBOILER A)	13.31	natural gas	55 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion practices	28514 T/YR	
MI-0420	06/03/2016 &nbsp;ACT	FGAUXBOILERS	13.31	Natural gas	6 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Use of pipeline quality natural gas and energy efficiency measures.	6155 T/YR	
MI-0421	08/26/2016 &nbsp;ACT	EUFLTOS1 in FGTOH (Thermal Oil System for Thermally Fused Lamination Lines)	13.31	Natural gas	34 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion and maintenance practices. Natural gas only.	5254 T/YR	
MI-0421	08/26/2016 &nbsp;ACT	EUTOH (In FGTOH)--Thermal Oil Heater	13.31	Natural gas	34 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion and maintenance practices, natural gas only.	17438 T/YR	
MI-0423	01/04/2017 &nbsp;ACT	FGFUELHTR (Two fuel pre-heaters identified as EUFUELHTR1 & EUFUELHTR2)	13.31	Natural gas	27 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Energy efficiency measures and the use of a low carbon fuel (pipeline quality natural gas).	13848 T/YR	
MI-0424	12/05/2016 &nbsp;ACT	EUFUELHTR (Fuel pre-heater)	13.31	Natural gas	3.7 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion practices.	1934 T/YR	
MI-0424	12/05/2016 &nbsp;ACT	EUAUXBOILER (Auxiliary boiler)	13.31	natural gas	83.5 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion practices.	43283 T/YR	
MI-0425	05/09/2017 &nbsp;ACT	EUTOH in FGTOH	13.31	Natural gas	38 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion and maintenance practices, natural gas only.	19490 T/YR	
MI-0425	05/09/2017 &nbsp;ACT	EUFLTOS1 in FGTOH	13.31	Natural gas	10.2 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion and maintenance practices, natural gas only.	5254 T/YR	
MI-0426	03/24/2017 &nbsp;ACT	FGAUXBOILERS (6 auxiliary boilers EUAUXBOIL2A, EUAUXBOIL3A, EUAUXBOIL2B, EUAUXBOIL3B, EUAUXBOIL2C, EUAUXBOIL3C)	13.31	Natural gas	3 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Use of pipeline quality natural gas and energy efficiency measures.	7324 T/YR	
MI-0433	06/29/2018 &nbsp;ACT	EUAUXBOILER (North Plant): Auxiliary Boilder	13.31	Natural gas	61.5 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Energy efficiency measures and the use of a low carbon fuel (pipeline quality natural gas).	31540 T/YR	
MI-0433	06/29/2018 &nbsp;ACT	EUAUXBOILER (South Plant): Auxiliary Boiler	13.31	Natural gas	61.5 MMBTU/h		Carbon Dioxide Equivalent (CO2e)	Energy efficiency measures and the use of a low carbon fuel (pipeline quality natural gas).	31540 T/YR	
MI-0435	07/16/2018 &nbsp;ACT	EUAUXBOILER: Auxiliary Boiler	13.31	Natural gas	99.9 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Energy efficiency measures, use of natural gas.	25623 T/YR	
MI-0435	07/16/2018 &nbsp;ACT	EUFUELHTR1: Natural gas fired fuel heater	13.31	Natural gas	20.8 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Natural gas fuel	6310 T/YR	
MI-0435	07/16/2018 &nbsp;ACT	EUFUELHTR2: Natural gas fired fuel heater	13.31	Natural gas	3.8 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Natural gas fuel	6310 T/YR	
*MI-0440	05/22/2019 &nbsp;ACT	FGFUELHEATERS	13.31	natural gas	25 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Utilize low-carbon fuels and implement energy efficiency measures and preventative maintenance pursuant to manufacturer recommendations.	12822 T/YR	
*MI-0441	12/21/2018 &nbsp;ACT	EUAUXBOILER--natural gas fired auxiliary boiler rated at &lt;= 99MMBTU/H	13.31	Natural gas	99 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Low carbon fuel (pipeline quality natural gas), good combustion practices and energy efficiency measures.	50776 T/YR	



**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - GHG (Gas-Fired)**

RBLCD	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT
*MI-0442	08/21/2019 &nbsp;ACT	FGAUXBOILER	13.31	Natural gas	80 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Energy efficiency	41031 T/YR	
*MI-0442	08/21/2019 &nbsp;ACT	FGPREHEAT	13.31	natural gas	7 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Energy efficiency	3590 T/YR	
*MI-0445	11/26/2019 &nbsp;ACT	FGFUELHTR (2 fuel pre-heaters)	13.31	Natural gas	27 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Energy Efficiency Measures and the use of a low carbon fuel (pipeline quality natural gas)	13848 T/YR	
MS-0092	05/08/2014 &nbsp;ACT	Regeneration Heater, methanol to gasoline	13.31	NATURAL GAS	13 MMBTU/H		Carbon Dioxide Equivalent (CO2e)		0	
MS-0092	05/08/2014 &nbsp;ACT	Reactor Heater, 5	13.31	NATURAL GAS	12 MMBTU/H		Carbon Dioxide Equivalent (CO2e)		0	
NY-0103	02/03/2016 &nbsp;ACT	Auxiliary boiler	13.31	natural gas	60 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	good combustion practiced and pipeline quality natural gas	119 LB/MMBTU	
NY-0114	09/11/2014 &nbsp;ACT	Package boilers	13.31	natural gas	0		Carbon Dioxide Equivalent (CO2e)	BACT Requirements: 1) Firing natural gas only. 2) Refractory and external insulation. 3) High efficiency low NOx burners. 4) Economizer. 5) Digital Control instrumentation. 6) Minimize air infiltration. 7) Combustion tuning. 8) Condensate return. 9) Steam line maintenance. 10) Operation and Maintenance Practices.	0	
NY-0116	03/29/2013 &nbsp;ACT	Boilers - NG	13.31	natural gas	0		Carbon Dioxide	Natural gas fired boilers required to achieve a minimum of 85% fuel to water heat transfer efficiency.	118 LB/MMBTU	
OH-0352	06/18/2013 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	99 MMBtu/H		Carbon Dioxide Equivalent (CO2e)		11671 T/YR	
OH-0355	05/07/2013 &nbsp;ACT	4 Indirect-Fired Air Preheaters	13.31	Natural gas	0		Carbon Dioxide Equivalent (CO2e)		74000 T/YR	
OH-0359	03/31/2014 &nbsp;ACT	Backup Boilers (B001, B002)	13.31	natural gas	96.5 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Efficient burner design (natural gas, economizer)	49494 T/YR	
OH-0360	11/05/2013 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural Gas	99 MMBtu/H		Carbon Dioxide Equivalent (CO2e)		26259.76 T/YR	
OH-0366	08/25/2015 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	34 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion controls/natural gas combustion	4008 T/YR	
OH-0367	09/23/2016 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	99 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion controls, natural gas combustion, and ultra low sulfur diesel	32171 T/YR	
OH-0368	04/19/2017 &nbsp;ACT	Startup Heater (B001)	13.31	Natural gas	100 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion control (i.e., high temperatures, sufficient excess air, sufficient residence times, and good air/fuel mixing).	2840 T/YR	
OH-0370	09/07/2017 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	37.8 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion controls/natural gas combustion	4456 T/YR	
OH-0372	09/27/2017 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	37.8 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	use of natural gas, good combustion controls	4502 T/YR	
OH-0374	10/23/2017 &nbsp;ACT	Fuel Gas Heaters (2 identical, P007 and P008)	13.31	Natural gas	15 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Natural gas, low-emitting fuel	7695 T/YR	
OH-0375	11/07/2017 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	26.8 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Natural gas as the sole fuel	7845 T/YR	
OH-0377	04/19/2018 &nbsp;ACT	Auxiliary Boiler (B001)	13.31	Natural gas	44.55 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion practices and pipeline quality natural gas	2817.6 T/YR	
OH-0377	04/19/2018 &nbsp;ACT	Auxiliary Boiler (B002)	13.31	Natural gas	80 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion practices and pipeline quality natural gas	5009.1 T/YR	

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - GHG (Gas-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT
OH-0379	02/06/2019 &nbsp;ACT	Startup boiler (B001)	13.31	Natural gas	15.17 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion practices and the use of natural gas	1784 LB/H	
OH-0379	02/06/2019 &nbsp;ACT	Ladle Preheaters (P002, P003 and P004)	13.31	Natural gas	15 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion practices and the use of natural gas	1764 LB/H	
*OH-0381	09/27/2019 &nbsp;ACT	Tunnel Furnace #2 (P018)	13.31	Natural Gas	88 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Use of natural gas and energy efficient design	10283.06 LB/H	
OK-0148	09/12/2012 &nbsp;ACT	Commercial/Institutional Boilers (&lt;100 MMBTUH)	13.31	Natural Gas	11.04 MMBTUH		Carbon Dioxide Equivalent (CO2e)		117 LB/MMBTU	
OK-0156	07/31/2013 &nbsp;ACT	Refinery Boiler	13.31	Natural Gas	5 MMBTUH		Carbon Dioxide	Good Combustion	0	
OK-0164	01/08/2015 &nbsp;ACT	Heaters/Boilers	13.31	Natural Gas	0 MMBTUH		Carbon Dioxide Equivalent (CO2e)	1. Use pipeline-quality natural gas. 2. Good Combustion Practices. 3. Tune-ups for applicable boilers/heaters per 40CFR63, Subpart DDDDD.	153716 TONS PER YEAR	
OK-0173	01/19/2016 &nbsp;ACT	Heaters (Gas-Fired)	13.31	Natural Gas	0		Carbon Dioxide Equivalent (CO2e)	Natural Gas Fuel	120 LB/MMBTU	
OR-0050	03/05/2014 &nbsp;ACT	Auxiliary boiler	13.31	natural gas	39.8 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Clean fuels	117 LB CO2/MMBTU	
OR-0050	03/05/2014 &nbsp;ACT	Auxiliary boiler	13.31	natural gas	39.8 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Clean fuels	117 LB CO2/MMBTU	
PA-0291	04/23/2013 &nbsp;ACT	AUXILIARY BOILER	13.31	Natural Gas	40 MMBTU/H		Carbon Dioxide Equivalent (CO2e)		13696 TPY	
PA-0296	12/17/2013 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	40 MMBTU/H		Carbon Dioxide Equivalent (CO2e)		12346 T/YR	
PA-0309	12/23/2015 &nbsp;ACT	Auxillary Boiler	13.31	Natural gas	13.31 MMBtu/hr		Carbon Dioxide Equivalent (CO2e)		44107 TON	
PA-0311	09/01/2015 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	55.4 MMBtu/hr		Carbon Dioxide Equivalent (CO2e)		13561 TPY	
SC-0113	02/08/2012 &nbsp;ACT	BOILERS	13.31	NATURAL GAS	5 MMBTU/H		Carbon Dioxide	CONTROL METHOD FOR CO2E: GOOD DESIGN AND COMBUSTION PRACTICES.	0	
TX-0634	10/12/2012 &nbsp;ACT	Thermal Oxidizers	13.31	Natural Gas	0		Carbon Dioxide Equivalent (CO2e)		36406 T/YR	
TX-0634	10/12/2012 &nbsp;ACT	Thermal Oxidizers	13.31	Natural Gas	0		Carbon Dioxide		36406 T/YR	
TX-0635	01/17/2013 &nbsp;ACT	Vapor Destruction Unit	13.31	Natural Gas	28.8 MM BTU/H		Carbon Dioxide		2400 T/YR	
TX-0746	11/18/2014 &nbsp;ACT	Regeneration Heater	13.31	Natural Gas	36 MMBTU/H		Carbon Dioxide Equivalent (CO2e)		168.3 LB CO2/MMSCF	
TX-0746	11/18/2014 &nbsp;ACT	Hot Oil Heater	13.31	Natural Gas	60 MMBTU/H		Carbon Dioxide Equivalent (CO2e)		280.5 LB CO2/MMSCFD PROCES	
TX-0757	05/12/2014 &nbsp;ACT	Pipeline Heater	13.31	Natural Gas	3 MMBtu/hr (HHV)		Carbon Dioxide Equivalent (CO2e)		624.78 TPY CO2E	
TX-0758	08/01/2014 &nbsp;ACT	Dew-Point Heater	13.31	Natural Gas	9 MMBTU/H		Carbon Dioxide Equivalent (CO2e)		2631 TPY CO2E	
TX-0772	11/06/2015 &nbsp;ACT	Commercial/Institutional-Size Boilers/Furnaces	13.31	natural gas	40 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion practice to ensure complete combustion.	20758 T/YR	
TX-0772	11/06/2015 &nbsp;ACT	Commercial/Institutional-Size Boilers/Furnaces	13.31	natural gas	95.7 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion practices and use of low carbon fuel	119195 T/YR	
TX-0772	11/06/2015 &nbsp;ACT	Commercial/Institutional-Size Boilers/Furnaces	13.31	natural gas	13.2 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion practice to ensure complete combustion.	6850 T/YR	
TX-0845	08/24/2018 &nbsp;ACT	HEATERS	13.31	NATL GAS	31 BTU/HR		Carbon Dioxide Equivalent (CO2e)	low carbon fuel selection, and good combustion practices	0	

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - GHG (Gas-Fired)**

RBLCD	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT
TX-0851	12/17/2018 &nbsp;ACT	Thermal Oxidizer	13.31	NATL GAS	71.3 MMBTU/HR		Carbon Dioxide Equivalent (CO2e)	Natural Gas / Clean Fuel, good combustion practices.	0	
TX-0888	04/23/2020 &nbsp;ACT	Heaters	13.31	natural gas	100 MMBtu		Carbon Dioxide Equivalent (CO2e)	Good combustion practice, clean fuel, and proper design	0	
VA-0321	03/12/2013 &nbsp;ACT	AUXILIARY BOILER	13.31	Natural Gas	66.7 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Pipeline quality natural gas and fuel-efficient design and operation	117 LB/MMBTU	
*VA-0333	12/09/2020 &nbsp;ACT	Three (3) boilers	13.31	Natural Gas	76.6 MMBtu/hr		Carbon Dioxide Equivalent (CO2e)		117.1 LB	
WI-0266	09/06/2018 &nbsp;ACT	Natural gas-fired boiler (Boiler B01)	13.31	Natural Gas	35 mmBtu/hr		Carbon Dioxide Equivalent (CO2e)	Good combustion practices, use only natural gas, equip with Low NOx burners and flue gas recirculation	160 LBCO2E/1000 LB STEAM	
*WI-0283	04/24/2018 &nbsp;ACT	B01-B12, Boilers	13.31	Natural Gas	28 mmBTU/hr		Carbon Dioxide Equivalent (CO2e)	Ultra-low NOx Burners, Flue Gas Recirculation, Good Combustion Practices and the Use of Pipeline Quality Natural Gas	160 LB/1000 LB CO2E	
*WI-0284	04/24/2018 &nbsp;ACT	B13-B24 & B25-B36 Natural Gas-Fired Boilers	13.31	Natural Gas	28 mmBTU		Carbon Dioxide Equivalent (CO2e)	Ultra-Low NOx Burners, Flue Gas Recirculation, and Good Combustion Practices and the Use of Pipeline Quality Natural Gas.	160 LB CO2E/1000LB STEAM	
*WI-0292	04/01/2019 &nbsp;ACT	P44 Space Heaters	13.31	Natural Gas	20 mmBTU/hr		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices, the Use of Low-NOx Burners	0	
*WV-0029	03/27/2018 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas	77.8 mmBtu/hr		Carbon Dioxide Equivalent (CO2e)	Use of Natural Gas	9107 LB/HR	
*WV-0031	06/14/2018 &nbsp;ACT	CT-1 & CT-2 - Solar Titan 130 Combustion Turbine/compressor	13.31	Natural Gas	20500 hp		Carbon Dioxide Equivalent (CO2e)	Limited to natural gas.	1.01 LB CO2E/HP	
*WV-0031	06/14/2018 &nbsp;ACT	WH-1 - Boiler	13.31	Natural Gas	8.72 mmBtu/hr		Carbon Dioxide Equivalent (CO2e)	Limited to natural gas; and tune-up the boiler once every five years.	0	
*WV-0032	09/18/2018 &nbsp;ACT	Auxiliary Boiler	13.31	Natural Gas/Ethane	111.9 mmBtu/hr		Carbon Dioxide Equivalent (CO2e)	Use of Natural Gas	14768 LB/HR	
WY-0075	07/16/2014 &nbsp;ACT	Auxiliary Boiler	13.31	natural gas	25.06 MMBtu/h		Carbon Dioxide Equivalent (CO2e)	good combustion practices and energy efficiency	12855 TONS	
WY-0076	07/01/2014 &nbsp;ACT	Startup Heater	13.31	Natural Gas	16 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	limited to 200 hours of operation per year	187 T/YR	

BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - CO (Oil-Fired)

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units
											Limit
AK-0082	01/23/2015	Boilers and Heaters	13.22	Ultra Low Sulfur Diesel	7 MMBTU/H		Carbon Monoxide		5 LB/1,000 GAL		0.0357
FL-0328	10/27/2011	Boiler	13.22	Diesel	9.6 MMBTU/H		Carbon Monoxide	Use of good combustion and maintenance practices, based on the current manufacturer's specifications for this boiler.	0.12 TONS PER YEAR		
MI-0400	06/29/2011	Auxiliary Boiler	13.22	Diesel	72.4 MMBTU/H		Carbon Monoxide	Good combustion control	6.11 LB/H		0.0844
*SC-0194	11/14/2008	K and L Area Boilers - Fuel Oil	13.22	No. 2 Fuel Oil	14.9 MMBTU/hr		Carbon Monoxide	Good Combustion Practices	0.036 LB/MMBTU		0.0360

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - NO<sub>x</sub> (Oil-Fired)**

**Std Units  
Limit**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	lb/mmbtu
AK-0082	01/23/2015 &nbsp;ACT	Boilers and Heaters	13.22	Ultra Low Sulfur Diesel	7 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )		20 LB/1,000 GAL		0.1429
FL-0328	10/27/2011 &nbsp;ACT	Boiler	13.22	Diesel	9.6 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Use of good combustion and maintenance practices, based on the current manufacturer's specifications for this boiler.	0.49 TONS PER YEAR		
FL-0347	09/16/2014 &nbsp;ACT	Flowback Boiler	13.22	Diesel	8 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Use of good combustion practices based on the most recent manufacturer's specifications issued for this boiler	0		
MI-0400	06/29/2011 &nbsp;ACT	Auxiliary Boiler	13.22	Diesel	72.4 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burner	1.67 LB/H		0.0231
*WA-0349	04/04/2013 &nbsp;ACT	steam generating boiler	13.22	diesel	0		Nitrogen Oxides (NO <sub>x</sub> )	Low NO <sub>x</sub> burners	0.09 LB/MMBTU		0.0900
*WI-0270	06/13/2016 &nbsp;ACT	B27 - Auxilary Steam Boiler	13.22	Distillate fuel oil	83.8 mmBTU/hr		Nitrogen Oxides (NO <sub>x</sub> )	Limit nitrogen oxides emissions to 0.21 pounds per MMBTU	0.21 LB/MMBTU		0.2100

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit lb/MMBtu
AK-0081	06/12/2013 &nbsp;ACT	Combustion	13.22	ULSD	0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Good combustion and operation practices	0.25 LB/GAL		1.7857
AK-0082	01/23/2015 &nbsp;ACT	Boilers and Heaters	13.22	Ultra Low Sulfur Diesel	7 MMBTU/H		Particulate matter, filterable &lt; 10 Åµ (FPM10)		2.3 LB/1,000 GAL		0.0164
FL-0328	10/27/2011 &nbsp;ACT	Boiler	13.22	Diesel	9.6 MMBTU/H		Particulate matter, total (TPM)	Use of good combustion and maintenance practices, based on the current manufacturerâ€™s specifications for this boiler.	0.05 TONS PER YEAR		
FL-0347	09/16/2014 &nbsp;ACT	Flowback Boiler	13.22	Diesel	8 MMBTU/H		Particulate matter, total (TPM)	Use of good combustion practices based on the most recent manufacturer's specifications issued for this boiler	0		
MI-0400	06/29/2011 &nbsp;ACT	Auxiliary Boiler	13.22	Diesel	72.4 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)		2.17 LB/H		0.0300
*WA-0349	04/04/2013 &nbsp;ACT	steam generating boiler	13.22	diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices	13400000 GAL/YR		0.0200
*WI-0270	06/13/2016 &nbsp;ACT	B27 - Auxilary Steam Boiler	13.22	Distillate fuel oil	83.8 mmBTU/hr		Particulate matter, total (TPM)	Switch to ultra-low sulfur fuel oil (sulfur content no greater than 15 ppm, by weight)	0.015 LB/MMBTU		0.0150

Std Units  
Limit

Appendix C, Page C2-105

**BACT Determinations for Commercial/Institutional-Size Boilers/Furnaces (< 100 MMBtu/hr) - GHG (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit lb/MMBtu
AK-0082	01/23/2015 &nbsp;ACT	Boilers and Heaters	13.22	Ultra Low Sulfur Diesel	7 MMBTU/H		Carbon Dioxide Equivalent (CO2e)		45537 TONS/YEAR		
FL-0347	09/16/2014 &nbsp;ACT	Flowback Boiler	13.22	Diesel	8 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Use of good combustion practices based on the most recent manufacturer's specifications issued for this boiler	0		
TX-0612	11/10/2011 &nbsp;ACT	EMGEN1-STK - DIESEL FIRED EMERGENCY GENERATOR	13.22	DIESEL	93.8		Carbon Dioxide Equivalent (CO2e)		15314 LB/H		163.2623
*WI-0270	06/13/2016 &nbsp;ACT	B27 - Auxilary Steam Boiler	13.22	Distillate fuel oil	83.8 mmBTU/hr		Carbon Dioxide Equivalent (CO2e)	Limit GHG emissions to 203.8 pounds of carbon dioxide equivalents (CO2-e) per 1000 pounds of steam produced, averaged over any 12 consecutive month period (computed monthly).	0		



**BACT Determinations for Emergency Diesel Engines - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
AK-0082	01/23/2015 &nbsp;ACT	Emergency Camp Generators	17.11	Ultra Low Sulfur Diesel	2695 hp		Carbon Monoxide		2.6 GRAMS/HP-H		-
AK-0084	06/30/2017 &nbsp;ACT	Black Start and Emergency Internal Combustion Engines	17.11	Diesel	1500 kW	e	Carbon Monoxide	Good Combustion Practices	4.38 G/KW-HR		-
AK-0084	06/30/2017 &nbsp;ACT	Fire Pump Diesel Internal Combustion Engines	17.21	Diesel	252 hp		Carbon Monoxide	Good Combustion Practices	3.3 G/KW-HR		-
*AK-0085	08/13/2020 &nbsp;ACT	Three (3) Firewater Pump Engines and two (2) Emergency Diesel Generators	17.21	ULSD	19.4 gph		Carbon Monoxide	Good combustion practices, limit operation to 500 hours per year per engine	3.3 G/HP-HR		-
AL-0301	07/22/2014 &nbsp;ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	DIESEL	800 HP		Carbon Monoxide		0.0055 LB/HP-H		-
*AL-0318	12/18/2017 &nbsp;ACT	250 Hp Emergency CI, Diesel-fired RICE	17.11	Diesel	0		Carbon Monoxide		0		-
AR-0161	09/23/2019 &nbsp;ACT	Emergency Engines	17.11	Diesel	0		Carbon Monoxide	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	3.5 G/KW-H		-
AR-0163	06/09/2019 &nbsp;ACT	Emergency Engines	17.11	Diesel	0		Carbon Monoxide	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	3.5 G/KW-HR		-
AR-0168	03/17/2021 &nbsp;ACT	Emergency Engines	17.21	Diesel	0		Carbon Monoxide	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	3.5 G/KW-HR		-
AR-0171	02/14/2019 &nbsp;ACT	SN-106 Cold Mill 1 Diesel Fired Emergency Generator	17.21	Diesel	1073 bhp		Carbon Monoxide	Good operating practices.	4 G/KW-HR		-
CA-1192	06/21/2011 &nbsp;ACT	EMERGENCY FIREWATER PUMP ENGINE	17.21	DIESEL	288 HP		Carbon Monoxide	EQUIPPED W/ A TURBOCHARGER AND AN INTERCOOLER/AFTERCOOLER	0.447 G/HP-H		-
CA-1212	10/18/2011 &nbsp;ACT	EMERGENCY IC ENGINE	17.11	DIESEL	2683 HP		Carbon Monoxide		3.5 G/KW-H		-
CA-1212	10/18/2011 &nbsp;ACT	EMERGENCY IC ENGINE	17.21	DIESEL	182 HP		Carbon Monoxide		3.5 G/KW-H		-
FL-0328	10/27/2011 &nbsp;ACT	Emergency Engine	17.11	Diesel	0		Carbon Monoxide	Use of good combustion practices, based on the current manufacturerâ€™s specifications for this engine	0.09 TONS PER YEAR		-
FL-0328	10/27/2011 &nbsp;ACT	Emergency Fire Pump Engine	17.11	Diesel	0		Carbon Monoxide	Use of good combustion practices, based on the current manufacturerâ€™s specifications for this engine	0.005 TONS PER YEAR		-
FL-0332	09/23/2011 &nbsp;ACT	600 HP Emergency Equipment	17.11	Ultra-Low Sulfur Oil	0		Carbon Monoxide	See Pollutant Notes.	2.6 G/HP-H		-
FL-0338	05/30/2012 &nbsp;ACT	Emergency Generator Diesel Engine - Development Driller 1	17.11	Diesel	2229 hp		Carbon Monoxide	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	0.37 T/12MO ROLLING TOTAL		-
FL-0338	05/30/2012 &nbsp;ACT	Emergency Generator Diesel Engine - C.R. Luigs	17.11	diesel	2064 hp		Carbon Monoxide	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	0.34 T/12MO ROLLING TOTAL		-
FL-0346	04/22/2014 &nbsp;ACT	Four 3100 kW black start emergency generators	17.11	ULSD	2.32 MMBtu/hr (HHV) per engine		Carbon Monoxide	Good combustion practice	3.5 GRAMS PER KW-HR		-
FL-0346	04/22/2014 &nbsp;ACT	Emergency fire pump engine (300 HP)	17.21	USLD	29 MMBTU/H		Carbon Monoxide	Good combustion practice.	3.5 GRAM PER KW-HR		-

**BACT Determinations for Emergency Diesel Engines - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
FL-0347	09/16/2014 &nbsp;ACT	Emergency Diesel Engine	17.11	Diesel	3300 hp		Carbon Monoxide	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0		
FL-0347	09/16/2014 &nbsp;ACT	Remotely Operated Vehicle Emergency Generator	17.21	Diesel	427 hp		Carbon Monoxide	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0		
FL-0354	08/25/2015 &nbsp;ACT	Emergency fire pump engine, 300 HP	17.21	Diesel	29 MMBTU/H		Carbon Monoxide	Low-emitting fuel and certified engine	3.5 G / KWH		-
FL-0356	03/09/2016 &nbsp;ACT	Three 3300-kW ULSD emergency generators	17.11	ULSD	0		Carbon Monoxide	Use of clean engine	3.5 G / KW-HR		-
FL-0356	03/09/2016 &nbsp;ACT	One 422-hp emergency fire pump engine	17.21	ULSD	0		Carbon Monoxide	Use of clean engine technology	3.5 G / KW-HR		-
*FL-0363	12/04/2017 &nbsp;ACT	Two 3300 kW emergency generators	17.11	ULSD	0		Carbon Monoxide	Certified engine	3.5 GRAMS PER KWH		-
*FL-0363	12/04/2017 &nbsp;ACT	Emergency Fire Pump Engine (422 hp)	17.21	ULSD	0		Carbon Monoxide	Certified engine	3.5 G / KWH		-
*FL-0367	07/27/2018 &nbsp;ACT	1,500 kW Emergency Diesel Generator	17.11	ULSD	14.82 MMBtu/hour		Carbon Monoxide	Operate and maintain the engine according to the manufacturer's written instructions	3.5 G/KW-HOUR		-
*FL-0367	07/27/2018 &nbsp;ACT	Emergency Fire Pump Engine (347 HP)	17.21	ULSD	8700 gal/year		Carbon Monoxide	Operate and maintain the engine according to the manufacturer's written instructions	3.5 G/KW-HOUR		-
IA-0105	10/26/2012 &nbsp;ACT	Emergency Generator	17.11	diesel fuel	142 GAL/H		Carbon Monoxide	good combustion practices	3.5 G/KW-H		-
IA-0105	10/26/2012 &nbsp;ACT	Fire Pump	17.21	diesel fuel	14 GAL/H		Carbon Monoxide	good combustion practices	3.5 G/KW-H		-
IA-0106	07/12/2013 &nbsp;ACT	Emergency Generators	17.11	diesel fuel	180 GAL/H		Carbon Monoxide	good combustion practices	3.5 G/KW-H		-
IL-0114	09/05/2014 &nbsp;ACT	Emergency Generator	17.11	distillate fuel oil	3755 HP		Carbon Monoxide	Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7.	3.5 G/KW-H		-
IL-0129	07/30/2018 &nbsp;ACT	Emergency Engines	17.11	Ultra-low sulfur diesel	0		Carbon Monoxide		0		
IL-0130	12/31/2018 &nbsp;ACT	Emergency Engine	17.11	Ultra-Low Sulfur Diesel	1500 kW		Carbon Monoxide		3.5 G/KW-HR		-
IN-0158	12/03/2012 &nbsp;ACT	TWO (2) EMERGENCY DIESEL GENERATORS	17.11	DIESEL	1006 HP EACH		Carbon Monoxide	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	2.6 G/HP-H		-
IN-0158	12/03/2012 &nbsp;ACT	EMERGENCY DIESEL GENERATOR	17.11	DIESEL	2012 HP		Carbon Monoxide	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	2.6 G/HP-H		-
IN-0166	06/27/2012 &nbsp;ACT	TWO (2) EMERGENCY GENERATORS	17.11	DIESEL	1341 HORSEPOWER, EACH		Carbon Monoxide	GOOD COMBUSTION PRACTICES AND LIMITED HOURS OF NON-EMERGENCY OPERATION	0		
IN-0173	06/04/2014 &nbsp;ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	NO. 2, DIESEL	3600 BHP		Carbon Monoxide	GOOD COMBUSTION PRACTICES	2.61 G/BHP-H		-
IN-0179	09/25/2013 &nbsp;ACT	DIESEL-FIRED EMERGENCY GENERATOR	17.11	NO. 2 FUEL OIL	4690 B-HP		Carbon Monoxide	GOOD COMBUSTION PRACTICES	2.61 G/B-HP-H		-
IN-0179	09/25/2013 &nbsp;ACT	DIESEL-FIRED EMERGENCY WATER PUMP	17.21	NO. 2 FUEL OIL	481 BHP		Carbon Monoxide	GOOD COMBUSTION PRACTICES	2.6 G/B-HP-H		-
IN-0180	06/04/2014 &nbsp;ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	NO. 2, DIESEL	3600 BHP		Carbon Monoxide	GOOD COMBUSTION PRACTICES	2.61 G/B-HP-H		-
IN-0234	12/08/2015 &nbsp;ACT	EMERGENCY FIRE PUMP ENGINE	17.21	DISTILLATE OIL	0		Carbon Monoxide	GOOD COMBUSTION PRACTICES	2.01 G/HP-H		-
IN-0263	03/23/2017 &nbsp;ACT	EMERGENCY GENERATORS (EU014A AND EU-014B)	17.11	DISTILLATE OIL	3600 HP EACH		Carbon Monoxide	GOOD COMBUSTION PRACTICES	2.61 G/HP-H EACH		-

**BACT Determinations for Emergency Diesel Engines - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
IN-0295	02/23/2018 &nbsp;ACT	Emergency Diesel Generators	17.21	Deisel	150 hp		Carbon Monoxide		3.08 G/KW-HR		-
IN-0295	02/23/2018 &nbsp;ACT	Emergency Diesel Generators	17.21	Diesel	250 hp		Carbon Monoxide		3.08 G/HP-HR		-
IN-0317	06/11/2019 &nbsp;ACT	Emergency generator EU-6006	17.11	Diesel	2800 HP		Carbon Monoxide	Tier II diesel engine	3.5 G/KWH		-
IN-0317	06/11/2019 &nbsp;ACT	Emergency fire pump EU-6008	17.11	Diesel	750 HP		Carbon Monoxide	Engine that complies with Table 4 to Subpart IIII of Part 60	3.5 G/KWH		-
*KS-0036	03/18/2013 &nbsp;ACT	Cummins 6BTA 5.9F-1 Diesel Engine Fire Pump	17.21	No. 2 Fuel Oil	182 BHP		Carbon Monoxide	utilize efficient combustion/design technology	0.53 LB/HR		-
KY-0109	10/24/2016 &nbsp;ACT	Emergency Generators #1, #2, & #3 (EU72, EU73, & EU74)	17.11	Diesel	53.6 gal/hr		Carbon Monoxide	The permittee shall prepare and maintain for EU72, EU73, and EU74, within 90 days of startup, a good combustion and operation practices plan (GCOP) that defines, measures and verifies the use of operational and design practices determined as BACT for minimizing CO, VOC, PM, PM10, and PM2.5 emissions. Any revisions requested by the Division shall be made and the plan shall be maintained on site. The permittee shall operate according to the provisions of this plan at all times, including periods of startup, shutdown, and malfunction. The plan shall be incorporated into the plant standard operating procedures (SOP) and shall be made available for the Division's inspection. The plan shall include, but not be limited to: i. A list of combustion optimization practices and a means of verifying the practices have occurred. ii. A list of combustion and operation practices to be used to lower energy consumption and a means of verifying the practices have occurred. iii. A list of the design choices determined to be BACT and verification that designs were implemented in the final construction.	2.6 G/HP-HR (EU72 & EU73)		-
KY-0110	07/23/2020 &nbsp;ACT	EP 10-02 - North Water System Emergency Generator	17.11	Diesel	2922 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.61 G/HP-HR		-
KY-0110	07/23/2020 &nbsp;ACT	EP 10-03 - South Water System Emergency Generator	17.11	Diesel	2922 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.61 G/HP-HR		-
KY-0110	07/23/2020 &nbsp;ACT	EP 10-04 - Emergency Fire Water Pump	17.11	Diesel	920 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.61 G/HP-HR		-
KY-0110	07/23/2020 &nbsp;ACT	EP 11-01 - Melt Shop Emergency Generator	17.21	Diesel	260 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.61 G/HP-HR		-
KY-0110	07/23/2020 &nbsp;ACT	EP 11-02 - Reheat Furnace Emergency Generator	17.21	Diesel	190 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.61 G/HP-HR		-
KY-0110	07/23/2020 &nbsp;ACT	EP 10-07 - Air Separation Plant Emergency Generator	17.11	Diesel	700 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.61 G/HP-HR		-
KY-0110	07/23/2020 &nbsp;ACT	EP 10-01 - Caster Emergency Generator	17.11	Diesel	2922 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.61 G/HP-HR		-

**BACT Determinations for Emergency Diesel Engines - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
KY-0110	07/23/2020 &nbsp;ACT	EP 11-03 - Rolling Mill Emergency Generator	17.21	Diesel	440 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.61 G/HP-HR		-
KY-0110	07/23/2020 &nbsp;ACT	EP 11-04 - IT Emergency Generator	17.21	Diesel	190 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.61 G/HP-HR		-
KY-0110	07/23/2020 &nbsp;ACT	EP 11-05 - Radio Tower Emergency Generator	17.21	Diesel	61 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	3.73 G/HP-HR		-
KY-0115	04/19/2021 &nbsp;ACT	New Pumphouse (XB13) Emergency Generator #1 (EP 08- 05)	17.11	Diesel	2922 HP		Carbon Monoxide	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		-
KY-0115	04/19/2021 &nbsp;ACT	Tunnel Furnace Emergency Generator (EP 08-06)	17.11	Diesel	2937 HP		Carbon Monoxide	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		-
KY-0115	04/19/2021 &nbsp;ACT	Caster B Emergency Generator (EP 08-07)	17.11	Diesel	2937 HP		Carbon Monoxide	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		-
KY-0115	04/19/2021 &nbsp;ACT	Air Separation Unit Emergency Generator (EP 08-08)	17.11	Diesel	700 HP		Carbon Monoxide	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		-
KY-0115	04/19/2021 &nbsp;ACT	Cold Mill Complex Emergency Generator (EP 09-05)	17.21	Diesel	350 HP		Carbon Monoxide	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		-
LA-0251	04/26/2011 &nbsp;ACT	Fire Pump Engines - 2 units	17.21	diesel	444 hp		Carbon Monoxide	good equipment design and proper combustion practices	0.65 LB/H		-
LA-0254	08/16/2011 &nbsp;ACT	EMERGENCY DIESEL GENERATOR	17.11	DIESEL	1250 HP		Carbon Monoxide	ULTRA LOW SULFUR DIESEL AND GOOD COMBUSTION PRACTICES	2.6 G/HP-H		-
LA-0254	08/16/2011 &nbsp;ACT	EMERGENCY FIRE PUMP	17.21	DIESEL	350 HP		Carbon Monoxide	ULTRA LOW SULFUR DIESEL AND GOOD COMBUSTION PRACTICES	2.6 G/HP-H		-
LA-0296	05/23/2014 &nbsp;ACT	Emergency Diesel Generators (EQTs 622, 671, 773, 850, 994, 995, 996, 1033, 1077, 1105, & 1202)	17.11	Diesel	2682 HP		Carbon Monoxide	Compliance with 40 CFR 60 Subpart IIII; operating the engine in accordance with the engine manufacturer's instructions and/or written procedures (consistent with safe operation) designed to maximize combustion efficiency and minimize fuel usage.	15.43 LB/HR		-
LA-0305	06/30/2016 &nbsp;ACT	Diesel Engines (Emergency)	17.11	Diesel	4023 hp		Carbon Monoxide	Complying with 40 CFR 60 Subpart IIII	0		-
LA-0309	06/04/2015 &nbsp;ACT	Emergency Generator Engines	17.11	Diesel	2922 hp (each)		Carbon Monoxide	Complying with 40 CFR 60 Subpart IIII	0		-
*LA-0312	06/30/2017 &nbsp;ACT	DFP1-13 - Diesel Fire Pump Engine (EQT0013)	17.11	Diesel	650 horsepower		Carbon Monoxide	Compliance with NSPS Subpart IIII	0.9 LB/HR		-
*LA-0312	06/30/2017 &nbsp;ACT	DEG1-13 - Diesel Fired Emergency Generator Engine (EQT0012)	17.11	Diesel	1474 horsepower		Carbon Monoxide	Compliance with NSPS Subpart IIII	0.51 LB/HR		-
LA-0313	08/31/2016 &nbsp;ACT	SCPS Emergency Diesel Generator 1	17.11	Diesel	2584 HP		Carbon Monoxide	Compliance with NESHAP 40 CFR 63 Subpart ZZZZ and NSPS 40 CFR 60 Subpart IIII, and good combustion practices (use of ultra-low sulfur diesel fuel).	14.81 LB/H		-
LA-0313	08/31/2016 &nbsp;ACT	SCPS Emergency Diesel Firewater Pump 1	17.21	Diesel	282 HP		Carbon Monoxide	Compliance with NESHAP 40 CFR 63 Subpart ZZZZ and NSPS 40 CFR 60 Subpart IIII, and good combustion practices (use of ultra-low sulfur diesel fuel).	1.62 LB/H		-
LA-0314	08/03/2016 &nbsp;ACT	Diesel emergency generator engine - EGEN	17.21	diesel	350 hp		Carbon Monoxide	complying with 40 CFR 63 subpart ZZZZ	0		-

**BACT Determinations for Emergency Diesel Engines - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
*LA-0315	05/23/2014 &nbsp;ACT	Emergency Diesel Generator 1	17.11	Diesel	5364 HP		Carbon Monoxide	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	30.86 LB/H		-
*LA-0315	05/23/2014 &nbsp;ACT	Emergency Diesel Generator 2	17.11	Diesel	5364 HP		Carbon Monoxide	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	30.86 LB/H		-
*LA-0315	05/23/2014 &nbsp;ACT	Fire Pump Diesel Engine 1	17.11	Diesel	751 HP		Carbon Monoxide	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	4.32 LB/H		-
*LA-0315	05/23/2014 &nbsp;ACT	Fire Pump Diesel Engine 2	17.11	Diesel	751 HP		Carbon Monoxide	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	4.32 LB/H		-
LA-0316	02/17/2017 &nbsp;ACT	emergency generator engines (6 units)	17.11	diesel	3353 hp		Carbon Monoxide	Complying with 40 CFR 60 Subpart IIII	0		
LA-0317	12/22/2016 &nbsp;ACT	Emergency Generator Engines (4 units)	17.11	Diesel	0		Carbon Monoxide	complying with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	0		
LA-0323	01/09/2017 &nbsp;ACT	Fire Water Diesel Pump No. 3 Engine	17.11	Diesel Fuel	600 hp		Carbon Monoxide	Proper operation and limits on hours operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0		
LA-0323	01/09/2017 &nbsp;ACT	Fire Water Diesel Pump No. 4 Engine	17.11	Diesel Fuel	600 hp		Carbon Monoxide	Proper operation and limits on hours of operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0		
LA-0323	01/09/2017 &nbsp;ACT	Standby Generator No. 9 Engine	17.21	Diesel Fuel	400 hp		Carbon Monoxide	Proper operation and limits on hours of operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0		
LA-0328	05/02/2018 &nbsp;ACT	Emergency Diesel Engine Pump P-39A	17.21	Diesel Fuel	375 HP		Carbon Monoxide	Compliance with 40 CFR 60 Subpart IIII	3.5		
LA-0328	05/02/2018 &nbsp;ACT	Emergency Diesel Engine Pump P-39B	17.21	Diesel Fuel	300 HP		Carbon Monoxide	Compliance with 40 CFR 60 Subpart IIII	3.5		
LA-0331	09/21/2018 &nbsp;ACT	Large Emergency Engines (>50kW)	17.11	Diesel Fuel	5364 HP		Carbon Monoxide	Good Combustion and Operating Practices.	3.5 G/KW-H		-
LA-0364	01/06/2020 &nbsp;ACT	Emergency Generator Diesel Engines	17.11	Diesel Fuel	550 hp		Carbon Monoxide	Compliance with the limitations imposed by 40 CFR 63 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures designed to maximize combustion efficiency and minimize fuel usage.	0		
LA-0364	01/06/2020 &nbsp;ACT	Emergency Fire Water Pumps	17.11	Diesel Fuel	550 hp		Carbon Monoxide	Compliance with the limitations imposed by 40 CFR 63 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures designed to maximize combustion efficiency and minimize fuel usage.	0		
*LA-0370	04/27/2020 &nbsp;ACT	Emergency Fire Pump Engine (EQT0021, ENG-1)	17.21	Diesel	1.1 MM BTU/hr		Carbon Monoxide	The use of low sulfur fuels and compliance with 40 CFR 60 Subpart IIII	0.4 LB/HR		
MA-0039	01/30/2014 &nbsp;ACT	Emergency Engine/Generator	17.11	ULSD	7.4 MMBTU/H		Carbon Monoxide		2.6 GM/BHP-H		-
MA-0039	01/30/2014 &nbsp;ACT	Fire Pump Engine	17.21	ULSD	2.7 MMBTU/H		Carbon Monoxide		2.6 GM/BHP-H		-
MD-0041	04/23/2014 &nbsp;ACT	EMERGENCY GENERATOR	17.21	ULTRA-LOW SULFUR DIESEL	1500 KW		Carbon Monoxide	USE OF ULTRA LOW SULFUR DIESEL AND GOOD COMBUSTION PRACTICES	2.6 G/HP-H		-
MD-0041	04/23/2014 &nbsp;ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA-LOW SULFUR DIESEL	300 HP		Carbon Monoxide	USE OF ULTRA LOW SULFUR DIESEL AND GOOD COMBUSTION PRACTICES	2.6 G/HP-H		-
MD-0042	04/08/2014 &nbsp;ACT	EMERGENCY GENERATOR 1	17.11	ULTRA LOW SULFU DIESEL	2250 KW		Carbon Monoxide	USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES AND HOURS OF OPERATION LIMITED TO 100 HOURS PER YEAR	2.6 G/HP-H		-
MD-0042	04/08/2014 &nbsp;ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA LOW SULFUR DIESEL	477 HP		Carbon Monoxide	USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES AND HOURS OF OPERATION LIMITED TO 100 HOURS PER YEAR	2.6 G/HP-H		-
MD-0044	06/09/2014 &nbsp;ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	1550 HP		Carbon Monoxide	GOOD COMBUSTION PRACTICES AND DESIGNED TO MEET EMISSION LIMIT	2.6 G/HP-H		-

**BACT Determinations for Emergency Diesel Engines - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
MD-0044	06/09/2014 &nbsp;ACT	5 EMERGENCY FIRE WATER PUMP ENGINES	17.21	ULTRA LOW SULFUR DIESEL	350 HP		Carbon Monoxide	GOOD COMBUSTION PRACTICES AND DESIGNED TO MEET EMISSION LIMIT	3 G/HP-H		-
MD-0045	11/13/2015 &nbsp;ACT	EMERGENCY GENERATOR	17.21	ULTRA-LOW SULFUR DIESEL	1490 HP		Carbon Monoxide	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	3.5 G/KW-H		-
MD-0045	11/13/2015 &nbsp;ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA-LOW SULFUR DIESEL	305 HP		Carbon Monoxide	USE OF ULTRA LOW SULFUR DIESEL AND GOOD COMBUSTION PRACTICES	3.5 G/KW-H		-
MD-0046	10/31/2014 &nbsp;ACT	DIESEL-FIRED AUXILIARY (EMERGENCY) ENGINES (TWO)	17.21	ULTRA-LOW SULFUR DIESEL	1500 KW		Carbon Monoxide	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	3.5 G/KW-H		-
MD-0046	10/31/2014 &nbsp;ACT	DIESEL-FIRED FIRE PUMP ENGINE	17.21	ULTRA-LOW SULFUR DIESEL	300 HP		Carbon Monoxide	EXCLUSIVE USE OF ULTRA LOW SULFUR DIESEL FUEL AND GOOD COMBUSTION PRACTICES	3.5 G/KW-H		-
MI-0406	11/01/2013 &nbsp;ACT	FG-EMGEN7-8; Two (2) 1,000kW diesel-fueled emergency reciprocating internal combustion engines	17.11	Diesel	1000 kW		Carbon Monoxide	Good combustion practices.	2.6 G/B-HP-H		-
MI-0410	07/25/2013 &nbsp;ACT	EU-FPENGINE: Diesel fuel fired emergency backup fire pump	17.21	diesel fuel	315 hp nameplate		Carbon Monoxide	Proper combustion design and ultra low sulfur diesel fuel.	2.6 G/HP-H		-
MI-0412	12/04/2013 &nbsp;ACT	Emergency Engine -- Diesel Fire Pump (EUFENGINE)	17.21	Diesel	165 HP		Carbon Monoxide	Good combustion practices	3.7 G/HP-H		-
MI-0421	08/26/2016 &nbsp;ACT	Emergency Diesel Generator Engine (EUEMRGRICE in FGRICE)	17.11	Diesel	500 H/YR		Carbon Monoxide	Good design and combustion practices.	3.5 G/KW-H		-
MI-0421	08/26/2016 &nbsp;ACT	Dieself fire pump engine (EUFIREPUMP in FGRICE)	17.11	Diesel	500 H/YR		Carbon Monoxide	Good design and combustion practices.	3.5 G/KW-H		-
MI-0423	01/04/2017 &nbsp;ACT	EUENGINE (Diesel fuel emergency engine)	17.11	Diesel Fuel	22.68 MMBTU/H		Carbon Monoxide	Good combustion practices and meeting NSPS Subpart IIII requirements.	3.5 G/KW-H		-
MI-0423	01/04/2017 &nbsp;ACT	EUPENGINE (Emergency engine--diesel fire pump)	17.21	Diesel	1.66 MMBTU/H		Carbon Monoxide	Good combustion practices and meeting NSPS Subpart IIII requirements.	2.6 G/BHP-H		-
MI-0424	12/05/2016 &nbsp;ACT	EUPENGINE (Emergency engine--diesel fire pump)	17.21	diesel	500 H/YR		Carbon Monoxide	Good combustion practices.	3.7 G/HP-H		-
MI-0425	05/09/2017 &nbsp;ACT	EUEMRGRICE1 in FGRICE (Emergency diesel generator engine)	17.11	Diesel	500 H/YR		Carbon Monoxide	Good design and combustion practices.	3.5 G/KW-H		-
MI-0425	05/09/2017 &nbsp;ACT	EUEMRGRICE2 in FGRICE (Emergency Diesel Generator Engine)	17.11	Diesel	500 H/YR		Carbon Monoxide	Good design and combustion practices.	3.5 G/KW-H		-
MI-0425	05/09/2017 &nbsp;ACT	EUFIREPUMP in FGRICE (Diesel fire pump engine)	17.11	Diesel	500 H/YR		Carbon Monoxide	Good design and combustion practices.	3.5 G/KW-H		-
MI-0433	06/29/2018 &nbsp;ACT	EUPENGINE (South Plant): Fire pump engine	17.21	Diesel	300 HP		Carbon Monoxide	Good combustion practices and meeting NSPS Subpart IIII requirements.	2.6 G/BPH-H		-
MI-0433	06/29/2018 &nbsp;ACT	EUENGINE (North Plant): Emergency Engine	17.11	Diesel	1341 HP		Carbon Monoxide	Good combustion practices and meeting NSPS Subpart IIII requirements.	3.5 G/KW-H		-

**BACT Determinations for Emergency Diesel Engines - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
MI-0433	06/29/2018 &nbsp;ACT	EUFENGINE (North Plant): Fire pump engine	17.21	Diesel	300 HP		Carbon Monoxide	Good combustion practices and meeting NSPS Subpart IIII requirements.	2.6 G/BHP-H		-
MI-0433	06/29/2018 &nbsp;ACT	EUENGINE (South Plant): Emergency Engine	17.11	Diesel	1341 HP		Carbon Monoxide	Good combustion practices and meeting NSPS IIII requirements.	3.5 G/KW-H		-
MI-0435	07/16/2018 &nbsp;ACT	EUENGINE: Emergency engine	17.11	Diesel	2 MW		Carbon Monoxide	State of the art combustion design.	3.5 G/KW-H		-
MI-0435	07/16/2018 &nbsp;ACT	EUPENGINE: Fire pump engine	17.21	Diesel	399 BHP		Carbon Monoxide	State of the art combustion design.	3.5 G/KW-H		-
MI-0441	12/21/2018 &nbsp;ACT	EUEMGD1--A 1500 HP diesel fueled emergency engine	17.11	Diesel	1500 HP		Carbon Monoxide	Good combustion practices and will be NSPS compliant.	3.5 G/KW-H		-
MI-0441	12/21/2018 &nbsp;ACT	EUEMGD2--A 6000 HP diesel fuel fired emergency engine	17.11	Diesel	6000 HP		Carbon Monoxide	Good combustion practices and will be NSPS compliant.	3.5 G/KW-H		-
MI-0441	12/21/2018 &nbsp;ACT	EUPPRICE--A 315 HP diesel fueled emergency engine	17.21	Diesel	2.5 MMBTU/H		Carbon Monoxide	Good combustion practices.	2.6 G/HP-H		-
*MI-0445	11/26/2019 &nbsp;ACT	EUPENGINE (Emergency engine- diesel fire pump	17.21	diesel fuel	1.66 MMBTU/H		Carbon Monoxide	Good Combustion Practices and meeting NSPS Subpart IIII requirements	2.6 G/BHP-H		-
*MI-0445	11/26/2019 &nbsp;ACT	EUENGINE (diesel fuel emergency engine)	17.11	diesel fuel	22.68 MMBTU/H		Carbon Monoxide	Good Combustion Practices and meeting NSPS Subpart IIII requirements	3.5 G/KW-H		-
MI-0447	01/07/2021 &nbsp;ACT	EUEMGD--emergency engine	17.11	diesel fuel	4474.2 KW		Carbon Monoxide	Good combustion practices and will be NSPS compliant.	3.5 G/KW-H		-
MI-0447	01/07/2021 &nbsp;ACT	EUPPRICE--A 315 HP diesel fueled emergency engine	17.21	Diesel	2.5 MMBTU/H		Carbon Monoxide	Good combustion practices	2.6 G/HP-H		-
NJ-0079	07/25/2012 &nbsp;ACT	Emergency Generator	17.11	Ultra Low Sulfur distillate Diesel	100 H/YR		Carbon Monoxide	Use of ULSD oil	1.99 LB/H		-
NJ-0080	11/01/2012 &nbsp;ACT	Emergency Generator	17.11	ULSD	200 H/YR		Carbon Monoxide		11.56 LB/H		-
NJ-0081	03/07/2014 &nbsp;ACT	Emergency diesel fire pump	17.21	Ultra Low Sulfur Distillate oil	0		Carbon Monoxide		0.079 LB/H		-
NJ-0084	03/10/2016 &nbsp;ACT	Diesel Fired Emergency Generator	17.11	ULSD	44 H/YR		Carbon Monoxide	use of ultra low sulfur diesel oil a clean burning fuel	3.5 LB/H		-
NJ-0084	03/10/2016 &nbsp;ACT	Emergency Diesel Fire Pump	17.21	ULSD	100 H/YR		Carbon Monoxide	use of ULSD a clean burning fuel, and limited hours of operation	1.1 LB/H		-
NJ-0085	07/19/2016 &nbsp;ACT	EMERGENCY GENERATOR DIESEL	17.21	DIESEL OIL	0 100 H/YR		Carbon Monoxide	Use of Ultra Low Sulfur Diesel (ULSD) Oil a clean burning fuel and limited hours of operation (<= 100 H/YR)	11.6 LB/H		-
NJ-0085	07/19/2016 &nbsp;ACT	EMERGENCY DIESEL FIRE PUMP	17.21	ULSD	100 H/YR		Carbon Monoxide	Use of Ultra Low Sulfur Diesel (ULSD) Oil a clean burning fuel and limited hours of operation	1.87 LB/H		-
NY-0103	02/03/2016 &nbsp;ACT	Emergency fire pump	17.21	ultra low sulfur diesel	460 hp		Carbon Monoxide	Compliance demonstrated with vendor emission certification and adherence to vendor-specified maintenance recommendations.	0.53 G/BHP-H		-
NY-0104	08/01/2013 &nbsp;ACT	Emergency generator	17.11	ultra low sulfur diesel	0		Carbon Monoxide	Good combustion practice.	0.45 G/BHP-H		-
NY-0104	08/01/2013 &nbsp;ACT	Fire pump	17.21	ultra low sulfur diesel	0		Carbon Monoxide	Good combustion practice.	0.75 LB/MMBTU		-
OH-0352	06/18/2013 &nbsp;ACT	Emergency fire pump engine	17.21	diesel	300 HP		Carbon Monoxide	Purchased certified to the standards in NSPS Subpart IIII	1.7 LB/H		-
OH-0352	06/18/2013 &nbsp;ACT	Emergency generator	17.11	diesel	2250 KW		Carbon Monoxide	Purchased certified to the standards in NSPS Subpart IIII	17.35 LB/H		-
OH-0360	11/05/2013 &nbsp;ACT	Emergency generator (P003)	17.11	diesel	1112 KW		Carbon Monoxide	Purchased certified to the standards in NSPS Subpart IIII	8.57 LB/H		-

**BACT Determinations for Emergency Diesel Engines - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
OH-0360	11/05/2013 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	diesel	400 HP		Carbon Monoxide	Purchased certified to the standards in NSPS Subpart IIII	2.3 LB/H		-
OH-0363	11/05/2014 &nbsp;ACT	Emergency generator (P002)	17.11	Diesel fuel	1100 KW		Carbon Monoxide	Emergency operation only, < 500 hours/year each for maintenance checks and readiness testing designed to meet NSPS Subpart IIII	8.49 LB/H		-
OH-0363	11/05/2014 &nbsp;ACT	Emergency Fire Pump Engine (P003)	17.21	Diesel fuel	260 HP		Carbon Monoxide	Emergency operation only, < 500 hours/year each for maintenance checks and readiness testing designed to meet NSPS Subpart IIII	0.69 LB/H		-
OH-0366	08/25/2015 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	140 HP		Carbon Monoxide	State-of-the-art combustion design	1.15 LB/H		-
OH-0366	08/25/2015 &nbsp;ACT	Emergency generator (P003)	17.11	Diesel fuel	2346 HP		Carbon Monoxide	State-of-the-art combustion design	13.5 LB/H		-
OH-0367	09/23/2016 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	311 HP		Carbon Monoxide	State-of-the-art combustion design	1.79 LB/H		-
OH-0367	09/23/2016 &nbsp;ACT	Emergency generator (P003)	17.11	Diesel fuel	2947 HP		Carbon Monoxide	State-of-the-art combustion design	16.96 LB/H		-
OH-0368	04/19/2017 &nbsp;ACT	Emergency Fire Pump Diesel Engine (P008)	17.21	Diesel fuel	460 HP		Carbon Monoxide	good combustion control and operating practices and engines designed to meet the stands of 40 CFR Part 60, Subpart IIII	2.6 LB/H		-
OH-0368	04/19/2017 &nbsp;ACT	Emergency Generator (P009)	17.11	Diesel fuel	5000 HP		Carbon Monoxide	good combustion control and operating practices and engines designed to meet the stands of 40 CFR Part 60, Subpart IIII	28.8 LB/H		-
OH-0370	09/07/2017 &nbsp;ACT	Emergency generator (P003)	17.11	Diesel fuel	1529 HP		Carbon Monoxide	State-of-the-art combustion design	8.8 LB/H		-
OH-0370	09/07/2017 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Carbon Monoxide	State-of-the-art combustion design	1.73 LB/H		-
OH-0372	09/27/2017 &nbsp;ACT	Emergency generator (P003)	17.11	Diesel fuel	1529 HP		Carbon Monoxide	State-of-the-art combustion design	8.8 LB/H		-
OH-0372	09/27/2017 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Carbon Monoxide	state of the art combustion design	1.73 LB/H		-
OH-0374	10/23/2017 &nbsp;ACT	Emergency Generators (2 identical, P004 and P005)	17.11	Diesel fuel	2206 HP		Carbon Monoxide	Certified to the meet the emissions standards in 40 CFR 89.112 and 89.113 pursuant to 40 CFR 60.4205(b) and 60.4202(a)(2). Good combustion practices per the manufacturer's operating manual.	12.69 LB/H		-
OH-0374	10/23/2017 &nbsp;ACT	Emergency Fire Pump (P006)	17.21	Diesel fuel	410 HP		Carbon Monoxide	Certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII. Good combustion practices per the manufacturer's operating manual.	2.36 LB/H		-
OH-0375	11/07/2017 &nbsp;ACT	Emergency Diesel Generator Engine (P001)	17.11	Diesel fuel	2206 HP		Carbon Monoxide	Good combustion design	12.64 LB/H		-
OH-0375	11/07/2017 &nbsp;ACT	Emergency Diesel Fire Pump Engine (P002)	17.11	Diesel fuel	700 HP		Carbon Monoxide	Good combustion design	4.01 LB/H		-
OH-0376	02/09/2018 &nbsp;ACT	Emergency diesel-fueled fire pump (P006)	17.21	Diesel fuel	250 HP		Carbon Monoxide	Comply with NSPS 40 CFR 60 Subpart IIII	1.4 LB/H		-
OH-0376	02/09/2018 &nbsp;ACT	Emergency diesel-fired generator (P007)	17.11	Diesel fuel	2682 HP		Carbon Monoxide	Comply with NSPS 40 CFR 60 Subpart IIII	15.4 LB/H		-
OH-0377	04/19/2018 &nbsp;ACT	Emergency Fire Pump (P004)	17.21	Diesel fuel	320 HP		Carbon Monoxide	Good combustion practices (ULSD) and compliance with 40 CFR Part 60, Subpart IIII	1.83 LB/H		-
OH-0378	12/21/2018 &nbsp;ACT	Emergency Diesel-fired Generator Engine (P007)	17.11	Diesel fuel	3353 HP		Carbon Monoxide	certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII, shall employ good combustion practices per the manufacturer's operating manual	19.25 LB/H		-
OH-0378	12/21/2018 &nbsp;ACT	1,000 kW Emergency Generators (P008 - P010)	17.11	Diesel fuel	1341 HP		Carbon Monoxide	certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII, shall employ good combustion practices per the manufacturer's operating manual	7.7 LB/H		-



**BACT Determinations for Emergency Diesel Engines - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
OK-0154	07/02/2013 &nbsp;ACT	DIESEL-FIRED EMERGENCY GENERATOR ENGINE	17.11	DIESEL	1341 HP		Carbon Monoxide	COMBUSTION CONTROL	0.001 LB/HR		
PA-0275	10/24/2011 &nbsp;ACT	Fire Water Pump	17.29	Diesel	0		Carbon Monoxide		1.43 LB/H		
PA-0278	10/10/2012 &nbsp;ACT	Emergency Generator	17.11	Diesel	0		Carbon Monoxide		0.13 G/B-HP-H		-
PA-0278	10/10/2012 &nbsp;ACT	Fire Pump	17.21	Diesel	0		Carbon Monoxide		0.5 G/B-HP-H		-
PA-0286	01/31/2013 &nbsp;ACT	Fire Pump Engine - 460 BHP	17.21	Diesel	0		Carbon Monoxide		0.5 G/HP-H		-
PA-0286	01/31/2013 &nbsp;ACT	EMERGENCY GENERATOR- ENGINE	17.13	Diesel	0		Carbon Monoxide		0.13 GM/B-HP-H		-
PA-0291	04/23/2013 &nbsp;ACT	EMERGENCY FIREWATER PUMP	17.21	ULTRA LOW SULFUR DISTILLATE	3.25 MMBTU/H		Carbon Monoxide		2.58 LB/H		
PA-0291	04/23/2013 &nbsp;ACT	EMERGENCY GENERATOR	17.11	Ultra Low sulfur Distillate	7.8 MMBTU/H		Carbon Monoxide		5.79 LB/H		
PA-0296	12/17/2013 &nbsp;ACT	Emergency Firewater Pump	17.21	Diesel	16 Gal/hr		Carbon Monoxide		0.09 T/YR		
PA-0309	12/23/2015 &nbsp;ACT	Fire pump engine	17.21	Ultra-low sulfur diesel	15 gal/hr		Carbon Monoxide		0.5 GM/HP-HR		-
PA-0309	12/23/2015 &nbsp;ACT	2000 kW Emergency Generator	17.11	Ultra-low sulfur Diesel	0		Carbon Monoxide		0.6 GM/HP-HR		-
PA-0310	09/02/2016 &nbsp;ACT	Emergency Generator Engines	17.11	ULSD	0		Carbon Monoxide		2.61 G/BHP-HR		-
PA-0310	09/02/2016 &nbsp;ACT	Emergency Fire Pump Engine	17.21	ULSD	0		Carbon Monoxide		2.61 G/BHP-HR		-
PA-0311	09/01/2015 &nbsp;ACT	Fire Pump Engine	17.11	diesel	0		Carbon Monoxide		1 G/HP-HR		-
*PA-0313	07/27/2017 &nbsp;ACT	Emergency Generator	17.11	Diesel	2500 bhp		Carbon Monoxide		3.5 G		-
*PA-0326	02/18/2021 &nbsp;ACT	Emergency Generator Parking Garage	17.21	Diesel	0		Carbon Monoxide	The use of certified engines, design of engines to include turbocharger and an intercooler/aftercooler, good combustion practices and proper operation and maintenance including certification to applicable federal emission standards	0.5 G		-
*PA-0326	02/18/2021 &nbsp;ACT	Emergency GeneratorTelecom Hut &nbsp;Tower	17.21	diesel	0		Carbon Monoxide	The use of certified engines, design of engines to include turbocharger and an intercooler/aftercooler, good combustion practices and proper operation and maintenance including certification to applicable federal emission standards	0.5 G		-
PR-0009	04/10/2014 &nbsp;ACT	Emergency Diesel Fire Pump	17.21	ULSD Fuel Oil #2	0		Carbon Monoxide		2.6 G/B-HP-H		-
PR-0009	04/10/2014 &nbsp;ACT	Emergency Diesel Generator	17.11	ULSD Fuel oil # 2	0		Carbon Monoxide		2.6 G/BHP-H		-
SC-0113	02/08/2012 &nbsp;ACT	EMERGENCY ENGINE 1 THRU 8	17.21	DIESEL	29 HP		Carbon Monoxide	PURCHASE OF CERTIFIED ENGINE. HOURS OF OPERATION LIMITED TO 100 HOURS FOR MAINTENANCE AND TESTING.	5.5 GR/KW-H		-
SC-0113	02/08/2012 &nbsp;ACT	FIRE PUMP	17.21	DIESEL	500 HP		Carbon Monoxide	ENGINES CERTIFIED TO MEET NSPS, SUBPART III. HOURS OF OPERATION LIMITED TO 100 HOURS PER YEAR FOR MAINTENANCE AND TESTING.	3.5 GR/KW-H		-
SC-0113	02/08/2012 &nbsp;ACT	EMERGENCY GENERATORS 1 THRU 8	17.11	DIESEL	757 HP		Carbon Monoxide	ENGINES MUST BE CERTIFIED TO COMPLY WITH NSPS, SUBPART III.	3.5 GR/KW-H		-

**BACT Determinations for Emergency Diesel Engines - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
*SD-0005	06/29/2010 &nbsp;ACT	Emergency Generator	17.11	Distillate Oil	2000 Kilowatts		Carbon Monoxide		0		
*SD-0005	06/29/2010 &nbsp;ACT	Fire Water Pump	17.11	Distillate Oil	577 horsepower		Carbon Monoxide		0		
TX-0728	04/01/2015 &nbsp;ACT	Emergency Diesel Generator	17.11	Diesel	1500 hp		Carbon Monoxide	Minimized hours of operations Tier II engine	0.0126 G/HP HR		-
TX-0799	06/08/2016 &nbsp;ACT	Fire pump engines	17.11	diesel	0		Carbon Monoxide	Equipment specifications and good combustion practices. Operation limited to 100 hours per year.	0.0055 LB/HP-HR		-
TX-0799	06/08/2016 &nbsp;ACT	EMERGENCY ENGINES	17.21	diesel	0		Carbon Monoxide	Equipment specifications and good combustion practices. Operation limited to 100 hours per year.	0.0068 LB/HP-HR		-
TX-0846	09/23/2018 &nbsp;ACT	FIRE PUMP DIESEL ENGINE	17.21	NO 2 DIESEL	214 kW		Carbon Monoxide	Meets EPA Tier 4 requirements	3.58 G/KW		-
TX-0864	09/09/2019 &nbsp;ACT	EMERGENCY DIESEL ENGINE	17.21	Ultra-low sulfur diesel	0		Carbon Monoxide	Tier 4 exhaust emission standards specified at 40 CFR Â§ 1039.101(b)	0		
TX-0872	10/31/2019 &nbsp;ACT	Emergency Generators	17.11	ultra low sulfur diesel	0		Carbon Monoxide	Limiting duration and frequency of generator use to 100 hr/yr. Good combustion practices will be used to reduce VOC including maintaining proper air-to-fuel ratio.	0.6 G/KW HR		-
TX-0876	02/06/2020 &nbsp;ACT	Emergency generator	17.11	DIESEL	0		Carbon Monoxide	Tier 4 exhaust emission standards specified in 40 CFR Â§ 1039.101, limited to 100 hours per year of non-emergency operation	0		
TX-0882	01/17/2020 &nbsp;ACT	EMERGENCY ENGINES	17.12	DIESEL	0		Carbon Monoxide	GOOD COMBUSTION PRACTICES, CLEAN FUEL, 100 HR/YR, ULTRA LOW SULFUR FUEL	0.0057 LB/MMBTU		
TX-0888	04/23/2020 &nbsp;ACT	EMERGENCY GENERATORS & FIRE WATER PUMP ENGINES	17.11	Ultra-low Sulfur Diesel	0		Carbon Monoxide	well-designed and properly maintained engines and each limited to 100 hours per year of non-emergency use.	0		
TX-0889	08/08/2020 &nbsp;ACT	Emergency Generator Engines	17.21	Ultra-low sulfur diesel	0		Carbon Monoxide	Good combustion practices and limited hours of operation	100 HR/YR		
*TX-0904	09/09/2020 &nbsp;ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	0		Carbon Monoxide	100 HOURS OPERATIONS, Tier 4 exhaust emission standards specified in 40 CFR Â§ 1039.101	0		
TX-0905	09/16/2020 &nbsp;ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	0		Carbon Monoxide	limited to 100 hours per year of non-emergency operation	0		
VA-0321	03/12/2013 &nbsp;ACT	Emergency diesel generator- 2200 kW	17.11	ultra low sulfur diesel	500 hrs/yr		Carbon Monoxide	good combustion practices	3.5 G/KW-HR		-
VA-0321	03/12/2013 &nbsp;ACT	Diesel Fire water pump 376 bhp	17.21	diesel	500 h/yr		Carbon Monoxide	good combustion practices	0.9 G/KW-HR		-
VA-0325	06/17/2016 &nbsp;ACT	DIESEL-FIRED EMERGENCY GENERATOR 3000 kW (1)	17.11	DIESEL FUEL	0		Carbon Monoxide	Good Combustion Practices/Maintenance	3.5 G/KW		-
VA-0328	04/26/2018 &nbsp;ACT	Emergency Diesel GEN	17.11	Ultra Low Sulfur Diesel	500 H/YR		Carbon Monoxide	good combustion practices and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	2.6 G/HP H		-
VA-0328	04/26/2018 &nbsp;ACT	Emergency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Carbon Monoxide	good combustion practices and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	2.6 G/HP HR		-
VA-0332	06/24/2019 &nbsp;ACT	Emergency Diesel Generator - 300 kW	17.11	Ultra Low Sulfur Diesel	500 H/YR		Carbon Monoxide	good combustion practices, high efficiency design, and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	2.6 G/HP-H		-
VA-0332	06/24/2019 &nbsp;ACT	Emergency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Carbon Monoxide	good combustion practices, high efficiency design, and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	2.6 G/HP-H		-
WI-0263	02/15/2016 &nbsp;ACT	Fire pump (process P05)	17.21	Diesel	1.27 mmBtu/hr		Carbon Monoxide	Good combustion practices, use diesel fuel, and operate <500 hr/yr	0		

**BACT Determinations for Emergency Diesel Engines - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
*WI-0284	04/24/2018 &nbsp;ACT	Diesel-Fired Emergency Generators	17.11	Diesel Fuel	0		Carbon Monoxide	Good Combustion Practices	0.6 G/KWH		-
*WI-0286	04/24/2018 &nbsp;ACT	P42 -Diesel Fired Emergency Generator	17.11	Diesel Fuel	0		Carbon Monoxide	Good Combustion Practices	0.6 G/KWH		-
*WI-0291	01/28/2019 &nbsp;ACT	P04 Emergency Diesel Generator	17.21	Diesel Fuel	0.22 mmBTU/hr		Carbon Monoxide	Good Combustion Practices	5 G/KWH		-
WV-0025	11/21/2014 &nbsp;ACT	Emergency Generator	17.11	Diesel	2015.7 HP		Carbon Monoxide		0		-
WV-0025	11/21/2014 &nbsp;ACT	Fire Pump Engine	17.21	Diesel	251 HP		Carbon Monoxide		1.44 LB/H		-
WY-0070	08/28/2012 &nbsp;ACT	Diesel Emergency Generator (EP15)	17.11	Ultra Low Sulfur Diesel	839 hp		Carbon Monoxide	EPA Tier 2 rated	0		
WY-0070	08/28/2012 &nbsp;ACT	Diesel Fire Pump Engine (EP16)	17.21	Ultra Low Sulfur Diesel	327 hp		Carbon Monoxide	EPA Tier 3 rated	0		
WY-0071	10/15/2012 &nbsp;ACT	Emergency Air Compressor	17.21	Ultra Low Sulfur Diesel	400 hp		Carbon Monoxide	EPA Tier 3 Rated Diesel Engine	0		

### BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Limit g/kW-hr	VOC g/kW-hr
AK-0082	01/23/2015 &nbsp;ACT	Emergency Camp Generators	17.11	Ultra Low Sulfur Diesel	2695 hp		Nitrogen Oxides (NOx)		4.8 GRAMS/HP-H		6.4	
AK-0082	01/23/2015 &nbsp;ACT	Emergency Camp Generators	17.11	Ultra Low Sulfur Diesel	2695 hp		Volatile Organic Compounds (VOC)		0.0007 LB/HP-H		0.43	6.9
AK-0084	06/30/2017 &nbsp;ACT	Black Start and Emergency Internal Combustion Engines	17.11	Diesel	1500 kWe		Nitrogen Oxides (NOx)	Good Combustion Practices	8 G/KW-HR		-	
AK-0084	06/30/2017 &nbsp;ACT	Fire Pump Diesel Internal Combustion Engines	17.21	Diesel	252 hp		Nitrogen Oxides (NOx)	Good Combustion Practices	3.7 G/KW-HR		-	
*AK-0085	08/13/2020 &nbsp;ACT	Three (3) Firewater Pump Engines and two (2) Emergency Diesel Generators	17.21	ULSD	19.4 gph		Nitrogen Oxides (NOx)	Good combustion practices, limit operation to 500 hours per year per engine	3.6 G/HP-HR		-	
*AK-0085	08/13/2020 &nbsp;ACT	Three (3) Firewater Pump Engines and two (2) Emergency Diesel Generators	17.21	ULSD	19.4 gph		Volatile Organic Compounds (VOC)	Good combustion practices, ULSD, and limit operation to 500 hours per year.	0.19 G/HP-HR		-	5.1
AL-0301	07/22/2014 &nbsp;ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	DIESEL	800 HP		Nitrogen Oxides (NOx)		0.015 LB/HP-H		-	
*AL-0318	12/18/2017 &nbsp;ACT	250 Hp Emergency CI, Diesel-fired RICE	17.11	Diesel	0		Nitrogen Oxides (NOx)		0			
*AL-0318	12/18/2017 &nbsp;ACT	250 Hp Emergency CI, Diesel-fired RICE	17.11	Diesel	0		Volatile Organic Compounds (VOC)		0			
AR-0161	09/23/2019 &nbsp;ACT	Emergency Engines	17.11	Diesel	0		Volatile Organic Compounds (VOC)	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	1.9 G/KW-HR		-	
AR-0161	09/23/2019 &nbsp;ACT	Emergency Engines	17.11	Diesel	0		Nitrogen Oxides (NOx)	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	0.4 G/KW-H		-	2.3
AR-0163	06/09/2019 &nbsp;ACT	Emergency Engines	17.11	Diesel	0		Volatile Organic Compounds (VOC)	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	1.55 G/KW-HR		-	
AR-0163	06/09/2019 &nbsp;ACT	Emergency Engines	17.11	Diesel	0		Nitrogen Oxides (NOx)	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	4.86 G/KW-HR		-	6.4
AR-0168	03/17/2021 &nbsp;ACT	Emergency Engines	17.21	Diesel	0		Volatile Organic Compounds (VOC)	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	1.55 G/KW-HR		-	
AR-0168	03/17/2021 &nbsp;ACT	Emergency Engines	17.21	Diesel	0		Nitrogen Oxides (NOx)	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	4.86 G/KW-HR		-	6.4
AR-0171	02/14/2019 &nbsp;ACT	SN-106 Cold Mill 1 Diesel Fired Emergency Generator	17.21	Diesel	1073 bhp		Nitrogen Oxides (NOx)	Good operating practices.	2 G/KW-HR		-	
AR-0171	02/14/2019 &nbsp;ACT	SN-106 Cold Mill 1 Diesel Fired Emergency Generator	17.21	Diesel	1073 bhp		Volatile Organic Compounds (VOC)	Good operating practices.	1 G/KW-HR		-	3.0
CA-1192	06/21/2011 &nbsp;ACT	EMERGENCY FIREWATER PUMP ENGINE	17.21	DIESEL	288 HP		Nitrogen Oxides (NOx)	EQUIPPED W/ A TURBOCHARGER AND AN INTERCOOLER/ AFTERCOOLER	3.4 G/HP-H		-	
CA-1212	10/18/2011 &nbsp;ACT	EMERGENCY IC ENGINE	17.11	DIESEL	2683 HP		Nitrogen Oxides (NOx)		6.4 G/KW-H		-	
CA-1212	10/18/2011 &nbsp;ACT	EMERGENCY IC ENGINE	17.21	DIESEL	182 HP		Nitrogen Oxides (NOx)		4 G/KW-H		-	
CA-1220	10/03/2011 &nbsp;ACT	ICE-Emergency-Compression Ignition	17.11	diesel	1881 BHP		Nitrogen Oxides (NOx)	Tier 2 certified and 50 hr/y M&T limit	3.9 G/B-HP-H		-	

**BACT Determinations for Emergency Diesel Engines - NOx + VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr	NOx + VOC g/kW-hr
CA-1221	12/05/2011 &nbsp;   ACT	ICE:Emergency-Compression Ignition	17.11	diesel	3634 bhp		Nitrogen Oxides (NOx)	Tier 2 certified and 50 hr/yr for M&T limit	3.5 G/B-HP-H		-	
DC-0009	03/15/2012 &nbsp;   ACT	Diesel Emergency Generator	17.11	Ultra-low Sulfur Diesel	2682 hp		Nitrogen Oxides (NOx)		31.87 LB/HR		-	
FL-0327	06/13/2011 &nbsp;   ACT	Emergency Engine	17.11	Diesel	0		Nitrogen Oxides (NOx)	Limited use of 24 hours/week and recordkeeping of operation.	9.4 TONS PER PROJECT			
FL-0328	10/27/2011 &nbsp;   ACT	Emergency Engine	17.11	Diesel	0		Nitrogen Oxides (NOx)	Use of good combustion practices, based on the current manufacturer's specifications for this engine	0.4 TONS PER YEAR			
FL-0328	10/27/2011 &nbsp;   ACT	Emergency Engine	17.11	Diesel	0		Volatile Organic Compounds (VOC)	Use of good combustion practices, based on the current manufacturer's specifications for this engine	0.03 TONS PER YEAR			
FL-0328	10/27/2011 &nbsp;   ACT	Emergency Fire Pump Engine	17.11	Diesel	0		Nitrogen Oxides (NOx)	Use of good combustion practices, based on the current manufacturer's specifications for this engine	0.02 TONS PER YEAR			
FL-0328	10/27/2011 &nbsp;   ACT	Emergency Fire Pump Engine	17.11	Diesel	0		Volatile Organic Compounds (VOC)	Use of good combustion practices, based on the current manufacturer's specifications for this engine	0.002 TONS PER YEAR			
FL-0332	09/23/2011 &nbsp;   ACT	600 HP Emergency Equipment	17.11	Ultra-Low Sulfur Oil	0		Nitrogen Oxides (NOx)	See Pollutant Notes.	3 G/HP-H		-	
FL-0338	05/30/2012 &nbsp;   ACT	Emergency Generator Diesel Engine - Development Driller 1	17.11	Diesel	2229 hp		Nitrogen Oxides (NOx)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	1.6 T/12MO ROLLING TOTAL			
FL-0338	05/30/2012 &nbsp;   ACT	Emergency Generator Diesel Engine - Development Driller 1	17.11	Diesel	2229 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	0.04 T/12MO ROLLING TOTAL			
FL-0338	05/30/2012 &nbsp;   ACT	Emergency Generator Diesel Engine - C.R. Luigs	17.11	diesel	2064 hp		Nitrogen Oxides (NOx)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	1.49 T/12MO ROLLING TOTAL			
FL-0338	05/30/2012 &nbsp;   ACT	Emergency Generator Diesel Engine - C.R. Luigs	17.11	diesel	2064 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	0.04 T/12MO ROLLING TOTAL			
FL-0347	09/16/2014 &nbsp;   ACT	Emergency Diesel Engine	17.11	Diesel	3300 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0			
FL-0347	09/16/2014 &nbsp;   ACT	Emergency Diesel Engine	17.11	Diesel	3300 hp		Nitrogen Oxides (NOx)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0			
FL-0347	09/16/2014 &nbsp;   ACT	Remotely Operated Vehicle Emergency Generator	17.21	Diesel	427 hp		Nitrogen Oxides (NOx)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0			
FL-0347	09/16/2014 &nbsp;   ACT	Remotely Operated Vehicle Emergency Generator	17.21	Diesel	427 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0			

### BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)

BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)											Std Units Limit	NO <sub>x</sub> + VOC
RBLCHD	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	g/kW-hr	g/kW-hr
FL-0348	05/15/2012 &nbsp;   ACT	Emergency Electrical Generator	17.11	Diesel	1100 hp		Nitrogen Oxides (NOx)	Use of good combustion and maintenance practices based on the current manufacturer's specifications for this engine.	0.22 TONS			
FL-0354	08/25/2015 &nbsp;   ACT	Emergency fire pump engine, 300 HP	17.21	Diesel	29 MMBTU/H		Nitrogen Oxides (NOx)	Low-emitting fuel and certified engine	4 G / KWH		-	
*FL-0367	07/27/2018 &nbsp;   ACT	1,500 kW Emergency Diesel Generator	17.11	ULSD	14.82 MMBtu/hour		Nitrogen Oxides (NOx)	Operate and maintain the engine according to the manufacturer's written instructions	6.4 G/KW-HOUR		-	
*FL-0367	07/27/2018 &nbsp;   ACT	Emergency Fire Pump Engine (347 HP)	17.21	ULSD	8700 gal/year		Nitrogen Oxides (NOx)	Operate and maintain the engine according to the manufacturer's written instructions	4 G/KW-HR		-	
IA-0105	10/26/2012 &nbsp;   ACT	Emergency Generator	17.11	diesel fuel	142 GAL/H		Nitrogen Oxides (NOx)	good combustion practices	6 G/KW-H		-	
IA-0105	10/26/2012 &nbsp;   ACT	Emergency Generator	17.11	diesel fuel	142 GAL/H		Volatile Organic Compounds (VOC)	good combustion practices	0.4 G/KW-H		-	6.4
IA-0105	10/26/2012 &nbsp;   ACT	Fire Pump	17.21	diesel fuel	14 GAL/H		Nitrogen Oxides (NOx)	good combustion practices	3.75 G/KW-H		-	
IA-0105	10/26/2012 &nbsp;   ACT	Fire Pump	17.21	diesel fuel	14 GAL/H		Volatile Organic Compounds (VOC)	good combustion practices	0.25 G/KW-H		-	4.0
IA-0106	07/12/2013 &nbsp;   ACT	Emergency Generators	17.11	diesel fuel	180 GAL/H		Volatile Organic Compounds (VOC)	good combustion practices	4 G/KW-H		-	
IL-0114	09/05/2014 &nbsp;   ACT	Emergency Generator	17.11	distillate fuel oil	3755 HP		Nitrogen Oxides (NOx)	Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7.	0.67 G/KW-H		-	
IL-0114	09/05/2014 &nbsp;   ACT	Emergency Generator	17.11	distillate fuel oil	3755 HP		Volatile Organic Compounds (VOC)	Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7.	0.4 G/KW-H		-	1.1
IL-0129	07/30/2018 &nbsp;   ACT	Emergency Engines	17.11	Ultra-low sulfur diesel	0		Nitrogen Oxides (NOx)		0			
IL-0130	12/31/2018 &nbsp;   ACT	Emergency Engine	17.11	Ultra-Low Sulfur Diesel	1500 kW		Nitrogen Oxides (NOx)		6.4 G/KW-HR		-	
IN-0158	12/03/2012 &nbsp;   ACT	TWO (2) EMERGENCY DIESEL GENERATORS	17.11	DIESEL	1006 HP EACH		Volatile Organic Compounds (VOC)	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	1.04 LB/H		-	
IN-0158	12/03/2012 &nbsp;   ACT	TWO (2) EMERGENCY DIESEL GENERATORS	17.11	DIESEL	1006 HP EACH		Nitrogen Oxides (NOx)	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	4.8 G/HP-H		-	7.1
IN-0158	12/03/2012 &nbsp;   ACT	EMERGENCY DIESEL GENERATOR	17.11	DIESEL	2012 HP		Volatile Organic Compounds (VOC)	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	1.04 LB/H		-	
IN-0158	12/03/2012 &nbsp;   ACT	EMERGENCY DIESEL GENERATOR	17.11	DIESEL	2012 HP		Nitrogen Oxides (NOx)	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	4.8 G/HP-H		-	6.8
IN-0166	06/27/2012 &nbsp;   ACT	TWO (2) EMERGENCY GENERATORS	17.11	DIESEL	1341 HORSEPOWER, EACH		Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES AND LIMITED HOURS OF NON-EMERGENCY OPERATION	0			
IN-0173	06/04/2014 &nbsp;   ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	NO. 2, DIESEL	3600 BHP		Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES	4.46 G/BHP-H		-	
IN-0173	06/04/2014 &nbsp;   ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	NO. 2, DIESEL	3600 BHP		Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES	0.31 G/BHP-H		-	6.4
IN-0179	09/25/2013 &nbsp;   ACT	DIESEL-FIRED EMERGENCY GENERATOR	17.11	NO. 2 FUEL OIL	4690 B-HP		Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES	4.46 G/B-HP-H		-	

**BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr	NO <sub>x</sub> + VOC g/kW-hr
IN-0179	09/25/2013 &nbsp;   ACT	DIESEL-FIRED EMERGENCY GENERATOR	17.11	NO. 2 FUEL OIL	4690	B-HP	Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES	0.31 G/B-HP-H		-	6.4
IN-0179	09/25/2013 &nbsp;   ACT	DIESEL-FIRED EMERGENCY WATER PUMP	17.21	NO. 2 FUEL OIL	481	BHP	Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES	2.86 G/B-HP-H		-	
IN-0179	09/25/2013 &nbsp;   ACT	DIESEL-FIRED EMERGENCY WATER PUMP	17.21	NO. 2 FUEL OIL	481	BHP	Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES	0.141 G/B-HP-H		-	4.0
IN-0180	06/04/2014 &nbsp;   ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	NO. 2, DIESEL	3600	BHP	Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES	4.46 G/B-HP-H		-	
IN-0180	06/04/2014 &nbsp;   ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	NO. 2, DIESEL	3600	BHP	Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES	0.31 G/B-HP-H		-	6.4
IN-0185	04/24/2014 &nbsp;   ACT	DIESEL FIRE PUMP	17.11	DIESEL	300	HP	Nitrogen Oxides (NOx)		3 G/HP-H		-	
IN-0234	12/08/2015 &nbsp;   ACT	EMERGENCY FIRE PUMP ENGINE	17.21	DISTILLATE OIL	0		Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES	0.05 G/HP-H		-	
IN-0234	12/08/2015 &nbsp;   ACT	EMERGENCY FIRE PUMP ENGINE	17.21	DISTILLATE OIL	0		Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES	9.5 G/HP-H		-	12.8
IN-0263	03/23/2017 &nbsp;   ACT	EMERGENCY GENERATORS (EU014A AND EU- 014B)	17.11	DISTILLATE OIL	3600	HP EACH	Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES	4.42 G/HP-H EACH		-	
IN-0263	03/23/2017 &nbsp;   ACT	EMERGENCY GENERATORS (EU014A AND EU- 014B)	17.11	DISTILLATE OIL	3600	HP EACH	Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES	0.35 G/HP-H EACH		-	6.4
IN-0295	02/23/2018 &nbsp;   ACT	Emergency Diesel Generators	17.21	Deisel	150	hp	Volatile Organic Compounds (VOC)		1.134 G/HP-HR		-	
IN-0295	02/23/2018 &nbsp;   ACT	Emergency Diesel Generators	17.21	Deisel	150	hp	Nitrogen Oxides (NOx)		14.06 G/HP-HR		-	20.4
IN-0295	02/23/2018 &nbsp;   ACT	Emergency Diesel Generators	17.21	Diesel	250	hp	Volatile Organic Compounds (VOC)		1.134 G/HP-HR		-	20.4
IN-0295	02/23/2018 &nbsp;   ACT	Emergency Diesel Generators	17.21	Diesel	250	hp	Nitrogen Oxides (NOx)		9.2 G/KW-HR		-	10.7
IN-0317	06/11/2019 &nbsp;   ACT	Emergency generator EU-6006	17.11	Diesel	2800	HP	Nitrogen Oxides (NOx)	Tier II diesel engine	6.4 G/KWH		-	
IN-0317	06/11/2019 &nbsp;   ACT	Emergency generator EU-6006	17.11	Diesel	2800	HP	Volatile Organic Compounds (VOC)	Tier II diesel engine	6.4 G/KWH		-	12.8
IN-0317	06/11/2019 &nbsp;   ACT	Emergency fire pump EU-6008	17.11	Diesel	750	HP	Nitrogen Oxides (NOx)	Engine that complies with Table 4 to Subpart IIII of Part 60	4 G/KWH		-	
IN-0317	06/11/2019 &nbsp;   ACT	Emergency fire pump EU-6008	17.11	Diesel	750	HP	Volatile Organic Compounds (VOC)	Engine that complies with Table 4 to Subpart IIII of Part 60	4 G/KWH		-	8.0
*KS-0030	03/31/2016 &nbsp;   ACT	Compression ignition RICE emergency fire pump	17.21	Ultra-low sulfur diesel (ULSD)	197	HP	Nitrogen Oxides (NOx)		3 G/HP-HR		-	

### BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)

BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)											Std Units Limit	NO <sub>x</sub> + VOC
RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	g/kW-hr	g/kW-hr
*KS-0030	03/31/2016 &nbsp;ACT	Compression ignition RICE emergency fire pump	17.21	Ultra-low-sulfur diesel (ULSD)	197 HP		Volatile Organic Compounds (VOC)		1.14 G/HP-HR		-	5.6
*KS-0036	03/18/2013 &nbsp;ACT	Cummins 6BTA 5.9F-1 Diesel Engine Fire Pump	17.21	No. 2 Fuel Oil	182 BHP		Nitrogen Oxides (NOx)	utilize efficient combustion/design technology	2 LB/HR		-	
*KS-0036	03/18/2013 &nbsp;ACT	Cummins 6BTA 5.9F-1 Diesel Engine Fire Pump	17.21	No. 2 Fuel Oil	182 BHP		Volatile Organic Compounds (VOC)	utilize efficient combustion/design technology	0.77 G/BHP-H		-	7.7
KY-0109	10/24/2016 &nbsp;ACT	Emergency Generators #1, #2, & #3 (EU72, EU73, & EU74)	17.11	Diesel	53.6 gal/hr		Volatile Organic Compounds (VOC)	The permittee shall prepare and maintain for EU72, EU73, and EU74, within 90 days of startup, a good combustion and operation practices plan (GCOP) that defines, measures and verifies the use of operational and design practices determined as BACT for minimizing CO, VOC, PM, PM10, and PM2.5 emissions. Any revisions requested by the Division shall be made and the plan shall be maintained on site. The permittee shall operate according to the provisions of this plan at all times, including periods of startup, shutdown, and malfunction. The plan shall be incorporated into the plant standard operating procedures (SOP) and shall be made available for the Division's inspection. The plan shall include, but not be limited to: i. A list of combustion optimization practices and a means of verifying the practices have occurred. ii. A list of combustion and operation practices to be used to lower energy consumption and a means of verifying the practices have occurred. iii. A list of the design choices determined to be BACT and verification that designs were implemented in the final construction.	4.77 G/HP-HR (EU72 & EU73)		-	
KY-0110	07/23/2020 &nbsp;ACT	EP 10-02 - North Water System Emergency Generator	17.11	Diesel	2922 HP		Nitrogen Oxides (NOx)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	4.77 G/HP-HR		-	
KY-0110	07/23/2020 &nbsp;ACT	EP 10-02 - North Water System Emergency Generator	17.11	Diesel	2922 HP		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0			
KY-0110	07/23/2020 &nbsp;ACT	EP 10-03 - South Water System Emergency Generator	17.11	Diesel	2922 HP		Nitrogen Oxides (NOx)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	4.77 G/HP-HR		-	
KY-0110	07/23/2020 &nbsp;ACT	EP 10-03 - South Water System Emergency Generator	17.11	Diesel	2922 HP		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0			
KY-0110	07/23/2020 &nbsp;ACT	EP 10-04 - Emergency Fire Water Pump	17.11	Diesel	920 HP		Nitrogen Oxides (NOx)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	4.77 G/HP-HR		-	
KY-0110	07/23/2020 &nbsp;ACT	EP 10-04 - Emergency Fire Water Pump	17.11	Diesel	920 HP		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0			
KY-0110	07/23/2020 &nbsp;ACT	EP 11-01 - Melt Shop Emergency Generator	17.21	Diesel	260 HP		Nitrogen Oxides (NOx)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.98 G/HP-HR		-	



**BACT Determinations for Emergency Diesel Engines - NOx + VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr	NOx + VOC g/kW-hr
KY-0110	07/23/2020 &nbsp;   ACT	EP 11-01 - Melt Shop Emergency Generator	17.21	Diesel	260	HP	Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0			
KY-0110	07/23/2020 &nbsp;   ACT	EP 11-02 - Reheat Furnace Emergency Generator	17.21	Diesel	190	HP	Nitrogen Oxides (NOx)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.98 G/HP-HR		-	
KY-0110	07/23/2020 &nbsp;   ACT	EP 11-02 - Reheat Furnace Emergency Generator	17.21	Diesel	190	HP	Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0			
KY-0110	07/23/2020 &nbsp;   ACT	EP 10-07 - Air Separation Plant Emergency Generator	17.11	Diesel	700	HP	Nitrogen Oxides (NOx)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	4.77 G/HP-HR		-	
KY-0110	07/23/2020 &nbsp;   ACT	EP 10-07 - Air Separation Plant Emergency Generator	17.11	Diesel	700	HP	Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0			
KY-0110	07/23/2020 &nbsp;   ACT	EP 10-01 - Caster Emergency Generator	17.11	Diesel	2922	HP	Nitrogen Oxides (NOx)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	4.77 G/HP-HR		-	
KY-0110	07/23/2020 &nbsp;   ACT	EP 10-01 - Caster Emergency Generator	17.11	Diesel	2922	HP	Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0			
KY-0110	07/23/2020 &nbsp;   ACT	EP 11-03 - Rolling Mill Emergency Generator	17.21	Diesel	440	HP	Nitrogen Oxides (NOx)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.98 G/HP-HR		-	
KY-0110	07/23/2020 &nbsp;   ACT	EP 11-03 - Rolling Mill Emergency Generator	17.21	Diesel	440	HP	Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0			
KY-0110	07/23/2020 &nbsp;   ACT	EP 11-04 - IT Emergency Generator	17.21	Diesel	190	HP	Nitrogen Oxides (NOx)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.98 G/HP-HR		-	
KY-0110	07/23/2020 &nbsp;   ACT	EP 11-04 - IT Emergency Generator	17.21	Diesel	190	HP	Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0			
KY-0110	07/23/2020 &nbsp;   ACT	EP 11-05 - Radio Tower Emergency Generator	17.21	Diesel	61	HP	Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0			
KY-0110	07/23/2020 &nbsp;   ACT	EP 11-05 - Radio Tower Emergency Generator	17.21	Diesel	61	HP	Nitrogen Oxides (NOx)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	3.5 G/HP-HR		-	
KY-0115	04/19/2021 &nbsp;   ACT	New Pumphouse (XB13) Emergency Generator #1 (EP 08-05)	17.11	Diesel	2922	HP	Nitrogen Oxides (NOx)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		-	
KY-0115	04/19/2021 &nbsp;   ACT	Tunnel Furnace Emergency Generator (EP 08-06)	17.11	Diesel	2937	HP	Nitrogen Oxides (NOx)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		-	
KY-0115	04/19/2021 &nbsp;   ACT	Caster B Emergency Generator (EP 08-07)	17.11	Diesel	2937	HP	Nitrogen Oxides (NOx)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		-	
KY-0115	04/19/2021 &nbsp;   ACT	Air Separation Unit Emergency Generator (EP 08-08)	17.11	Diesel	700	HP	Nitrogen Oxides (NOx)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		-	
KY-0115	04/19/2021 &nbsp;   ACT	Cold Mill Complex Emergency Generator (EP 09-05)	17.21	Diesel	350	HP	Nitrogen Oxides (NOx)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		-	
LA-0251	04/26/2011 &nbsp;   ACT	Fire Pump Engines - 2 units	17.21	diesel	444	hp	Nitrogen Oxides (NOx)		5.82 LB/H		-	

### BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)

BACT Determinations for Emergency Diesel Engines - NOx + VOC (Oil-Fired)											Std Units Limit	NOx + VOC
RBLCID	PERMIT ISSUANCE DATE	PROCESS NAME	PROCESS TYPE	PRIMARY FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL METHOD DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	g/kW-hr	g/kW-hr
LA-0254	08/16/2011 &nbsp;  ACT	EMERGENCY DIESEL GENERATOR	17.11	DIESEL	1250 HP		Volatile Organic Compounds (VOC)	ULTRA LOW SULFUR DIESEL AND GOOD COMBUSTION PRACTICES	1 G/HP-H		-	
LA-0254	08/16/2011 &nbsp;  ACT	EMERGENCY FIRE PUMP	17.21	DIESEL	350 HP		Volatile Organic Compounds (VOC)	ULTRA LOW SULFUR DIESEL AND GOOD COMBUSTION PRACTICES	1 G/HP-H		-	
LA-0276	12/15/2016 &nbsp;  ACT	Fire Pump Engines (2 units)	17.11	Diesel	700 hp		Volatile Organic Compounds (VOC)	Comply with standards of NSPS Subpart IIII	0			
LA-0292	01/22/2016 &nbsp;  ACT	Emergency Generators No. 1 & No. 2	17.11	Diesel	1341 HP		Nitrogen Oxides (NOx)	Good equipment design, proper combustion techniques, use of low sulfur fuel, and compliance with 40 CFR 60 Subpart IIII	14.16 LB/HR		-	
LA-0292	01/22/2016 &nbsp;  ACT	Emergency Generators No. 1 & No. 2	17.11	Diesel	1341 HP		Volatile Organic Compounds (VOC)	Good combustion practices consistent with the manufacturer's recommendations to maximize fuel efficiency and minimize emissions	0.83 LB/HR		-	6.8
LA-0296	05/23/2014 &nbsp;  ACT	Emergency Diesel Generators (EQTs 622, 671, 773, 850, 994, 995, 996, 1033, 1077, 1105, & 1202)	17.11	Diesel	2682 HP		Nitrogen Oxides (NOx)	Compliance with 40 CFR 60 Subpart IIII; operating the engine in accordance with the engine manufacturer's instructions and/or written procedures (consistent with safe operation) designed to maximize combustion efficiency and minimize fuel usage.	27.37 LB/HR		-	
LA-0296	05/23/2014 &nbsp;  ACT	Emergency Diesel Generators (EQTs 622, 671, 773, 850, 994, 995, 996, 1033, 1077, 1105, & 1202)	17.11	Diesel	2682 HP		Volatile Organic Compounds (VOC)	Compliance with 40 CFR 60 Subpart IIII; operating the engine in accordance with the engine manufacturer's instructions and/or written procedures (consistent with safe operation) designed to maximize combustion efficiency and minimize fuel usage.	0.85 LB/HR		-	6.4
LA-0305	06/30/2016 &nbsp;  ACT	Diesel Engines (Emergency)	17.11	Diesel	4023 hp		Nitrogen Oxides (NOx)	Complying with 40 CFR 60 Subpart IIII	0			
LA-0308	09/26/2013 &nbsp;  ACT	2000 KW Diesel Fired Emergency Generator Engine	17.11	Diesel	20.4 MMBTU/hr		Nitrogen Oxides (NOx)	Good combustion and maintenance practices, and compliance with NSPS 40 CFR 60 Subpart IIII	33.07 LB/H		-	
LA-0309	06/04/2015 &nbsp;  ACT	Emergency Generator Engines	17.11	Diesel	2922 hp (each)		Nitrogen Oxides (NOx)	Complying with 40 CFR 60 Subpart IIII	6.4 G/KW-HR		-	
LA-0309	06/04/2015 &nbsp;  ACT	Emergency Generator Engines	17.11	Diesel	2922 hp (each)		Volatile Organic Compounds (VOC)	Complying with 40 CFR 60 Subpart IIII	0			
*LA-0312	06/30/2017 &nbsp;  ACT	DFP1-13 - Diesel Fire Pump Engine (EQT0013)	17.11	Diesel	650 horsepower		Nitrogen Oxides (NOx)	Compliance with NSPS Subpart IIII	6.6 LB/HR		-	
*LA-0312	06/30/2017 &nbsp;  ACT	DFP1-13 - Diesel Fire Pump Engine (EQT0013)	17.11	Diesel	650 horsepower		Volatile Organic Compounds (VOC)	Compliance with NNSPS Subpart IIII	0.13 LB/HR		-	6.3
*LA-0312	06/30/2017 &nbsp;  ACT	DEG1-13 - Diesel Fired Emergency Generator Engine (EQT0012)	17.11	Diesel	1474 horsepower		Nitrogen Oxides (NOx)	Compliance with NSPS Subpart IIII	19.23 LB/HR		-	
*LA-0312	06/30/2017 &nbsp;  ACT	DEG1-13 - Diesel Fired Emergency Generator Engine (EQT0012)	17.11	Diesel	1474 horsepower		Volatile Organic Compounds (VOC)	Compliance with NSPS Subpart IIII	0.04 LB/HR		-	8.0
LA-0313	08/31/2016 &nbsp;  ACT	SCPS Emergency Diesel Generator 1	17.11	Diesel	2584 HP		Volatile Organic Compounds (VOC)	Good combustion practices	27.34 LB/H		-	

**BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr	NO <sub>x</sub> + VOC g/kW-hr
LA-0313	08/31/2016 &nbsp;   ACT	SCPS Emergency Diesel Generator 1	17.11	Diesel	2584	HP	Nitrogen Oxides (NOx)	Compliance with NESHAP 40 CFR 63 Subpart ZZZZ and NSPS 40 CFR 60 Subpart IIII, and good combustion practices (use of ultra-low sulfur diesel fuel).	27.34	LB/H	-	12.9
LA-0313	08/31/2016 &nbsp;   ACT	SCPS Emergency Diesel Firewater Pump 1	17.21	Diesel	282	HP	Nitrogen Oxides (NOx)	Compliance with NESHAP 40 CFR 63 Subpart ZZZZ and NSPS 40 CFR 60 Subpart IIII, and good combustion practices (use of ultra-low sulfur diesel fuel).	1.87	LB/H	-	
LA-0313	08/31/2016 &nbsp;   ACT	SCPS Emergency Diesel Firewater Pump 1	17.21	Diesel	282	HP	Volatile Organic Compounds (VOC)	Good combustion practices	1.87	LB/H	-	8.1
LA-0314	08/03/2016 &nbsp;   ACT	Diesel emergency generator engine - EGEN	17.21	diesel	350	hp	Nitrogen Oxides (NOx)	complying with 40 CFR 63 subpart ZZZZ	0			
LA-0314	08/03/2016 &nbsp;   ACT	Diesel emergency generator engine - EGEN	17.21	diesel	350	hp	Volatile Organic Compounds (VOC)	complying with 40 CFR 63 subpart ZZZZ	0			
*LA-0315	05/23/2014 &nbsp;   ACT	Emergency Diesel Generator 1	17.11	Diesel	5364	HP	Nitrogen Oxides (NOx)	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	52.58	LB/H	-	
*LA-0315	05/23/2014 &nbsp;   ACT	Emergency Diesel Generator 1	17.11	Diesel	5364	HP	Volatile Organic Compounds (VOC)	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	3.86	LB/H	-	12.9
*LA-0315	05/23/2014 &nbsp;   ACT	Emergency Diesel Generator 2	17.11	Diesel	5364	HP	Nitrogen Oxides (NOx)	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	52.58	LB/H	-	
*LA-0315	05/23/2014 &nbsp;   ACT	Emergency Diesel Generator 2	17.11	Diesel	5364	HP	Volatile Organic Compounds (VOC)	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	3.86	LB/H	-	12.9
*LA-0315	05/23/2014 &nbsp;   ACT	Fire Pump Diesel Engine 1	17.11	Diesel	751	HP	Nitrogen Oxides (NOx)	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	4.6	LB/H	-	
*LA-0315	05/23/2014 &nbsp;   ACT	Fire Pump Diesel Engine 1	17.11	Diesel	751	HP	Volatile Organic Compounds (VOC)	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	0.34	LB/H	-	12.9
*LA-0315	05/23/2014 &nbsp;   ACT	Fire Pump Diesel Engine 2	17.11	Diesel	751	HP	Nitrogen Oxides (NOx)	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	4.6	LB/H	-	
*LA-0315	05/23/2014 &nbsp;   ACT	Fire Pump Diesel Engine 2	17.11	Diesel	751	HP	Volatile Organic Compounds (VOC)	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	0.34	LB/H	-	12.9
LA-0316	02/17/2017 &nbsp;   ACT	emergency generator engines (6 units)	17.11	diesel	3353	hp	Nitrogen Oxides (NOx)	Complying with 40 CFR 60 Subpart IIII	0			
LA-0316	02/17/2017 &nbsp;   ACT	emergency generator engines (6 units)	17.11	diesel	3353	hp	Volatile Organic Compounds (VOC)	Complying with 40 CFR 60 Subpart IIII	0			
LA-0317	12/22/2016 &nbsp;   ACT	Emergency Generator Engines (4 units)	17.11	Diesel	0		Nitrogen Oxides (NOx)	complying with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	0			
LA-0323	01/09/2017 &nbsp;   ACT	Fire Water Diesel Pump No. 3 Engine	17.11	Diesel Fuel	600	hp	Nitrogen Oxides (NOx)	Proper operation and limits on hours operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0			
LA-0323	01/09/2017 &nbsp;   ACT	Fire Water Diesel Pump No. 4 Engine	17.11	Diesel Fuel	600	hp	Nitrogen Oxides (NOx)	Proper operation and limits on hours of operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0			
LA-0323	01/09/2017 &nbsp;   ACT	Standby Generator No. 9 Engine	17.21	Diesel Fuel	400	hp	Nitrogen Oxides (NOx)	Proper operation and limits on hours of operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0			
LA-0328	05/02/2018 &nbsp;   ACT	Emergency Diesel Engine Pump P-39A	17.21	Diesel Fuel	375	HP	Nitrogen Oxides (NOx)	Good combustion practices and NSPS IIII	4	G/KW-H	-	

**BACT Determinations for Emergency Diesel Engines - NOx + VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr	NO <sub>x</sub> + VOC g/kW-hr
LA-0328	05/02/2018 &nbsp;ACT	Emergency Diesel Engine Pump P-39A	17.21	Diesel Fuel	375	HP	Volatile Organic Compounds (VOC)	Good combustion practices and NSPS Subpart IIII	4	G/KW-H	-	8.0
LA-0328	05/02/2018 &nbsp;ACT	Emergency Diesel Engine Pump P-39B	17.21	Diesel Fuel	300	HP	Nitrogen Oxides (NOx)	Good combustion practices and NSPS Subpart IIII	4	G/KW-H	-	
LA-0328	05/02/2018 &nbsp;ACT	Emergency Diesel Engine Pump P-39B	17.21	Diesel Fuel	300	HP	Volatile Organic Compounds (VOC)	Good combustion practices and NSPS Subpart IIII	4	G/KW-H	-	8.0
LA-0331	09/21/2018 &nbsp;ACT	Large Emergency Engines (>50kW)	17.11	Diesel Fuel	5364	HP	Nitrogen Oxides (NOx)	Good Combustion and Operating Practices	5.6	G/KW-H	-	
LA-0331	09/21/2018 &nbsp;ACT	Large Emergency Engines (>50kW)	17.11	Diesel Fuel	5364	HP	Volatile Organic Compounds (VOC)	Good combustion and operating practices.	0.79	G/KW-H	-	6.4
LA-0364	01/06/2020 &nbsp;ACT	Emergency Generator Diesel Engines	17.11	Diesel Fuel	550	hp	Nitrogen Oxides (NOx)	Compliance with the limitations imposed by 40 CFR 63 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures designed to maximize combustion efficiency and minimize fuel usage.	0			
LA-0364	01/06/2020 &nbsp;ACT	Emergency Generator Diesel Engines	17.11	Diesel Fuel	550	hp	Volatile Organic Compounds (VOC)	Compliance with the limitations imposed by 40 CFR 63 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures designed to maximize combustion efficiency and minimize fuel usage.	0			
LA-0364	01/06/2020 &nbsp;ACT	Emergency Fire Water Pumps	17.11	Diesel Fuel	550	hp	Nitrogen Oxides (NOx)	Compliance with the limitations imposed by 40 CFR 63 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures designed to maximize combustion efficiency and minimize fuel usage.	0			
LA-0364	01/06/2020 &nbsp;ACT	Emergency Fire Water Pumps	17.11	Diesel Fuel	550	hp	Volatile Organic Compounds (VOC)	Compliance with the limitations imposed by 40 CFR 63 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures designed to maximize combustion efficiency and minimize fuel usage.	0			
LA-0366	02/03/2021 &nbsp;ACT	Fire Pump, Sawmill Emergency, and Planer Mill Emergency Generator Engines	17.21	Diesel	0		Volatile Organic Compounds (VOC)	Good Combustion Practices and Compliance with NSPS 40 CFR 60 Subpart IIII	804.6	HP		
*LA-0370	04/27/2020 &nbsp;ACT	Emergency Fire Pump Engine (EQT0021, ENG- 1)	17.21	Diesel	1.1	MM BTU/hr	Nitrogen Oxides (NOx)	The use of low sulfur fuels and compliance with 40 CFR 60 Subpart IIII	1.15	LB/HR		
MA-0039	01/30/2014 &nbsp;ACT	Emergency Engine/Generator	17.11	ULSD	7.4	MMBTU/H	Nitrogen Oxides (NOx)		4.8	GM/BHP-H	-	
MA-0039	01/30/2014 &nbsp;ACT	Fire Pump Engine	17.21	ULSD	2.7	MMBTU/H	Nitrogen Oxides (NOx)		3	GM/BHP-H	-	
MD-0041	04/23/2014 &nbsp;ACT	EMERGENCY GENERATOR	17.21	ULTRA-LOW SULFUR DIESEL	1500	KW	Nitrogen Oxides (NOx)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES, AND LIMITING THE HOURS OF OPERATION	4.8	G/HP-H	-	
MD-0041	04/23/2014 &nbsp;ACT	EMERGENCY GENERATOR	17.21	ULTRA-LOW SULFUR DIESEL	1500	KW	Volatile Organic Compounds (VOC)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES, AND LIMITING THE HOURS OF OPERATION	4.8	LB/MMBTU		
MD-0041	04/23/2014 &nbsp;ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA-LOW SULFUR DIESEL	300	HP	Nitrogen Oxides (NOx)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES, AND LIMITING THE HOURS OF OPERATION	3	G/HP-H	-	

**BACT Determinations for Emergency Diesel Engines - NOx + VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr	NO <sub>x</sub> + VOC g/kW-hr
MD-0042	04/08/2014 &nbsp;    ACT	EMERGENCY GENERATOR 1	17.11	ULTRA LOW SULFU DIESEL	2250 KW		Nitrogen Oxides (NOx)	LIMITED OPERATING HOURS, USE OF ULTRA-LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	4.8 G/HP-H		-	
MD-0042	04/08/2014 &nbsp;    ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA LOW SULFUR DIESEL	477 HP		Nitrogen Oxides (NOx)	LIMITED OPERATING HOURS, USE OF ULTRA-LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	3 G/HP-H		-	
MD-0043	07/01/2014 &nbsp;    ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	1300 HP		Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES, LIMITED HOURS OF OPERATION, AND EXCLUSIVE USE OF ULSD	4.8 G/HP-H		-	
MD-0043	07/01/2014 &nbsp;    ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRAL LOW SULFUR DIESEL	350 HP		Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES, LIMITED HOURS OF OPERATION, AND EXCLUSIVE USE OF ULSD	3 G/HP-H		-	
MD-0044	06/09/2014 &nbsp;    ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	1550 HP		Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES AND DESIGNED TO ACHIEVE EMISSION LIMIT	4.8 G/HP-H		-	
MD-0044	06/09/2014 &nbsp;    ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	1550 HP		Volatile Organic Compounds (VOC)	USE ONLY ULSD, GOOD COMBUSTION PRACTICES, AND DESIGNED TO ACHIEVE EMISSION LIMIT	4.8 G/HP-H		-	12.9
MD-0044	06/09/2014 &nbsp;    ACT	5 EMERGENCY FIRE WATER PUMP ENGINES	17.21	ULTRA LOW SULFUR DIESEL	350 HP		Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES AND DESIGNED TO ACHIEVE EMISSION LIMIT	3 G/HP-H		-	
MD-0044	06/09/2014 &nbsp;    ACT	5 EMERGENCY FIRE WATER PUMP ENGINES	17.21	ULTRA LOW SULFUR DIESEL	350 HP		Volatile Organic Compounds (VOC)	USE ONLY ULSD, GOOD COMBUSTION PRACTICES, AND DESIGNED TO ACHIEVE EMISSION LIMIT	3 G/HP-H		-	8.0
MD-0045	11/13/2015 &nbsp;    ACT	EMERGENCY GENERATOR	17.21	ULTRA-LOW SULFUR DIESEL	1490 HP		Nitrogen Oxides (NOx)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	6.4 G/KW-H		-	
MD-0045	11/13/2015 &nbsp;    ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA-LOW SULFUR DIESEL	305 HP		Nitrogen Oxides (NOx)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	4 G/KW-H		-	
MD-0046	10/31/2014 &nbsp;    ACT	DIESEL-FIRED AUXILIARY (EMERGENCY) ENGINES (TWO)	17.21	ULTRA-LOW SULFUR DIESEL	1500 KW		Nitrogen Oxides (NOx)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	6.4 G/KW-H		-	
MD-0046	10/31/2014 &nbsp;    ACT	DIESEL-FIRED FIRE PUMP ENGINE	17.21	ULTRA-LOW SULFUR DIESEL	300 HP		Nitrogen Oxides (NOx)	EXCLUSIVE USE OF ULTRA LOW SULFUR DIESEL FUEL AND GOOD COMBUSTION PRACTICES	4 G/KW-H		-	
MI-0394	02/29/2012 &nbsp;    ACT	Four (4) Emergency Generators	17.11	Diesel	2280 KW		Nitrogen Oxides (NOx)	No add-on controls, but ignition timing retardation (ITR) is good design. Engines are tuned for low-NOx operation versus low CO operation.	6.93 G/KW-H		-	
MI-0394	02/29/2012 &nbsp;    ACT	Nine (9) DRUPS Emergency Generators	17.11	Diesel	3010 KW		Nitrogen Oxides (NOx)	No add-on controls, but ignition timing retardation (ITR) is good design. Engines are tuned for low-NOx operation versus low CO operation.	5.98 G/KW-H		-	
MI-0395	07/13/2012 &nbsp;    ACT	Nine (9) DRUPS Emergency Generators	17.11	Diesel	3010 KW		Nitrogen Oxides (NOx)	No add-on controls, but ignition timing retardation (ITR) is good design. Engines are tuned for low-NOx operation versus low CO operation.	5.98 G/KW-H		-	
MI-0395	07/13/2012 &nbsp;    ACT	Four (4) Emergency Generators	17.11	Diesel	2500 KW		Nitrogen Oxides (NOx)	No add-on control, but ignition timing retardation (ITR) is good design. Engines are tuned for low-NOx operation versus low CO operation.	7.13 G/KW-H		-	
MI-0400	06/29/2011 &nbsp;    ACT	Fire Pump	17.21	Diesel	420 HP		Nitrogen Oxides (NOx)		3 G/HP-H		-	
MI-0406	11/01/2013 &nbsp;    ACT	FG-EMGEN7-8; Two (2) 1,000kW diesel-fueled emergency reciprocating internal combustion engines	17.11	Diesel	1000 kW		Nitrogen Oxides (NOx)	Good combustion practices	4.8 G/B-HP-H		-	

**BACT Determinations for Emergency Diesel Engines - NOx + VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr	NOx + VOC g/kW-hr
MI-0410	07/25/2013 &nbsp;    ACT	EU-FPENGINE: Diesel fuel fired emergency backup fire pump	17.21	diesel fuel	315 hp	nameplate	Volatile Organic Compounds (VOC)	Proper combustion design and ultra low sulfur diesel fuel.	0			
MI-0410	07/25/2013 &nbsp;    ACT	EU-FPENGINE: Diesel fuel fired emergency backup fire pump	17.21	diesel fuel	315 hp	nameplate	Nitrogen Oxides (NOx)	Proper combustion design and ultra low sulfur diesel fuel.	3 G/HP-H		-	
MI-0412	12/04/2013 &nbsp;    ACT	Emergency Engine -- Diesel Fire Pump (EUFENGINE)	17.21	Diesel	165 HP		Nitrogen Oxides (NOx)	Good combustion practices	3 G/HP-H		-	
MI-0412	12/04/2013 &nbsp;    ACT	Emergency Engine -- Diesel Fire Pump (EUFENGINE)	17.21	Diesel	165 HP		Volatile Organic Compounds (VOC)	Good combustion practices	0.001 LB/H		-	4.0
MI-0418	01/14/2015 &nbsp;    ACT	FG-BACKUPGENS (Nine (9) DRUPS Emergency Engines)	17.11	Diesel	3490 KW		Nitrogen Oxides (NOx)	No add-on controls, but injection timing retardation (ITR) is good design. Engines are tuned for low-NOx operation versus low CO operation.	8 G/KW-H		-	
MI-0418	01/14/2015 &nbsp;    ACT	Four (4) emergency engines in FG-BACKUPGENS	17.11	Diesel	2710 KW		Nitrogen Oxides (NOx)	No add-on controls, but injection timing retardation (ITR) is good design. Engines are tuned for low-NOx operation versus low CO operation.	7.13 G/KW-H		-	
MI-0421	08/26/2016 &nbsp;    ACT	Emergency Diesel Generator Engine (EUEMRGRICE in FGRICE)	17.11	Diesel	500 H/YR		Nitrogen Oxides (NOx)	Certified engines, limited operating hours.	22.6 LB/H			
MI-0421	08/26/2016 &nbsp;    ACT	Dieself fire pump engine (EUFIREPUMP in FGRICE)	17.11	Diesel	500 H/YR		Nitrogen Oxides (NOx)	Certified engines, limited operating hours.	3.53 LB/H			
MI-0423	01/04/2017 &nbsp;    ACT	EUEMENGINE (Diesel fuel emergency engine)	17.11	Diesel Fuel	22.68 MMBTU/H		Nitrogen Oxides (NOx)	Good combustion practices and meeting NSPS IIII requirements.	6.4 G/KW-H		-	
MI-0423	01/04/2017 &nbsp;    ACT	EUEMENGINE (Diesel fuel emergency engine)	17.11	Diesel Fuel	22.68 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices.	1.87 LB/H			
MI-0423	01/04/2017 &nbsp;    ACT	EUFENGINE (Emergency engine--diesel fire pump)	17.21	Diesel	1.66 MMBTU/H		Nitrogen Oxides (NOx)	Good combustion practices and meeting NSPS Subpart IIII requirements.	3 G/BHP-H		-	
MI-0423	01/04/2017 &nbsp;    ACT	EUFENGINE (Emergency engine--diesel fire pump)	17.21	Diesel	1.66 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices	0.64 LB/H			
MI-0424	12/05/2016 &nbsp;    ACT	EUFENGINE (Emergency engine--diesel fire pump)	17.21	diesel	500 H/YR		Nitrogen Oxides (NOx)	Good combustion practices.	3 G/HP-H		-	
MI-0424	12/05/2016 &nbsp;    ACT	EUFENGINE (Emergency engine--diesel fire pump)	17.21	diesel	500 H/YR		Volatile Organic Compounds (VOC)	Good combustion practices	0.47 LB/H			
MI-0425	05/09/2017 &nbsp;    ACT	EUEMRGRICE1 in FGRICE (Emergency diesel generator engine)	17.11	Diesel	500 H/YR		Nitrogen Oxides (NOx)	Certified engines, limited operating hours.	21.2 LB/H			
MI-0425	05/09/2017 &nbsp;    ACT	EUEMRGRICE2 in FGRICE (Emergency Diesel Generator Engine)	17.11	Diesel	500 H/YR		Nitrogen Oxides (NOx)	Certified engines, limited operating hours	4.4 LB/H			
MI-0425	05/09/2017 &nbsp;    ACT	EUFIREPUMP in FGRICE (Diesel fire pump engine)	17.11	Diesel	500 H/YR		Nitrogen Oxides (NOx)	Certified engines. Limited operating hours.	3.53 LB/H			

### BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)

BACT Determinations for Emergency Diesel Engines - NOx + VOC (Oil-Fired)											Std Units Limit g/kW-hr	NO <sub>x</sub> + VOC g/kW-hr
RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT		
MI-0433	06/29/2018 &nbsp;  ACT	EUPENGINE (South Plant): Fire pump engine	17.21	Diesel	300 HP		Nitrogen Oxides (NOx)	Good combustion practices and meeting NSPS Subpart IIII requirements.	3 G/BHP-H		-	
MI-0433	06/29/2018 &nbsp;  ACT	EUPENGINE (South Plant): Fire pump engine	17.21	Diesel	300 HP		Volatile Organic Compounds (VOC)	Good combustion practices.	0.75 LB/H		-	5.5
MI-0433	06/29/2018 &nbsp;  ACT	EUEMENGINE (North Plant): Emergency Engine	17.11	Diesel	1341 HP		Nitrogen Oxides (NOx)	Good combustion practices and meeting NSPS Subpart IIII requirements.	6.4 G/KW-H		-	
MI-0433	06/29/2018 &nbsp;  ACT	EUEMENGINE (North Plant): Emergency Engine	17.11	Diesel	1341 HP		Volatile Organic Compounds (VOC)	Good combustion practices.	0.86 LB/H		-	6.8
MI-0433	06/29/2018 &nbsp;  ACT	EUPENGINE (North Plant): Fire pump engine	17.21	Diesel	300 HP		Nitrogen Oxides (NOx)	Good combustion practices and meeting NSPS Subpart IIII requirements.	3 G/BHP-H		-	
MI-0433	06/29/2018 &nbsp;  ACT	EUPENGINE (North Plant): Fire pump engine	17.21	Diesel	300 HP		Volatile Organic Compounds (VOC)	Good combustion practices	0.75 LB/H		-	5.5
MI-0433	06/29/2018 &nbsp;  ACT	EUEMENGINE (South Plant): Emergency Engine	17.11	Diesel	1341 HP		Nitrogen Oxides (NOx)	Good combustion practices and meeting NSPS IIII requirements.	6.4 G/KW-H		-	
MI-0433	06/29/2018 &nbsp;  ACT	EUEMENGINE (South Plant): Emergency Engine	17.11	Diesel	1341 HP		Volatile Organic Compounds (VOC)	Good combustion practices	0.86 LB/H		-	6.8
MI-0434	03/22/2018 &nbsp;  ACT	EUFIREPUMPENGs (2 emergency fire pump engines)	17.21	Diesel	250 BHP		Nitrogen Oxides (NOx)	Good combustion practices.	3 G/B-HP-H		-	
MI-0434	03/22/2018 &nbsp;  ACT	EULIFESAFETYENG - One diesel-fueled emergency engine/generator	17.21	Diesel	500 KW		Nitrogen Oxides (NOx)	Good combustion practices.	4 G/KW-H		-	
MI-0435	07/16/2018 &nbsp;  ACT	EUEMENGINE: Emergency engine	17.11	Diesel	2 MW		Nitrogen Oxides (NOx)	State of the art combustion design.	6.4 G/KW-H		-	
MI-0435	07/16/2018 &nbsp;  ACT	EUEMENGINE: Emergency engine	17.11	Diesel	2 MW		Volatile Organic Compounds (VOC)	State of the art combustion design.	1.89 LB/H			
MI-0435	07/16/2018 &nbsp;  ACT	EUPENGINE: Fire pump engine	17.21	Diesel	399 BHP		Nitrogen Oxides (NOx)	State of the art combustion design.	4 G/KW-H		-	
MI-0435	07/16/2018 &nbsp;  ACT	EUPENGINE: Fire pump engine	17.21	Diesel	399 BHP		Volatile Organic Compounds (VOC)	State of the art combustion design.	0.13 LB/H		-	4.2
MI-0441	12/21/2018 &nbsp;  ACT	EUEMGD1--A 1500 HP diesel fueled emergency engine	17.11	Diesel	1500 HP		Nitrogen Oxides (NOx)	Good combustion practices and will be NSPS compliant.	6.4 G/KW-H		-	
MI-0441	12/21/2018 &nbsp;  ACT	EUEMGD2--A 6000 HP diesel fuel fired emergency engine	17.11	Diesel	6000 HP		Nitrogen Oxides (NOx)	Good combustion practices and will be NSPS compliant.	6.4 G/KW-H		-	
*MI-0445	11/26/2019 &nbsp;  ACT	EUPENGINE (Emergency engine-diesel fire pump	17.21	diesel fuel	1.66 MMBTU/H		Nitrogen Oxides (NOx)	Good Combustion Practices and meeting NSPS Subpart IIII requirements	3 G/BHP-H		-	
*MI-0445	11/26/2019 &nbsp;  ACT	EUEMENGINE (diesel fuel emergency engine)	17.11	diesel fuel	22.68 MMBTU/H		Nitrogen Oxides (NOx)	Good Combustion Practices and meeting NSPS Subpart IIII requirements	6.4 G/KW-H		-	
NJ-0079	07/25/2012 &nbsp;  ACT	Emergency Generator	17.11	Ultra Low Sulfur distillate Diesel	100 H/YR		Nitrogen Oxides (NOx)	Use of ULSD diesel oil	21.16 LB/H			

**BACT Determinations for Emergency Diesel Engines - NOx + VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr	NOx + VOC g/kW-hr
NJ-0079	07/25/2012 &nbsp;ACT	Emergency Generator	17.11	Ultra Low Sulfur distillate Diesel	100 H/YR		Volatile Organic Compounds (VOC)	Use of ULSD oil	0.49 LB/H			
NJ-0080	11/01/2012 &nbsp;ACT	Emergency Generator	17.11	ULSD	200 H/YR		Nitrogen Oxides (NOx)	use of ultra low sulfur diesel (ULSD) a clean fuel	18.53 LB/H			
NJ-0080	11/01/2012 &nbsp;ACT	Emergency Generator	17.11	ULSD	200 H/YR		Volatile Organic Compounds (VOC)	use of ULSD, a low sulfur clean fuel	2.62 LB/H			
NJ-0081	03/07/2014 &nbsp;ACT	Emergency diesel fire pump	17.21	Ultra Low Sulfur Distillate oil	0		Nitrogen Oxides (NOx)		1.75 LB/H			
NJ-0081	03/07/2014 &nbsp;ACT	Emergency diesel fire pump	17.21	Ultra Low Sulfur Distillate oil	0		Volatile Organic Compounds (VOC)		0.119 LB/H			
NJ-0084	03/10/2016 &nbsp;ACT	Diesel Fired Emergency Generator	17.11	ULSD	44 H/YR		Volatile Organic Compounds (VOC)	use of ULSD a clean burning fuel, and limited hours of operation	1 LB/H			
NJ-0084	03/10/2016 &nbsp;ACT	Diesel Fired Emergency Generator	17.11	ULSD	44 H/YR		Nitrogen Oxides (NOx)	use of ultra low sulfur diesel a clean burning fuel.	42.3 LB/H			
NJ-0084	03/10/2016 &nbsp;ACT	Emergency Diesel Fire Pump	17.21	ULSD	100 H/YR		Nitrogen Oxides (NOx)	use of ULSD a clean burning fuel, and limited hours of operation	1.7 LB/H			
NJ-0084	03/10/2016 &nbsp;ACT	Emergency Diesel Fire Pump	17.21	ULSD	100 H/YR		Volatile Organic Compounds (VOC)	use of ULSD a clean burning fuel, and limited hours of operation	0.1 LB/H			
NJ-0085	07/19/2016 &nbsp;ACT	EMERGENCY GENERATOR DIESEL	17.21	DIESEL OIL	0 100 H/YR		Nitrogen Oxides (NOx)	Use of Ultra Low Sulfur Diesel (ULSD) Oil a clean burning fuel and limited hours of operation	20.6 LB/H			
NJ-0085	07/19/2016 &nbsp;ACT	EMERGENCY GENERATOR DIESEL	17.21	DIESEL OIL	0 100 H/YR		Volatile Organic Compounds (VOC)	Use of Ultra Low Sulfur Diesel (ULSD) Oil a clean burning fuel and limited hours of operation	0.557 LB/H			
NJ-0085	07/19/2016 &nbsp;ACT	EMERGENCY DIESEL FIRE PUMP	17.21	ULSD	100 H/YR		Nitrogen Oxides (NOx)	Use of Ultra Low Sulfur Diesel (ULSD) Oil a clean burning fuel and limited hours of operation	2.05 LB/H			
NJ-0085	07/19/2016 &nbsp;ACT	EMERGENCY DIESEL FIRE PUMP	17.21	ULSD	100 H/YR		Volatile Organic Compounds (VOC)	Use of Ultra Low Sulfur Diesel (ULSD) Oil a clean burning fuel and limited hours of operation	0.117 LB/H			
NY-0103	02/03/2016 &nbsp;ACT	Emergency fire pump	17.21	ultra low sulfur diesel	460 hp		Volatile Organic Compounds (VOC)	Compliance demonstrated with vendor emission certification and adherence to vendor-specified maintenance recommendations.	0.1 G/BHP-H		-	
NY-0103	02/03/2016 &nbsp;ACT	Emergency fire pump	17.21	ultra low sulfur diesel	460 hp		Nitrogen Oxides (NOx)	Compliance demonstrated with vendor emission certification and adherence to vendor-specified maintenance recommendations.	2.6 G/BHP-H		-	3.6
NY-0104	08/01/2013 &nbsp;ACT	Emergency generator	17.11	ultra low sulfur diesel	0		Volatile Organic Compounds (VOC)	Good combustion practice.	0.0331 LB/MMBTU			
NY-0104	08/01/2013 &nbsp;ACT	Fire pump	17.21	ultra low sulfur diesel	0		Volatile Organic Compounds (VOC)	Good combustion practice.	0.3612 LB/MMBTU			
OH-0352	06/18/2013 &nbsp;ACT	Emergency fire pump engine	17.21	diesel	300 HP		Nitrogen Oxides (NOx)	Purchased certified to the standards in NSPS Subpart IIII	1.7 LB/H		-	
OH-0352	06/18/2013 &nbsp;ACT	Emergency fire pump engine	17.21	diesel	300 HP		Volatile Organic Compounds (VOC)	Purchased certified to the standards in NSPS Subpart IIII	0.25 LB/H		-	4.0



### BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)

BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)											Std Units Limit g/kW-hr	NO <sub>x</sub> + VOC g/kW-hr
RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT		
OH-0352	06/18/2013 &nbsp;   ACT	Emergency generator	17.11	diesel	2250 KW		Nitrogen Oxides (NOx)	Purchased certified to the standards in NSPS Subpart IIII	27.8 LB/H		-	
OH-0352	06/18/2013 &nbsp;   ACT	Emergency generator	17.11	diesel	2250 KW		Volatile Organic Compounds (VOC)	Purchased certified to the standards in NSPS Subpart IIII	3.93 LB/H		-	6.4
OH-0360	11/05/2013 &nbsp;   ACT	Emergency generator (P003)	17.11	diesel	1112 KW		Nitrogen Oxides (NOx)	Purchased certified to the standards in NSPS Subpart IIII	13.74 LB/H		-	
OH-0360	11/05/2013 &nbsp;   ACT	Emergency generator (P003)	17.11	diesel	1112 KW		Volatile Organic Compounds (VOC)	Purchased certified to the standards in NSPS Subpart IIII	1.93 LB/H		-	6.4
OH-0360	11/05/2013 &nbsp;   ACT	Emergency fire pump engine (P004)	17.21	diesel	400 HP		Nitrogen Oxides (NOx)	Purchased certified to the standards in NSPS Subpart IIII	2.3 LB/H		-	
OH-0360	11/05/2013 &nbsp;   ACT	Emergency fire pump engine (P004)	17.21	diesel	400 HP		Volatile Organic Compounds (VOC)	Purchased certified to the standards in NSPS Subpart IIII	0.325 LB/H		-	4.0
OH-0363	11/05/2014 &nbsp;   ACT	Emergency generator (P002)	17.11	Diesel fuel	1100 KW		Nitrogen Oxides (NOx)	Emergency operation only, < 500 hours/year each for maintenance checks and readiness testing designed to meet NSPS Subpart IIII	29.01 LB/H		-	
OH-0363	11/05/2014 &nbsp;   ACT	Emergency Fire Pump Engine (P003)	17.21	Diesel fuel	260 HP		Nitrogen Oxides (NOx)	Emergency operation only, < 500 hours/year each for maintenance checks and readiness testing designed to meet NSPS Subpart IIII	1.72 LB/H		-	
OH-0366	08/25/2015 &nbsp;   ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	140 HP		Nitrogen Oxides (NOx)	State-of-the-art combustion design	0.81 LB/H		-	
OH-0366	08/25/2015 &nbsp;   ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	140 HP		Volatile Organic Compounds (VOC)	State-of-the-art combustion design	0.11 LB/H		-	4.0
OH-0366	08/25/2015 &nbsp;   ACT	Emergency generator (P003)	17.11	Diesel fuel	2346 HP		Nitrogen Oxides (NOx)	State-of-the-art combustion design	21.6 LB/H		-	
OH-0366	08/25/2015 &nbsp;   ACT	Emergency generator (P003)	17.11	Diesel fuel	2346 HP		Volatile Organic Compounds (VOC)		3.1 LB/H		-	6.4
OH-0367	09/23/2016 &nbsp;   ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	311 HP		Nitrogen Oxides (NOx)	State-of-the-art combustion design	1.79 LB/H		-	
OH-0367	09/23/2016 &nbsp;   ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	311 HP		Volatile Organic Compounds (VOC)	State-of-the-art combustion design	0.25 LB/H		-	4.0
OH-0367	09/23/2016 &nbsp;   ACT	Emergency generator (P003)	17.11	Diesel fuel	2947 HP		Nitrogen Oxides (NOx)	State-of-the-art combustion design	27.18 LB/H		-	
OH-0367	09/23/2016 &nbsp;   ACT	Emergency generator (P003)	17.11	Diesel fuel	2947 HP		Volatile Organic Compounds (VOC)	State-of-the-art combustion design	3.84 LB/H		-	6.4
OH-0368	04/19/2017 &nbsp;   ACT	Emergency Fire Pump Diesel Engine (P008)	17.21	Diesel fuel	460 HP		Nitrogen Oxides (NOx)	good combustion control and operating practices and engines designed to meet the stands of 40 CFR Part 60, Subpart IIII	0.3 LB/H		-	
OH-0368	04/19/2017 &nbsp;   ACT	Emergency Fire Pump Diesel Engine (P008)	17.21	Diesel fuel	460 HP		Volatile Organic Compounds (VOC)	good combustion control and operating practices and engines designed to meet the stands of 40 CFR Part 60, Subpart IIII	0.14 LB/H		-	0.6
OH-0368	04/19/2017 &nbsp;   ACT	Emergency Generator (P009)	17.11	Diesel fuel	5000 HP		Nitrogen Oxides (NOx)	good combustion control and operating practices and engines designed to meet the stands of 40 CFR Part 60, Subpart IIII	5.5 LB/H		-	
OH-0368	04/19/2017 &nbsp;   ACT	Emergency Generator (P009)	17.11	Diesel fuel	5000 HP		Volatile Organic Compounds (VOC)	good combustion control and operating practices and engines designed to meet the stands of 40 CFR Part 60, Subpart IIII	1.6 LB/H		-	0.9
OH-0370	09/07/2017 &nbsp;   ACT	Emergency generator (P003)	17.11	Diesel fuel	1529 HP		Nitrogen Oxides (NOx)	State-of-the-art combustion design	16.07 LB/H		-	

### BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)

BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)											Std Units Limit	NO <sub>x</sub> + VOC
RBLCHD	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	g/kW-hr	g/kW-hr
OH-0370	09/07/2017 &nbsp;  ACT	Emergency generator (P003)	17.11	Diesel fuel	1529 HP		Volatile Organic Compounds (VOC)	State-of-the-art combustion design	2 LB/H		-	7.2
OH-0370	09/07/2017 &nbsp;  ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Nitrogen Oxides (NOx)	State-of-the-art combustion design	1.97 LB/H		-	
OH-0370	09/07/2017 &nbsp;  ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Volatile Organic Compounds (VOC)	State-of-the-art combustion design	0.24 LB/H		-	4.5
OH-0372	09/27/2017 &nbsp;  ACT	Emergency generator (P003)	17.11	Diesel fuel	1529 HP		Nitrogen Oxides (NOx)	State-of-the-art combustion design	16.1 LB/H		-	
OH-0372	09/27/2017 &nbsp;  ACT	Emergency generator (P003)	17.11	Diesel fuel	1529 HP		Volatile Organic Compounds (VOC)	State-of-the-art combustion design	2 LB/H		-	7.2
OH-0372	09/27/2017 &nbsp;  ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Nitrogen Oxides (NOx)	State-of-the-art combustion design	1.97 LB/H		-	
OH-0372	09/27/2017 &nbsp;  ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Volatile Organic Compounds (VOC)	State-of-the-art combustion design	0.24 LB/H		-	4.5
OH-0374	10/23/2017 &nbsp;  ACT	Emergency Generators (2 identical, P004 and P005)	17.11	Diesel fuel	2206 HP		Nitrogen Oxides (NOx)	Certified to the meet the emissions standards in 40 CFR 89.112 and 89.113 pursuant to 40 CFR 60.4205(b) and 60.4202(a)(2). Good combustion practices per the manufacturerâ€™s operating manual.	23.21 LB/H		-	
OH-0374	10/23/2017 &nbsp;  ACT	Emergency Generators (2 identical, P004 and P005)	17.11	Diesel fuel	2206 HP		Volatile Organic Compounds (VOC)	Certified to the meet the emissions standards in 40 CFR 89.112 and 89.113 pursuant to 40 CFR 60.4205(b) and 60.4202(a)(2). Good combustion practices per the manufacturerâ€™s operating manual.	23.21 LB/H		-	12.8
OH-0374	10/23/2017 &nbsp;  ACT	Emergency Fire Pump (P006)	17.21	Diesel fuel	410 HP		Nitrogen Oxides (NOx)	Certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII. Good combustion practices per the manufacturerâ€™s operating manual	2.7 LB/H		-	
OH-0374	10/23/2017 &nbsp;  ACT	Emergency Fire Pump (P006)	17.21	Diesel fuel	410 HP		Volatile Organic Compounds (VOC)	Certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII. Good combustion practices per the manufacturerâ€™s operating manual.	2.7 LB/H		-	8.0
OH-0375	11/07/2017 &nbsp;  ACT	Emergency Diesel Generator Engine (P001)	17.11	Diesel fuel	2206 HP		Nitrogen Oxides (NOx)	Good combustion design	24.71 LB/H		-	
OH-0375	11/07/2017 &nbsp;  ACT	Emergency Diesel Generator Engine (P001)	17.11	Diesel fuel	2206 HP		Volatile Organic Compounds (VOC)	Good combustion design	24.71 LB/H		-	12.9
OH-0375	11/07/2017 &nbsp;  ACT	Emergency Diesel Fire Pump Engine (P002)	17.11	Diesel fuel	700 HP		Nitrogen Oxides (NOx)	Good combustion design	4.97 LB/H		-	
OH-0375	11/07/2017 &nbsp;  ACT	Emergency Diesel Fire Pump Engine (P002)	17.11	Diesel fuel	700 HP		Volatile Organic Compounds (VOC)	Good combustion design	4.97 LB/H		-	8.0
OH-0376	02/09/2018 &nbsp;  ACT	Emergency diesel-fueled fire pump (P006)	17.21	Diesel fuel	250 HP		Nitrogen Oxides (NOx)	Comply with NSPS 40 CFR 60 Subpart IIII	1.6 LB/H		-	
OH-0376	02/09/2018 &nbsp;  ACT	Emergency diesel-fired generator (P007)	17.11	Diesel fuel	2682 HP		Nitrogen Oxides (NOx)	Comply with NSPS 40 CFR 60 Subpart IIII	28.2 LB/H		-	
OH-0377	04/19/2018 &nbsp;  ACT	Emergency Diesel Generator (P003)	17.11	Diesel fuel	1860 HP		Nitrogen Oxides (NOx)	Good combustion practices (ULSD) and compliance with 40 CFR Part 60, Subpart IIII	19.68 LB/H		-	
OH-0377	04/19/2018 &nbsp;  ACT	Emergency Diesel Generator (P003)	17.11	Diesel fuel	1860 HP		Volatile Organic Compounds (VOC)	Good combustion practices (ULSD) and compliance with 40 CFR Part 60, Subpart IIII	19.68 LB/H		-	12.9

**BACT Determinations for Emergency Diesel Engines - NOx + VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr	NO <sub>x</sub> + VOC g/kW-hr
OH-0377	04/19/2018 &nbsp;   ACT	Emergency Fire Pump (P004)	17.21	Diesel fuel	320 HP		Nitrogen Oxides (NOx)	Good combustion practices (ULSD) and compliance with 40 CFR Part 60, Subpart IIII	2.12 LB/H		-	
OH-0377	04/19/2018 &nbsp;   ACT	Emergency Fire Pump (P004)	17.21	Diesel fuel	320 HP		Volatile Organic Compounds (VOC)	Good combustion practices (ULSD) and compliance with 40 CFR Part 60, Subpart IIII	2.12 LB/H		-	8.0
OH-0378	12/21/2018 &nbsp;   ACT	Emergency Diesel-fired Generator Engine (P007)	17.11	Diesel fuel	3353 HP		Nitrogen Oxides (NOx)	certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII, shall employ good combustion practices per the manufacturer's operating manual	37.41 LB/H		-	
OH-0378	12/21/2018 &nbsp;   ACT	Emergency Diesel-fired Generator Engine (P007)	17.11	Diesel fuel	3353 HP		Volatile Organic Compounds (VOC)	certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII, shall employ good combustion practices per the manufacturer's operating manual	37.41 LB/H		-	12.9
OH-0378	12/21/2018 &nbsp;   ACT	1,000 kW Emergency Generators (P008 - P010)	17.11	Diesel fuel	1341 HP		Nitrogen Oxides (NOx)	certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII, shall employ good combustion practices per the manufacturer's operating manual	14.96 LB/H		-	
OH-0378	12/21/2018 &nbsp;   ACT	1,000 kW Emergency Generators (P008 - P010)	17.11	Diesel fuel	1341 HP		Volatile Organic Compounds (VOC)	certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII, shall employ good combustion practices per the manufacturer's operating manual	14.96 LB/H		-	12.9
OH-0379	02/06/2019 &nbsp;   ACT	Emergency Generators (P005 and P006)	17.11	Diesel fuel	3131 HP		Nitrogen Oxides (NOx)	Tier IV engine Tier IV NSPS standards certified by engine manufacturer.	3.45 LB/H		-	
OK-0145	06/25/2012 &nbsp;   ACT	Emerg Diesel Gen, Fire Pump, Rail Steam Gen, Air Makeup Units	17.11	Diesel	0		Nitrogen Oxides (NOx)		0			
OK-0154	07/02/2013 &nbsp;   ACT	DIESEL-FIRED EMERGENCY GENERATOR ENGINE	17.11	DIESEL	1341 HP		Nitrogen Oxides (NOx)	COMBUSTION CONTROL	0.011 LB/HP-HR		-	
OK-0154	07/02/2013 &nbsp;   ACT	DIESEL-FIRED EMERGENCY GENERATOR ENGINE	17.11	DIESEL	1341 HP		Volatile Organic Compounds (VOC)	COMBUSTION CONTROL	0.0007 LB/HP-HR		-	7.1
OK-0156	07/31/2013 &nbsp;   ACT	Fire Pump Engine	17.11	Diesel	550 hp		Volatile Organic Compounds (VOC)	Good Combustion	0.35 LB/MMBTU			
OK-0164	01/08/2015 &nbsp;   ACT	Diesel-Fueled Fire Pump Engines	17.21	Ultra-Low Sulfur Distillate Fuel	300 HP		Volatile Organic Compounds (VOC)	1. Good Combustion Practices.	0.15 GRAMS PER HP-HR		-	
OK-0175	06/29/2017 &nbsp;   ACT	Emergency Use Engines &gt; 500 HP	17.11	Diesel	0		Volatile Organic Compounds (VOC)	Good combustion practices. Certified to meet EPA Tier 3 engine standards. Shall be limited to operate at no more than 500 hr/yr.	3 GM/HP-HR		-	
OK-0175	06/29/2017 &nbsp;   ACT	Emergency Use Engine less than or equal to 500 HP	17.21	Diesel	0		Volatile Organic Compounds (VOC)	Good combustion practices, certified to meet EPA Tier 3 engine standards. Gen-1, FP-1, and FP-2 shall be limited to operate no more than 500 hr/yr.	3 GM/HP-HR		-	
OK-0176	07/19/2017 &nbsp;   ACT	Emergency Generator	17.21	Diesel	400 HP		Volatile Organic Compounds (VOC)	Equipped with non-resettable hour meter. Fired with ultra-low sulfur diesel fuel (0.015 % or less by wt. sulfur.	217.24 TONS/YEAR/FACILITY			
OK-0181	09/11/2019 &nbsp;   ACT	EMERGENCY USE ENGINES &gt; 500 HP	17.11	DIESEL	0		Volatile Organic Compounds (VOC)	Good combustion practices. Certified to meet EPA Tier 3 engine standards. Each engine shall be limited to operate not more than 500 hours per year.	3 GM/HP-HR		-	

### BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)

BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)											Std Units Limit	NO <sub>x</sub> + VOC
RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	g/kW-hr	g/kW-hr
OK-0181	09/11/2019 &nbsp;  ACT	EMERGENCY USE ENGINES &lt; 500 HP	17.21	DIESEL	0		Volatile Organic Compounds (VOC)	Good Combustion Practices. Certified to meet EPA Tier 3 engine standards. Gen-1 and FP-1 shall be limited to operate not more than 500 hours per year. SP-1 shall be limited to operate not more than 876 hours per year.	3 GM/HP-HR		-	
PA-0275	10/24/2011 &nbsp;  ACT	Fire Water Pump	17.29	Diesel	0		Volatile Organic Compounds (VOC)		0.625 LB/H			
PA-0275	10/24/2011 &nbsp;  ACT	Fire Water Pump	17.29	Diesel	0		Nitrogen Oxides (NOx)		0.83 LB/H			
PA-0278	10/10/2012 &nbsp;  ACT	Emergency Generator	17.11	Diesel	0		Volatile Organic Compounds (VOC)		0.01 G/B-HP-H		-	
PA-0278	10/10/2012 &nbsp;  ACT	Emergency Generator	17.11	Diesel	0		Nitrogen Oxides (NOx)		4.93 G/B-HP-H		-	6.6
PA-0278	10/10/2012 &nbsp;  ACT	Fire Pump	17.21	Diesel	0		Nitrogen Oxides (NOx)		2.6 G/B-HP-H		-	
PA-0278	10/10/2012 &nbsp;  ACT	Fire Pump	17.21	Diesel	0		Volatile Organic Compounds (VOC)		0.1 G/B-HP-H		-	3.6
*PA-0282	06/01/2012 &nbsp;  ACT	650-KW BACKUP DIESEL GENERATOR	17.11	Diesel / #2 Oil	45.8 GAL/H		Nitrogen Oxides (NOx)		6.9 G/HP-H		-	
*PA-0282	06/01/2012 &nbsp;  ACT	400-KW DIESEL EMERGENCY GENERATOR	17.21	#2 Oil	29.2 GAL/H		Nitrogen Oxides (NOx)		6.9 G/B-HP-H		-	
PA-0286	01/31/2013 &nbsp;  ACT	Fire Pump Engine - 460 BHP	17.21	Diesel	0		Nitrogen Oxides (NOx)		2.6 G/HP-H		-	
PA-0286	01/31/2013 &nbsp;  ACT	Fire Pump Engine - 460 BHP	17.21	Diesel	0		Volatile Organic Compounds (VOC)		0.1 G/HP-H		-	3.6
PA-0286	01/31/2013 &nbsp;  ACT	EMERGENCY GENERATOR-ENGINE	17.13	Diesel	0		Nitrogen Oxides (NOx)		4.93 GM/B-HP-H		-	
PA-0286	01/31/2013 &nbsp;  ACT	EMERGENCY GENERATOR-ENGINE	17.13	Diesel	0		Volatile Organic Compounds (VOC)		0.01 GM/B-HP-H		-	6.6
PA-0291	04/23/2013 &nbsp;  ACT	EMERGENCY FIREWATER PUMP	17.21	ULTRA LOW SULFUR DISTILLATE	3.25 MMBTU/H		Nitrogen Oxides (NOx)		1.86 LB/H			
PA-0291	04/23/2013 &nbsp;  ACT	EMERGENCY FIREWATER PUMP	17.21	ULTRA LOW SULFUR DISTILLATE	3.25 MMBTU/H		Volatile Organic Compounds (VOC)		1.11 LB/H			
PA-0291	04/23/2013 &nbsp;  ACT	EMERGENCY GENERATOR	17.11	Ultra Low sulfur Distillate	7.8 MMBTU/H		Nitrogen Oxides (NOx)		9.89 LB/H			
PA-0291	04/23/2013 &nbsp;  ACT	EMERGENCY GENERATOR	17.11	Ultra Low sulfur Distillate	7.8 MMBTU/H		Volatile Organic Compounds (VOC)		0.7 LB/H			
PA-0296	12/17/2013 &nbsp;  ACT	Emergency Firewater Pump	17.21	Diesel	16 Gal/hr		Nitrogen Oxides (NOx)		0.09 T/YR			
PA-0296	12/17/2013 &nbsp;  ACT	Emergency Firewater Pump	17.21	Diesel	16 Gal/hr		Volatile Organic Compounds (VOC)		0.013 T/YR			
PA-0309	12/23/2015 &nbsp;  ACT	Fire pump engine	17.21	Ultra-low sulfur diesel	15 gal/hr		Nitrogen Oxides (NOx)		3 GM/HP-HR		-	

**BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr	NO <sub>x</sub> + VOC g/kW-hr
PA-0309	12/23/2015 &nbsp;    ACT	Fire pump engine	17.21	Ultra-low sulfur diesel	15 gal/hr		Volatile Organic Compounds (VOC)		0.12 GM/HP-HR		-	4.2
PA-0309	12/23/2015 &nbsp;    ACT	2000 kW Emergency Generator	17.11	Ultra-low sulfur Diesel	0		Nitrogen Oxides (NOx)		5.45 GM/HP-HR		-	
PA-0309	12/23/2015 &nbsp;    ACT	2000 kW Emergency Generator	17.11	Ultra-low sulfur Diesel	0		Volatile Organic Compounds (VOC)		0.22 GM/HP-HR		-	7.6
PA-0310	09/02/2016 &nbsp;    ACT	Emergency Generator Engines	17.11	ULSD	0		Nitrogen Oxides (NOx)		4.8 G/BHP-HR		-	
PA-0310	09/02/2016 &nbsp;    ACT	Emergency Fire Pump Engine	17.21	ULSD	0		Nitrogen Oxides (NOx)		3 G/BHP-HR		-	
PA-0311	09/01/2015 &nbsp;    ACT	Fire Pump Engine	17.11	diesel	0		Nitrogen Oxides (NOx)		3 G/HP-HR		-	
PA-0311	09/01/2015 &nbsp;    ACT	Fire Pump Engine	17.11	diesel	0		Volatile Organic Compounds (VOC)		0.2 G/HP-HR		-	4.3
*PA-0313	07/27/2017 &nbsp;    ACT	Emergency Generator	17.11	Diesel	2500 bhp		Volatile Organic Compounds (VOC)		3.5 G		-	
*PA-0326	02/18/2021 &nbsp;    ACT	Emergency Generator Parking Garage	17.21	Diesel	0		Nitrogen Oxides (NOx)	Use of certified engines, design of engines to include turbocharger and an intercooler/aftercooler, good combustion practices and proper operation and maintenance including certification to applicable federal emission standards	2.37 GRAM		-	
*PA-0326	02/18/2021 &nbsp;    ACT	Emergency Generator Parking Garage	17.21	Diesel	0		Volatile Organic Compounds (VOC)	The use of certified engines, design of engines to include turbocharger and an intercooler/aftercooler, good combustion practices and proper operation and maintenance including certification to applicable federal emission standards	2.37 GRAM		-	6.4
*PA-0326	02/18/2021 &nbsp;    ACT	Emergency GeneratorTelecom Hut & Tower	17.21	diesel	0		Nitrogen Oxides (NOx)	The use of certified engines, design of engines to include turbocharger and an intercooler/aftercooler, good combustion practices and proper operation and maintenance including certification to applicable federal emission standards	2.83 G		-	
*PA-0326	02/18/2021 &nbsp;    ACT	Emergency GeneratorTelecom Hut & Tower	17.21	diesel	0		Volatile Organic Compounds (VOC)	The use of certified engines, design of engines to include turbocharger and an intercooler/aftercooler, good combustion practices and proper operation and maintenance including certification to applicable federal emission standards	2.83 G		-	7.6
PR-0009	04/10/2014 &nbsp;    ACT	Emergency Diesel Fire Pump	17.21	ULSD Fuel Oil #2	0		Nitrogen Oxides (NOx)		2.85 G/B-HP-H		-	
PR-0009	04/10/2014 &nbsp;    ACT	Emergency Diesel Fire Pump	17.21	ULSD Fuel Oil #2	0		Volatile Organic Compounds (VOC)		0.15 G/B-HP-H		-	4.0
PR-0009	04/10/2014 &nbsp;    ACT	Emergency Diesel Generator	17.11	ULSD Fuel oil # 2	0		Nitrogen Oxides (NOx)		2.85 G/B-HP-H		-	
PR-0009	04/10/2014 &nbsp;    ACT	Emergency Diesel Generator	17.11	ULSD Fuel oil # 2	0		Volatile Organic Compounds (VOC)		0.15 G/B-HP-H		-	4.0
SC-0113	02/08/2012 &nbsp;    ACT	EMERGENCY ENGINE 1 THRU 8	17.21	DIESEL	29 HP		Nitrogen Oxides (NOx)	PURCHASE OF CERTIFIED ENGINE.	7.5 GR/KW-H		-	

### BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)

BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)											Std Units Limit	NO <sub>x</sub> + VOC
RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	g/kW-hr	g/kW-hr
SC-0113	02/08/2012 &nbsp;   ACT	EMERGENCY ENGINE 1 THRU 8	17.21	DIESEL	29 HP		Volatile Organic Compounds (VOC)	PURCHASE OF CERTIFIED ENGINES. HOURS OF OPERATION LIMITED TO 100 HOURS FOR MAINTENANCE AND TESTING.	7.5 GR/KW-H		-	15.0
SC-0113	02/08/2012 &nbsp;   ACT	FIRE PUMP	17.21	DIESEL	500 HP		Nitrogen Oxides (NOx)	PURCHASE OF CERTIFIED ENGINE BASED ON NSPS, SUBPART IIII.	4 GR/KW-H		-	
SC-0113	02/08/2012 &nbsp;   ACT	FIRE PUMP	17.21	DIESEL	500 HP		Volatile Organic Compounds (VOC)	CERTIFIED ENGINES THAT COMPLY WITH NSPS, SUBPART IIII. HOURS OF OPERATION LIMITED TO 100 HOURS PER YEAR FOR MAINTENANCE AND TESTING.	4 GR/KW-H		-	8.0
SC-0113	02/08/2012 &nbsp;   ACT	EMERGENCY GENERATORS 1 THRU 8	17.11	DIESEL	757 HP		Nitrogen Oxides (NOx)	ENGINES MUST BE CERTIFIED TO COMPLY WITH NSPS, SUBPART IIII.	4 GR/KW-H		-	
SC-0113	02/08/2012 &nbsp;   ACT	EMERGENCY GENERATORS 1 THRU 8	17.11	DIESEL	757 HP		Volatile Organic Compounds (VOC)	PURCHASE ENGINES CERTIFIED TO COMPLY WITH NSPS, SUBPART IIII.	4 GR/KW-H		-	8.0
SC-0159	07/09/2012 &nbsp;   ACT	EMERGENCY GENERATORS, GEN1, GEN2	17.11	DIESEL	1000 KW		Volatile Organic Compounds (VOC)	BACT HAS BEEN DETERMINED TO BE COMPLIANCE WITH NSPS, SUBPART IIII, 40 CFR60.4202 AND 40 CFR60.4205.	6.4 G/KW-H		-	
SC-0159	07/09/2012 &nbsp;   ACT	FIRE PUMPS, FIRE1, FIRE2, FIRE3	17.21	DIESEL	211 KW		Volatile Organic Compounds (VOC)	BACT HAS BEEN DETERMINED TO BE COMPLIANCE WITH NSPS, SUBPART IIII, 40 CFR60.4202 AND 40 CFR60.4205.	4 GKW-H		-	
SC-0193	04/15/2016 &nbsp;   ACT	Emergency Generators and Fire Pump	17.11	No. 2 Fuel Oil	1500 hp		Volatile Organic Compounds (VOC)	Must meet the standards of 40 CFR 60, Subpart IIII	100 HR/YR			
*SD-0005	06/29/2010 &nbsp;   ACT	Emergency Generator	17.11	Distillate Oil	2000 Kilowatts		Nitrogen Oxides (NOx)		0			
*SD-0005	06/29/2010 &nbsp;   ACT	Fire Water Pump	17.11	Distillate Oil	577 horsepower		Nitrogen Oxides (NOx)		0			
TX-0706	01/23/2014 &nbsp;   ACT	Emergency Engines	17.21	Ultra-low sulfur diesel	0		Nitrogen Oxides (NOx)		0.33 TPY			
TX-0706	01/23/2014 &nbsp;   ACT	Emergency Engines	17.21	Ultra-low sulfur diesel	0		Volatile Organic Compounds (VOC)		0.03 TPY			
TX-0728	04/01/2015 &nbsp;   ACT	Emergency Diesel Generator	17.11	Diesel	1500 hp		Nitrogen Oxides (NOx)	Minimized hours of operations Tier II engine	0.0218 G/HP HR		-	
TX-0728	04/01/2015 &nbsp;   ACT	Emergency Diesel Generator	17.11	Diesel	1500 hp		Volatile Organic Compounds (VOC)	Minimized hours of operations Tier II engine	0.7 LB/H		-	0.3
TX-0799	06/08/2016 &nbsp;   ACT	Fire pump engines	17.11	diesel	0		Volatile Organic Compounds (VOC)	Equipment specifications and good combustion practices. Operation limited to 100 hours per year.	0.0007 LB/HP-HR		-	
TX-0799	06/08/2016 &nbsp;   ACT	EMERGENCY ENGINES	17.21	diesel	0		Volatile Organic Compounds (VOC)	Equipment specifications and good combustion practices. Operation limited to 100 hours per year.	0.0025 LB/HP-HR		-	
TX-0846	09/23/2018 &nbsp;   ACT	FIRE PUMP DIESEL ENGINE	17.21	NO 2 DIESEL	214 kW		Nitrogen Oxides (NOx)	Meets EPA Tier 4 requirements	0.4 G/KW		-	
TX-0846	09/23/2018 &nbsp;   ACT	FIRE PUMP DIESEL ENGINE	17.21	NO 2 DIESEL	214 kW		Volatile Organic Compounds (VOC)	Meets EPA Tier 4 requirements	0.19 G/KW		-	0.6
TX-0864	09/09/2019 &nbsp;   ACT	EMERGENCY DIESEL ENGINE	17.21	Ultra-low sulfur diesel	0		Volatile Organic Compounds (VOC)	Tier 4 exhaust emission standards specified at 40 CFR Â§ 1039.101(b), 100 HR / YR	0			

### BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)

BACT Determinations for Emergency Diesel Engines - NOx + VOC (Oil-Fired)											Std Units Limit g/kW-hr	NO <sub>x</sub> + VOC g/kW-hr
RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT		
TX-0864	09/09/2019 &nbsp;   ACT	EMERGENCY DIESEL ENGINE	17.21	Ultra-low sulfur diesel	0		Nitrogen Oxides (NOx)	Tier 4 exhaust emission standards specified at 40 CFR Â§ 1039.101(b)	0			
TX-0872	10/31/2019 &nbsp;   ACT	Emergency Generators	17.11	ultra low sulfur diesel	0		Volatile Organic Compounds (VOC)	Limiting duration and frequency of generator use to 100 hr/yr. Good combustion practices will be used to reduce VOC including maintaining proper air-to-fuel ratio.	0.12 G/KW HR		-	
TX-0876	02/06/2020 &nbsp;   ACT	Emergency generator	17.11	DIESEL	0		Nitrogen Oxides (NOx)	Tier 4 exhaust emission standards specified in 40 CFR Â§ 1039.101, limited to 100 hours per year of non-emergency operation	0			
TX-0876	02/06/2020 &nbsp;   ACT	Emergency generator	17.11	DIESEL	0		Volatile Organic Compounds (VOC)	Tier 4 exhaust emission standards specified in 40 CFR Â§ 1039.101, limited to 100 hours per year of non-emergency operation	0			
TX-0879	02/19/2020 &nbsp;   ACT	Emergency Firewater Engine	17.11	Ultra-low sulfur diesel	0		Volatile Organic Compounds (VOC)	Meeting the requirements of 40 CFR Part 60, Subpart IIII. Firing ultra-low sulfur diesel fuel (no more than 15 ppm sulfur by weight). Limited to 100 hrs/yr of non-emergency operation. Have a non-resettable runtime meter.	0.1 G/HP HR		-	
TX-0879	02/19/2020 &nbsp;   ACT	Emergency Firewater Engine	17.11	Ultra-low sulfur diesel	0		Nitrogen Oxides (NOx)	Meeting the requirements of 40 CFR Part 60, Subpart IIII. Firing ultra-low sulfur diesel fuel (no more than 15 ppm sulfur by weight). Limited to 100 hrs/yr of non-emergency operation. Have a non-resettable runtime meter.	0			
TX-0882	01/17/2020 &nbsp;   ACT	EMERGENCY ENGINES	17.12	DIESEL	0		Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES, CLEAN FUEL, 100 HR/YR, ULTRA LOW SULFUR FUEL	0.0092 LB/MMBTU			
TX-0882	01/17/2020 &nbsp;   ACT	EMERGENCY ENGINES	17.12	DIESEL	0		Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES, CLEAN FUEL, 100 HR/YR, ULTRA LOW SULFUR FUEL	0.001 LB/MMBTU			
TX-0886	03/31/2020 &nbsp;   ACT	EMERGENCY DIESEL ENGINE	17.21	Ultra-low sulfur diesel	0		Nitrogen Oxides (NOx)	Limited operating hours, good combustion practices meets NSPS IIII Tier 3 engine	0			
TX-0886	03/31/2020 &nbsp;   ACT	EMERGENCY DIESEL ENGINE	17.21	Ultra-low sulfur diesel	0		Volatile Organic Compounds (VOC)	Limited operating hours, good combustion practices meets NSPS IIII Tier 3 engine	0			
TX-0888	04/23/2020 &nbsp;   ACT	EMERGENCY GENERATORS & FIRE WATER PUMP ENGINES	17.11	Ultra-low Sulfur Diesel	0		Nitrogen Oxides (NOx)	well-designed and properly maintained engines and each limited to 100 hours per year of non-emergency use.	0			
TX-0888	04/23/2020 &nbsp;   ACT	EMERGENCY GENERATORS & FIRE WATER PUMP ENGINES	17.11	Ultra-low Sulfur Diesel	0		Volatile Organic Compounds (VOC)	well-designed and properly maintained engines and each limited to 100 hours per year of non-emergency use.	0			
*TX-0904	09/09/2020 &nbsp;   ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	0		Nitrogen Oxides (NOx)	100 HOURS OPERATIONS, Tier 4 exhaust emission standards specified in 40 CFR Â§ 1039.101	0			
*TX-0904	09/09/2020 &nbsp;   ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	0		Volatile Organic Compounds (VOC)	100 HOURS OPERATIONS, Tier 4 exhaust emission standards specified in 40 CFR Â§ 1039.101	0			
TX-0905	09/16/2020 &nbsp;   ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	0		Nitrogen Oxides (NOx)	limited to 100 hours per year of non-emergency operation	0			
TX-0905	09/16/2020 &nbsp;   ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	0		Volatile Organic Compounds (VOC)	limited to 100 hours per year of non-emergency operation	0			
VA-0325	06/17/2016 &nbsp;   ACT	DIESEL-FIRED EMERGENCY GENERATOR 3000 kW (1)	17.11	DIESEL FUEL	0		Nitrogen Oxides (NOx)	Good Combustion Practices/Maintenance	6.4 G/KW		-	

### BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)

BACT Determinations for Emergency Diesel Engines - NOx + VOC (Oil-Fired)											Std Units Limit	NO <sub>x</sub> + VOC
RBLCHD	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	g/kW-hr	g/kW-hr
VA-0325	06/17/2016 &nbsp;   ACT	DIESEL-FIRED EMERGENCY GENERATOR 3000 kW (I)	17.11	DIESEL FUEL	0		Volatile Organic Compounds (VOC)	Good Combustion Practices/Maintenance	6.4 G/KW		-	12.8
VA-0327	07/12/2017 &nbsp;   ACT	Emergency Generator	17.11	Diesel	0		Volatile Organic Compounds (VOC)		0.49 LB/HR			
VA-0328	04/26/2018 &nbsp;   ACT	Emergency Diesel GEN	17.11	Ultra Low Sulfur Diesel	500 H/YR		Nitrogen Oxides (NOx)	good combustion practices and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	4.8 G/HP H		-	
VA-0328	04/26/2018 &nbsp;   ACT	Emergency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Volatile Organic Compounds (VOC)	good combustion practices and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	0			
VA-0328	04/26/2018 &nbsp;   ACT	Emergency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Nitrogen Oxides (NOx)	Good combustion practices and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	3 G/HP-HR		-	
VA-0332	06/24/2019 &nbsp;   ACT	Emergency Diesel Generator - 300 kW	17.11	Ultra Low Sulfur Diesel	500 H/YR		Nitrogen Oxides (NOx)	good combustion practices, high efficiency design, and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	4.8 G/HP-H		-	
VA-0332	06/24/2019 &nbsp;   ACT	Emegency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Volatile Organic Compounds (VOC)	good combustion practices, high efficiency design, and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	0.11 G/HP-HR		-	
VA-0332	06/24/2019 &nbsp;   ACT	Emegency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Nitrogen Oxides (NOx)	good combustion practices, high efficiency design, and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	3 G/HP-HR		-	4.2
*WI-0261	06/12/2014 &nbsp;   ACT	EG7 - Diesel Emergency Electric Generator w/ tank	17.21	Diesel fuel oil	197 BHP		Volatile Organic Compounds (VOC)	NSPS engine [Tier 3 emergency engine]. EG7 Storage tank, conventional fuel oil storage tank, good operating practices; limiting leakage, spills. (FT01). Engine limited to 200 hours / year (total) and NSPS requirements.	3.75 GRAM / HP-HR		-	
WI-0263	02/15/2016 &nbsp;   ACT	Fire pump (process P05)	17.21	Diesel	1.27 mmBtu/hr		Nitrogen Oxides (NOx)	Good combustion practices, use diesel fuel, and operate <500 hr/yr	0			
WI-0263	02/15/2016 &nbsp;   ACT	Fire pump (process P05)	17.21	Diesel	1.27 mmBtu/hr		Volatile Organic Compounds (VOC)	Good combustion practices, use diesel fuel, and operate <500 hr/yr	0			
*WI-0271	06/05/2015 &nbsp;   ACT	P10K 6" Diesel Powered Emergency Generator	17.21	Distillate Fuel	0		Nitrogen Oxides (NOx)	Expected NOx emission without controls are 0.59 tons/year and 5.9 pounds/hour. Given this low rate of NOx emissions, due to the 200 hour/year operational limitation, the Department believes, based on engineering judgment, that controls are not economically feasible for this unit. Thus, the RICE MACT remains the only control option.	5.9 LB/HR			
*WI-0279	10/02/2017 &nbsp;   ACT	EG8 6" Diesel Emergency Generator	17.21	Diesel Fuel	0		Volatile Organic Compounds (VOC)	Complying with NSPS Standards under 40 CFR Part 60 Subpart IIII	0			
*WI-0284	04/24/2018 &nbsp;   ACT	Diesel-Fired Emergency Generators	17.11	Diesel Fuel	0		Nitrogen Oxides (NOx)	The Use of Ultra-Low Sulfur Fuel and Good Combustion Practices	5.36 G/KWH		-	
*WI-0284	04/24/2018 &nbsp;   ACT	Diesel-Fired Emergency Generators	17.11	Diesel Fuel	0		Volatile Organic Compounds (VOC)	Good Combustion Practices	0.56 G/KWH		-	5.9
*WI-0286	04/24/2018 &nbsp;   ACT	P42 -Diesel Fired Emergency Generator	17.11	Diesel Fuel	0		Nitrogen Oxides (NOx)	Good Combustion Practices, The Use of an Engine Turbocharger and Aftercooler.	5.36 G/KWH		-	



**BACT Determinations for Emergency Diesel Engines - NOX + VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr	NO <sub>x</sub> + VOC g/kW-hr
*WI-0286	04/24/2018 &nbsp;    ACT	P42 -Diesel Fired Emergency Generator	17.11	Diesel Fuel	0		Volatile Organic Compounds (VOC)	Good Combustion Practices	0.56 G/KWH		-	5.9
*WI-0291	01/28/2019 &nbsp;    ACT	P04 Emergency Diesel Generator	17.21	Diesel Fuel	0.22 mmBTU/hr		Nitrogen Oxides (NOx)	Good Combustion Practices	4.7 G/KWH		-	
*WI-0292	04/01/2019 &nbsp;    ACT	P37 Diesel-Fired Emergency Fire Pump	17.21	Diesel Fuel	0		Volatile Organic Compounds (VOC)	Hours of Operation	200 HOURS			
WV-0025	11/21/2014 &nbsp;    ACT	Emergency Generator	17.11	Diesel	2015.7 HP		Nitrogen Oxides (NOx)		0		-	
WV-0025	11/21/2014 &nbsp;    ACT	Emergency Generator	17.11	Diesel	2015.7 HP		Volatile Organic Compounds (VOC)		1.24 LB/H		-	6.8
WV-0025	11/21/2014 &nbsp;    ACT	Fire Pump Engine	17.21	Diesel	251 HP		Nitrogen Oxides (NOx)		0		-	
WV-0025	11/21/2014 &nbsp;    ACT	Fire Pump Engine	17.21	Diesel	251 HP		Volatile Organic Compounds (VOC)		0.17 LB/H		-	4.4
WV-0027	09/15/2017 &nbsp;    ACT	Emergency Generator - ESDG14	17.11	ULSD	900 bhp		Nitrogen Oxides (NOx)	Engine Design	4.77 G/HP-HR		-	
WY-0070	08/28/2012 &nbsp;    ACT	Diesel Emergency Generator (EP15)	17.11	Ultra Low Sulfur Diesel	839 hp		Nitrogen Oxides (NOx)	EPA Tier 2 rated	0			
WY-0070	08/28/2012 &nbsp;    ACT	Diesel Fire Pump Engine (EP16)	17.21	Ultra Low Sulfur Diesel	327 hp		Nitrogen Oxides (NOx)	EPA Tier 3 rated	0			
WY-0071	10/15/2012 &nbsp;    ACT	Emergency Air Compressor	17.21	Ultra Low Sulfur Diesel	400 hp		Nitrogen Oxides (NOx)	EPA Tier 3 Rated Diesel Engine	0			

**BACT Determinations for Emergency Diesel Engines - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
AK-0082	01/23/2015 &nbsp;ACT	Emergency Camp Generators	17.11	Ultra Low Sulfur Diesel	2695 hp		Particulate matter, filterable &lt; 10 Åµ (FPM10)		0.15 GRAMS/HP-H		0.20
AK-0084	06/30/2017 &nbsp;ACT	Black Start and Emergency Internal Combustion Engines	17.11	Diesel	1500 kW	e	Particulate matter, total (TPM)	Clean Fuel and Good Combustion Practices	0.25 G/KW-HR		0.25
AK-0084	06/30/2017 &nbsp;ACT	Fire Pump Diesel Internal Combustion Engines	17.21	Diesel	252 hp		Particulate matter, total (TPM)	Clean Fuel and Good Combustion Practices	0.19 G/KW-HR		-
*AK-0085	08/13/2020 &nbsp;ACT	Three (3) Firewater Pump Engines and two (2) Emergency Diesel Generators	17.21	ULSD	19.4 gph		Particulate matter, total (TPM)	Good combustion practices, ULSD, and limit operation to 500 hours per year per engine	0.19 G/HP-HR		-
AL-0301	07/22/2014 &nbsp;ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	DIESEL	800 HP		Particulate matter, filterable (FPM)		0.0007 LB/HP-H		-
*AL-0318	12/18/2017 &nbsp;ACT	250 Hp Emergency CI, Diesel-fired RICE	17.11	Diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)		0		
AR-0140	09/18/2013 &nbsp;ACT	EMERGENCY GENERATORS	17.11	DIESEL	1500 KW		Particulate matter, total &lt; 10 Åµ (TPM10)	GOOD OPERATING PRACTICES, LIMITED HOURS OF OPERATION, COMPLIANCE WITH NSPS SUBPART IIII	0.04 G/KW-H		0.040
AR-0161	09/23/2019 &nbsp;ACT	Emergency Engines	17.11	Diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	0.02 G/KW-H		0.020
AR-0163	06/09/2019 &nbsp;ACT	Emergency Engines	17.11	Diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	0.2 G/KW-HR		0.20
AR-0168	03/17/2021 &nbsp;ACT	Emergency Engines	17.21	Diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	0.2 G/KW-HR		0.20
AR-0171	02/14/2019 &nbsp;ACT	SN-106 Cold Mill 1 Diesel Fired Emergency Generator	17.21	Diesel	1073 bhp		Particulate matter, total &lt; 10 Åµ (TPM10)	Good operating practices.	0.2 G/KW-HR		0.20
CA-1192	06/21/2011 &nbsp;ACT	EMERGENCY FIREWATER PUMP ENGINE	17.21	DIESEL	288 HP		Particulate matter, total (TPM)	USE ULTRA LOW SULFUR FUELNOT TO EXCEED 15 PPMVD FUEL SULFUR, OPERATIONAL LIMIT OF 50 HRS/YR	0		
CA-1212	10/18/2011 &nbsp;ACT	EMERGENCY IC ENGINE	17.11	DIESEL	2683 HP		Particulate matter, total (TPM)	USE ULTRA LOW SULFUR FUEL	0.2 G/KW-H		0.20
CA-1212	10/18/2011 &nbsp;ACT	EMERGENCY IC ENGINE	17.21	DIESEL	182 HP		Particulate matter, total (TPM)	USE ULTRA LOW SULFUR FUEL	0.2 G/KW-H		0.20
FL-0328	10/27/2011 &nbsp;ACT	Emergency Engine	17.11	Diesel	0		Particulate matter, total (TPM)	Use of good combustion practices, based on the current manufacturerâ€™s specifications for this engine	0.03 TONS PER YEAR		
FL-0328	10/27/2011 &nbsp;ACT	Emergency Fire Pump Engine	17.11	Diesel	0		Particulate matter, total (TPM)	Use of good combustion practices, based on the current manufacturerâ€™s specifications for this engine	0.002 TONS PER YEAR		
FL-0332	09/23/2011 &nbsp;ACT	600 HP Emergency Equipment	17.11	Ultra-Low Sulfur Oil	0		Particulate matter, total (TPM)	See Pollutant Notes.	0.15 G/HP-H		-
FL-0338	05/30/2012 &nbsp;ACT	Emergency Generator Diesel Engine - Development Driller 1	17.11	Diesel	2229 hp		Particulate matter, total (TPM)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	0.03 T/12MO ROLLING TOTAL		

**BACT Determinations for Emergency Diesel Engines - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
FL-0338	05/30/2012 &nbsp;ACT	Emergency Generator Diesel Engine - C.R. Luigs	17.11	diesel	2064 hp		Particulate matter, total (TPM)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	0.04 T/12MO ROLLING TOTAL		
FL-0346	04/22/2014 &nbsp;ACT	Four 3100 kW black start emergency generators	17.11	ULSD	2.32 MMBtu/hr (HHV) per engine		Particulate matter, total (TPM)	Good combustion practice	0.2 GRAMS PER KW-HR		0.20
FL-0346	04/22/2014 &nbsp;ACT	Emergency fire pump engine (300 HP)	17.21	USLD	29 MMBTU/H		Particulate matter, total (TPM)	Good combustion practice	0.2 GRAM PER HP-HR		0.27
FL-0347	09/16/2014 &nbsp;ACT	Emergency Diesel Engine	17.11	Diesel	3300 hp		Particulate matter, total (TPM)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0		
FL-0347	09/16/2014 &nbsp;ACT	Remotely Operated Vehicle Emergency Generator	17.21	Diesel	427 hp		Particulate matter, total (TPM)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0		
FL-0354	08/25/2015 &nbsp;ACT	Emergency fire pump engine, 300 HP	17.21	Diesel	29 MMBTU/H		Particulate matter, total (TPM)	Low-emitting fuel and certified engine	0.2 G / KWH		0.20
FL-0356	03/09/2016 &nbsp;ACT	Three 3300-kW ULSD emergency generators	17.11	ULSD	0		Particulate matter, total (TPM)	Use of clean fuel	0.2 G / KW-HR		0.2
FL-0356	03/09/2016 &nbsp;ACT	One 422-hp emergency fire pump engine	17.21	ULSD	0		Particulate matter, total (TPM)	Use of clean fuel	0.2 G / KW-HR		0.2
*FL-0363	12/04/2017 &nbsp;ACT	Two 3300 kW emergency generators	17.11	ULSD	0		Particulate matter, filterable (FPM)	Clean fuel	0.2 GRAMS PER KWH		0.20
*FL-0363	12/04/2017 &nbsp;ACT	Emergency Fire Pump Engine (422 hp)	17.21	ULSD	0		Particulate matter, filterable (FPM)	Certified engine	0.2 G / KWH		0.2
*FL-0367	07/27/2018 &nbsp;ACT	1,500 kW Emergency Diesel Generator	17.11	ULSD	14.82 MMBtu/hour		Particulate matter, filterable (FPM)	Operate and maintain the engine according to the manufacturer's written instructions	0.2 G/KW-HOUR		0.20
*FL-0367	07/27/2018 &nbsp;ACT	Emergency Fire Pump Engine (347 HP)	17.21	ULSD	8700 gal/year		Particulate matter, filterable (FPM)	Operate and maintain the engine according to the manufacturer's written instructions	0.2 G/KW-HOUR		0.20
IA-0105	10/26/2012 &nbsp;ACT	Emergency Generator	17.11	diesel fuel	142 GAL/H		Particulate matter, total (TPM)	good combustion practices	0.2 G/KW-H		0.20
IA-0105	10/26/2012 &nbsp;ACT	Fire Pump	17.21	diesel fuel	14 GAL/H		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	good combustion practices	0.2 G/KW-H		0.20
IA-0106	07/12/2013 &nbsp;ACT	Emergency Generators	17.11	diesel fuel	180 GAL/H		Particulate matter, total (TPM)	good combustion practices	0.2 G/KW-H		0.20
*IA-0117	03/17/2021 &nbsp;ACT	Emergency Fire Pump Engine	17.11	diesel	510 bhp		Particulate matter, total (TPM)		0.17 LB/HR		0.20
IL-0114	09/05/2014 &nbsp;ACT	Emergency Generator	17.11	distillate fuel oil	3755 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7.	0.1 G/KW-H		0.10

**BACT Determinations for Emergency Diesel Engines - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
IL-0129	07/30/2018 &nbsp;ACT	Emergency Engines	17.11	Ultra-low sulfur diesel	0		Particulate matter, total (TPM)		0		
IL-0130	12/31/2018 &nbsp;ACT	Emergency Engine	17.11	Ultra-Low Sulfur Diesel	1500 kW		Particulate matter, total (TPM)		0.2 G/KW-HR		0.20
IN-0158	12/03/2012 &nbsp;ACT	TWO (2) EMERGENCY DIESEL GENERATORS	17.11	DIESEL	1006 HP EACH		Particulate matter, filterable &lt; 10 Åµ (FPM10)	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	0.15 G/HP-H		0.20
IN-0158	12/03/2012 &nbsp;ACT	EMERGENCY DIESEL GENERATOR	17.11	DIESEL	2012 HP		Particulate matter, filterable &lt; 10 Åµ (FPM10)	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	0.15 G/HP-H		-
IN-0166	06/27/2012 &nbsp;ACT	TWO (2) EMERGENCY GENERATORS	17.11	DIESEL	1341 HORSEPOWER, EACH		Particulate matter, total &lt; 10 Åµ (TPM10)	USE OF LOW-S DIESEL AND LIMITED HOURS OF NON-EMERGENCY OPERATION	15 PPM SULFUR		
IN-0173	06/04/2014 &nbsp;ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	NO. 2, DIESEL	3600 BHP		Particulate matter, total &lt; 10 Åµ (TPM10)	GOOD COMBUSTION PRACTICES	0.15 G/BHP-H		0.20
IN-0179	09/25/2013 &nbsp;ACT	DIESEL-FIRED EMERGENCY GENERATOR	17.11	NO. 2 FUEL OIL	4690 B-HP		Particulate matter, total &lt; 10 Åµ (TPM10)	GOOD COMBUSTION PRACTICES	0.15 G/B-HP-H		0.20
IN-0179	09/25/2013 &nbsp;ACT	DIESEL-FIRED EMERGENCY WATER PUMP	17.21	NO. 2 FUEL OIL	481 BHP		Particulate matter, total &lt; 10 Åµ (TPM10)	GOOD COMBUSTION PRACTICES	0.15 G/B-HP-H		0.20
IN-0180	06/04/2014 &nbsp;ACT	DIESEL FIRED EMERGENCY GENERATOR	17.11	NO. 2, DIESEL	3600 BHP		Particulate matter, total &lt; 10 Åµ (TPM10)	GOOD COMBUSTION PRACTICES	0.15 G/B-HP-H		0.20
IN-0185	04/24/2014 &nbsp;ACT	DIESEL FIRE PUMP	17.11	DIESEL	300 HP		Particulate matter, filterable &lt; 10 Åµ (FPM10)		0.15 G/HP-H		0.20
IN-0234	12/08/2015 &nbsp;ACT	EMERGENCY FIRE PUMP ENGINE	17.21	DISTILLATE OIL	0		Particulate matter, filterable (FPM)	GOOD COMBUSTION PRACTICES	0.16 G/HP-H		0.21
IN-0263	03/23/2017 &nbsp;ACT	EMERGENCY GENERATORS (EU014A AND EU-014B)	17.11	DISTILLATE OIL	3600 HP EACH		Particulate matter, total (TPM)	GOOD COMBUSTION PRACTICES	0.15 G/HP-H EACH		0.20
IN-0295	02/23/2018 &nbsp;ACT	Emergency Diesel Generators	17.21	Deisel	150 hp		Particulate matter, filterable &lt; 10 Åµ (FPM10)		1.34 G/KW-HR		1.34
IN-0295	02/23/2018 &nbsp;ACT	Emergency Diesel Generators	17.21	Diesel	250 hp		Particulate matter, filterable &lt; 10 Åµ (FPM10)		1.34 G/KW-HR		1.34
IN-0317	06/11/2019 &nbsp;ACT	Emergency generator EU-6006	17.11	Diesel	2800 HP		Particulate matter, total (TPM)	Tier II diesel engine	0.2 G/KWH		0.20
IN-0317	06/11/2019 &nbsp;ACT	Emergency fire pump EU-6008	17.11	Diesel	750 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Engine that complies with Table 4 to Subpart III of Part 60	0.2 G/KWH		0.20
KS-0029	07/14/2015 &nbsp;ACT	Emergency diesel engine	17.21	diesel	750 KW		Particulate matter, total &lt; 10 Åµ (TPM10)	Low sulfur fuel oil (<15 ppm sulfur)	0.15 G PER BHP-HR		0.201
*KS-0030	03/31/2016 &nbsp;ACT	Compression ignition RICE emergency fire pump	17.21	Ultra-lowsulfur diesel (ULSD)	197 HP		Particulate matter, total &lt; 10 Åµ (TPM10)		0.15 G/HP-HR		-

**BACT Determinations for Emergency Diesel Engines - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
*KS-0036	03/18/2013 &nbsp;ACT	Cummins 6BTA 5.9F-1 Diesel Engine Fire Pump	17.21	No. 2 Fuel Oil	182 BHP		Particulate matter, total &lt; 10 Åµ (TPM10)	utilize efficient combustion/design technology	0.25 G/BHP-H		-
KY-0109	10/24/2016 &nbsp;ACT	Emergency Generators #1, #2, & #3 (EU72, EU73, & EU74)	17.11	Diesel	53.6 gal/hr		Particulate matter, total &lt; 10 Åµ (TPM10)	The permittee shall prepare and maintain for EU72, EU73, and EU74, within 90 days of startup, a good combustion and operation practices plan (GCOP) that defines, measures and verifies the use of operational and design practices determined as BACT for minimizing CO, VOC, PM, PM10, and PM2.5 emissions. Any revisions requested by the Division shall be made and the plan shall be maintained on site. The permittee shall operate according to the provisions of this plan at all times, including periods of startup, shutdown, and malfunction. The plan shall be incorporated into the plant standard operating procedures (SOP) and shall be made available for the Division's inspection. The plan shall include, but not be limited to: i. A list of combustion optimization practices and a means of verifying the practices have occurred. ii. A list of combustion and operation practices to be used to lower energy consumption and a means of verifying the practices have occurred. iii. A list of the design choices determined to be BACT and verification that designs were implemented in the final construction.	0.149 G/HP-HR (EU72 & EU73)		-
KY-0110	07/23/2020 &nbsp;ACT	EP 10-02 - North Water System Emergency Generator	17.11	Diesel	2922 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		-
KY-0110	07/23/2020 &nbsp;ACT	EP 10-03 - South Water System Emergency Generator	17.11	Diesel	2922 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		-
KY-0110	07/23/2020 &nbsp;ACT	EP 10-04 - Emergency Fire Water Pump	17.11	Diesel	920 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		-
KY-0110	07/23/2020 &nbsp;ACT	EP 11-01 - Melt Shop Emergency Generator	17.21	Diesel	260 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		-
KY-0110	07/23/2020 &nbsp;ACT	EP 11-02 - Reheat Furnace Emergency Generator	17.21	Diesel	190 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		-
KY-0110	07/23/2020 &nbsp;ACT	EP 10-07 - Air Separation Plant Emergency Generator	17.11	Diesel	700 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		-
KY-0110	07/23/2020 &nbsp;ACT	EP 10-01 - Caster Emergency Generator	17.11	Diesel	2922 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		-
KY-0110	07/23/2020 &nbsp;ACT	EP 11-03 - Rolling Mill Emergency Generator	17.21	Diesel	440 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		-
KY-0110	07/23/2020 &nbsp;ACT	EP 11-04 - IT Emergency Generator	17.21	Diesel	190 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		-

**BACT Determinations for Emergency Diesel Engines - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
KY-0110	07/23/2020 &nbsp;ACT	EP 11-05 - Radio Tower Emergency Generator	17.21	Diesel	61 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.3 G/HP-HR		-
KY-0115	04/19/2021 &nbsp;ACT	New Pumphouse (XB13) Emergency Generator #1 (EP 08- 05)	17.11	Diesel	2922 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0.15 G/HP-HR		-
KY-0115	04/19/2021 &nbsp;ACT	Tunnel Furnace Emergency Generator (EP 08-06)	17.11	Diesel	2937 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0.15 G/HP-HR		-
KY-0115	04/19/2021 &nbsp;ACT	Caster B Emergency Generator (EP 08-07)	17.11	Diesel	2937 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0.15 G/HP-HR		-
KY-0115	04/19/2021 &nbsp;ACT	Air Separation Unit Emergency Generator (EP 08-08)	17.11	Diesel	700 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0.15 G/HP-HR		-
KY-0115	04/19/2021 &nbsp;ACT	Cold Mill Complex Emergency Generator (EP 09-05)	17.21	Diesel	350 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0.15 G/HP-HR		-
LA-0251	04/26/2011 &nbsp;ACT	Fire Pump Engines - 2 units	17.21	diesel	444 hp		Particulate matter, filterable &lt; 10 Åµ (FPM10)		0.01 LB/H		0.20
LA-0254	08/16/2011 &nbsp;ACT	EMERGENCY DIESEL GENERATOR	17.11	DIESEL	1250 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	ULTRA LOW SULFUR DIESEL AND GOOD COMBUSTION PRACTICES	0.15 G/HP-H		0.20
LA-0254	08/16/2011 &nbsp;ACT	EMERGENCY FIRE PUMP	17.21	DIESEL	350 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	ULTRA LOW SULFUR DIESEL AND GOOD COMBUSTION PRACTICES	0.15 G/HP-H		0.20
LA-0292	01/22/2016 &nbsp;ACT	Emergency Generators No. 1 & No. 2	17.11	Diesel	1341 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Use of a certified engine, low sulfur diesel, and limiting non-emergency use to no more than 100 hours per year	0.44 LB/HR		0.20
LA-0296	05/23/2014 &nbsp;ACT	Emergency Diesel Generators (EQTs 622, 671, 773, 850, 994, 995, 996, 1033, 1077, 1105, & 1202)	17.11	Diesel	2682 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Compliance with 40 CFR 60 Subpart IIII; operating the engine in accordance with the engine manufacturer's instructions and/or written procedures (consistent with safe operation) designed to maximize combustion efficiency and minimize fuel usage.	0.88 LB/HR		0.20
LA-0305	06/30/2016 &nbsp;ACT	Diesel Engines (Emergency)	17.11	Diesel	4023 hp		Particulate matter, total &lt; 10 Åµ (TPM10)	Complying with 40 CFR 60 Subpart IIII	0		
LA-0308	09/26/2013 &nbsp;ACT	2000 KW Diesel Fired Emergency Generator Engine	17.11	Diesel	20.4 MMBTU/hr		Particulate matter, filterable &lt; 10 Åµ (FPM10)	Good combustion and maintenance practices, and compliance with NSPS 40 CFR 60 Subpart IIII	1.06 LB/H		
LA-0309	06/04/2015 &nbsp;ACT	Emergency Generator Engines	17.11	Diesel	2922 hp (each)		Particulate matter, total &lt; 10 Åµ (TPM10)	Complying with 40 CFR 60 Subpart IIII	0.2 G/KW-HR		0.20
*LA-0312	06/30/2017 &nbsp;ACT	DFP1-13 - Diesel Fire Pump Engine (EQT0013)	17.11	Diesel	650 horsepower		Particulate matter, total &lt; 10 Åµ (TPM10)	Compliance with NSPS Subpart IIII	0.15 LB/HR		0.14
*LA-0312	06/30/2017 &nbsp;ACT	DEG1-13 - Diesel Fired Emergency Generator Engine (EQT0012)	17.11	Diesel	1474 horsepower		Particulate matter, total &lt; 10 Åµ (TPM10)	Compliance with NSPS Subpart IIII	0.08 LB/HR		0.03
LA-0313	08/31/2016 &nbsp;ACT	SCPS Emergency Diesel Generator 1	17.11	Diesel	2584 HP		Particulate matter, filterable &lt; 10 Åµ (FPM10)	Compliance with NESHAP 40 CFR 63 Subpart ZZZZ and NSPS 40 CFR 60 Subpart IIII, and good combustion practices (use of ultra-low sulfur diesel fuel).	0.86 LB/H		0.20

**BACT Determinations for Emergency Diesel Engines - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
LA-0313	08/31/2016 &nbsp;ACT	SCPS Emergency Diesel Firewater Pump 1	17.21	Diesel	282 HP		Particulate matter, filterable &lt; 10 Åµ (FPM10)	Compliance with NESHAP 40 CFR 63 Subpart ZZZZ and NSPS 40 CFR 60 Subpart IIII, and good combustion practices (use of ultra-low sulfur diesel fuel).	0.09 LB/H		0.20
LA-0314	08/03/2016 &nbsp;ACT	Diesel emergency generator engine - EGEN	17.21	diesel	350 hp		Particulate matter, total &lt; 10 Åµ (TPM10)	complying with 40 CFR 63 subpart ZZZZ	0		
*LA-0315	05/23/2014 &nbsp;ACT	Emergency Diesel Generator 1	17.11	Diesel	5364 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Proper design and operation; use of ultra-low sulfur diesel	1.76 LB/H		0.20
*LA-0315	05/23/2014 &nbsp;ACT	Emergency Diesel Generator 2	17.11	Diesel	5364 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Proper design and operation; use of ultra-low sulfur diesel	1.76 LB/H		0.20
*LA-0315	05/23/2014 &nbsp;ACT	Fire Pump Diesel Engine 1	17.11	Diesel	751 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Proper design and operation; use of ultra-low sulfur diesel	0.25 LB/H		-
*LA-0315	05/23/2014 &nbsp;ACT	Fire Pump Diesel Engine 2	17.11	Diesel	751 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Proper design and operation; use of ultra-low sulfur diesel	0.25 LB/H		-
LA-0316	02/17/2017 &nbsp;ACT	emergency generator engines (6 units)	17.11	diesel	3353 hp		Particulate matter, total &lt; 10 Åµ (TPM10)	Complying with 40 CFR 60 Subpart IIII	0		
LA-0317	12/22/2016 &nbsp;ACT	Emergency Generator Engines (4 units)	17.11	Diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)	complying with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ	0		
LA-0323	01/09/2017 &nbsp;ACT	Fire Water Diesel Pump No. 3 Engine	17.11	Diesel Fuel	600 hp		Particulate matter, total &lt; 10 Åµ (TPM10)	Proper operation and limits on hours operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0		
LA-0323	01/09/2017 &nbsp;ACT	Fire Water Diesel Pump No. 4 Engine	17.11	Diesel Fuel	600 hp		Particulate matter, total &lt; 10 Åµ (TPM10)	Proper operation and limits on hours of operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0		
LA-0323	01/09/2017 &nbsp;ACT	Standby Generator No. 9 Engine	17.21	Diesel Fuel	400 hp		Particulate matter, total &lt; 10 Åµ (TPM10)	Proper operation and limits on hours of operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0		
LA-0328	05/02/2018 &nbsp;ACT	Emergency Diesel Engine Pump P-39A	17.21	Diesel Fuel	375 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Compliance with 40 CFR 60 Subpart IIII.	0.2		
LA-0328	05/02/2018 &nbsp;ACT	Emergency Diesel Engine Pump P-39B	17.21	Diesel Fuel	300 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Compliance with 40 CFR 60 Subpart IIII	0.2		
LA-0331	09/21/2018 &nbsp;ACT	Large Emergency Engines (&gt;50kW)	17.11	Diesel Fuel	5364 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion and operating practices.	0.2 G/KW-H		-
LA-0364	01/06/2020 &nbsp;ACT	Emergency Generator Diesel Engines	17.11	Diesel Fuel	550 hp		Particulate matter, total &lt; 10 Åµ (TPM10)	Compliance with the limitations imposed by 40 CFR 63 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures designed to maximize combustion efficiency and minimize fuel usage.	0		
LA-0364	01/06/2020 &nbsp;ACT	Emergency Fire Water Pumps	17.11	Diesel Fuel	550 hp		Particulate matter, total &lt; 10 Åµ (TPM10)	Compliance with the limitations imposed by 40 CFR 63 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures designed to maximize combustion efficiency and minimize fuel usage.	0		
*LA-0370	04/27/2020 &nbsp;ACT	Emergency Fire Pump Engine (EQT0021, ENG-1)	17.21	Diesel	1.1 MM BTU/hr		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	The use of low sulfur fuels and compliance with 40 CFR 60 Subpart IIII	0.04 LB/HR		

**BACT Determinations for Emergency Diesel Engines - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
MA-0039	01/30/2014 &nbsp;ACT	Emergency Engine/Generator	17.11	ULSD	7.4 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)		0.15 GM/BHP-H		0.201153
MA-0039	01/30/2014 &nbsp;ACT	Fire Pump Engine	17.21	ULSD	2.7 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)		0.15 GM/BHP-H		0.20
MD-0041	04/23/2014 &nbsp;ACT	EMERGENCY GENERATOR	17.21	ULTRA-LOW SULFUR DIESEL	1500 KW		Particulate matter, total &lt; 10 Åµ (TPM10)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	0.15 G/HP-H		-
MD-0041	04/23/2014 &nbsp;ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA-LOW SULFUR DIESEL	300 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	0.15 G/HP-H		-
MD-0042	04/08/2014 &nbsp;ACT	EMERGENCY GENERATOR 1	17.11	ULTRA LOW SULFU DIESEL	2250 KW		Particulate matter, total &lt; 10 Åµ (TPM10)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES, LIMITED HOURS OF OPERATION, AND DESIGNED TO ACHIEVE EMISSION LIMITS	0.15 G/HP-H		0.20
MD-0042	04/08/2014 &nbsp;ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA LOW SULFUR DIESEL	477 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES, LIMITED HOURS OF OPERATION, AND DESIGNED TO ACHIEVE EMISSION LIMITS	0.15 G/HP-H		-
MD-0043	07/01/2014 &nbsp;ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	1300 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	GOOD COMBUSTION PRACTICES, LIMITED HOURS OF OPERATION, AND EXCLUSIVE USE OF ULSD	0.17 G/HP-H		-
MD-0043	07/01/2014 &nbsp;ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRAL LOW SULFUR DIESEL	350 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	GOOD COMBUSTION PRACTICES, LIMITED HOURS OF OPERATION, AND EXCLUSIVE USE OF ULSD	0.17 G/HP-H		0.23
MD-0044	06/09/2014 &nbsp;ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	1550 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES AND DESIGNED TO ACHIEVE EMISSION LIMITS	0.17 G/HP-H		-
MD-0044	06/09/2014 &nbsp;ACT	5 EMERGENCY FIRE WATER PUMP ENGINES	17.21	ULTRA LOW SULFUR DIESEL	350 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES AND DESIGNED TO ACHIEVE EMISSION LIMITS	0.17 G/BHP-H		-
MD-0045	11/13/2015 &nbsp;ACT	EMERGENCY GENERATOR	17.21	ULTRA-LOW SULFUR DIESEL	1490 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES.	0.18 G/HP-H		0.2
MD-0045	11/13/2015 &nbsp;ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA-LOW SULFUR DIESEL	305 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES.	0.18 G/HP-H		0.24
MD-0046	10/31/2014 &nbsp;ACT	DIESEL-FIRED AUXILIARY (EMERGENCY) ENGINES (TWO)	17.21	ULTRA-LOW SULFUR DIESEL	1500 KW		Particulate matter, total &lt; 10 Åµ (TPM10)	USE OF ULTRA LOW SULFUR DIESEL AND GOOD COMBUSTION PRACTICES.	0.18 G/HP-H		0.2
MD-0046	10/31/2014 &nbsp;ACT	DIESEL-FIRED FIRE PUMP ENGINE	17.21	ULTRA-LOW SULFUR DIESEL	300 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	EXCLUSIVE USE OF ULTRA LOW SULFUR DIESEL FUEL AND GOOD COMBUSTION PRACTICES	0.18 G/HP-H		0.24
MI-0400	06/29/2011 &nbsp;ACT	Emergency generator	17.11	Diesel	4000 HP		Particulate matter, total &lt; 10 Åµ (TPM10)		1.76 LB/H		0.27
MI-0400	06/29/2011 &nbsp;ACT	Fire Pump	17.21	Diesel	420 HP		Particulate matter, total &lt; 10 Åµ (TPM10)		0.14 LB/H		-



Std Units	Limit
g/kW-hr	

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**BACT Determinations for Emergency Diesel Engines - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
MI-0441	12/21/2018 &nbsp;ACT	EUEMGD2--A 6000 HP diesel fuel fired emergency engine	17.11	Diesel	6000 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices, burn ultra low sulfur diesel fuel, and be NSPS compliant.	2.7 LB/H		-
MI-0441	12/21/2018 &nbsp;ACT	EUFPRICE--A 315 HP diesel fueled emergency engine	17.21	Diesel	2.5 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Ultra low sulfur diesel fuel and good combustion practices.	0.12 LB/H		
*MI-0445	11/26/2019 &nbsp;ACT	EUPPENGINE (Emergency engine-diesel fire pump	17.21	diesel fuel	1.66 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices	0.57 LB/H		
*MI-0445	11/26/2019 &nbsp;ACT	EUENGINE (diesel fuel emergency engine)	17.11	diesel fuel	22.68 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices	1.58 LB/H		
MI-0447	01/07/2021 &nbsp;ACT	EUEMGD--emergency engine	17.11	diesel fuel	4474.2 KW		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices, burn ultra-low diesel fuel and be NSPS compliant.	1 LB/H		-
MI-0447	01/07/2021 &nbsp;ACT	EUFPRICE--A 315 HP diesel fueled emergency engine	17.21	Diesel	2.5 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Ultra low sulfur diesel fuel and good combustion practices	0.12 LB/H		
MO-0089	05/12/2016 &nbsp;ACT	emergency engines	17.21	ULSD	0		Particulate matter, filterable (FPM)	good operating practices	0 G/KW		
NJ-0079	07/25/2012 &nbsp;ACT	Emergency Generator	17.11	Ultra Low Sulfur distillate Diesel	100 H/YR		Particulate matter, total &lt; 10 Åµ (TPM10)	Use of ULSD oil	0.13 LB/H		
NJ-0080	11/01/2012 &nbsp;ACT	Emergency Generator	17.11	ULSD	200 H/YR		Particulate matter, filterable &lt; 10 Åµ (FPM10)		0.66 LB/H		
NJ-0081	03/07/2014 &nbsp;ACT	Emergency diesel fire pump	17.21	Ultra Low Sulfur Distillate oil	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Use of ultra low sulfur distillate oil	0.15 G/B-HP-H		0.20
NJ-0084	03/10/2016 &nbsp;ACT	Diesel Fired Emergency Generator	17.11	ULSD	44 H/YR		Particulate matter, total &lt; 10 Åµ (TPM10)	use of ULSD a clean burning fuel, and limited hours of operation	0.26 LB/H		
NJ-0084	03/10/2016 &nbsp;ACT	Emergency Diesel Fire Pump	17.21	ULSD	100 H/YR		Particulate matter, total &lt; 10 Åµ (TPM10)	use of ULSD a clean burning fuel, and limited hours of operation	0.1 LB/H		
NJ-0085	07/19/2016 &nbsp;ACT	EMERGENCY GENERATOR DIESEL	17.21	DIESEL OIL	0 100 H/YR		Particulate matter, total &lt; 10 Åµ (TPM10)	Use of Ultra Low Sulfur Diesel (ULSD) Oil a clean burning fuel and limited hours of operation	0.661 LB/H		
NJ-0085	07/19/2016 &nbsp;ACT	EMERGENCY DIESEL FIRE PUMP	17.21	ULSD	100 H/YR		Particulate matter, total &lt; 10 Åµ (TPM10)	Use of Ultra Low Sulfur Diesel (ULSD) Oil a clean burning fuel and limited hours of operation	0.108 LB/H		
NY-0103	02/03/2016 &nbsp;ACT	Emergency fire pump	17.21	ultra low sulfur diesel	460 hp		Particulate matter, filterable (FPM)	Compliance demonstrated with vendor emission certification and adherence to vendor-specified maintenance recommendations.	0.087 G/BHP-H		0.12
NY-0104	08/01/2013 &nbsp;ACT	Emergency generator	17.11	ultra low sulfur diesel	0		Particulate matter, filterable (FPM)	Ultra low sulfur diesel with maximum sulfur content 0.0015 percent.	0.03 G/BHP-H		0.04
NY-0104	08/01/2013 &nbsp;ACT	Fire pump	17.21	ultra low sulfur diesel	0		Particulate matter, filterable (FPM)	Ultra low sulfur diesel with maximum sulfur content 0.0015 percent.	0.043 LB/MMBTU		
OH-0352	06/18/2013 &nbsp;ACT	Emergency fire pump engine	17.21	diesel	300 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Purchased certified to the standards in NSPS Subpart IIII	0.1 LB/H		0.200
OH-0352	06/18/2013 &nbsp;ACT	Emergency generator	17.11	diesel	2250 KW		Particulate matter, total &lt; 10 Åµ (TPM10)	Purchased certified to the standards in NSPS Subpart IIII	0.99 LB/H		0.200

**BACT Determinations for Emergency Diesel Engines - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
OH-0360	11/05/2013 &nbsp;ACT	Emergency generator (P003)	17.11	diesel	1112 KW		Particulate matter, total &lt; 10 Åµ (TPM10)	Purchased certified to the standards in NSPS Subpart IIII	0.49 LB/H		0.200
OH-0360	11/05/2013 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	diesel	400 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Purchased certified to the standards in NSPS Subpart IIII	0.131 LB/H		0.200
OH-0363	11/05/2014 &nbsp;ACT	Emergency generator (P002)	17.11	Diesel fuel	1100 KW		Particulate matter, total (TPM)	Emergency operation only, < 500 hours/ year each for maintenance checks and readiness testing designed to meet NSPS Subpart IIII	0.77 LB/H		0.32
OH-0363	11/05/2014 &nbsp;ACT	Emergency Fire Pump Engine (P003)	17.21	Diesel fuel	260 HP		Particulate matter, total (TPM)	Emergency operation only, < 500 hours/ year each for maintenance checks and readiness testing designed to meet NSPS Subpart IIII	0.09 LB/H		0.20
OH-0366	08/25/2015 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	140 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	State-of-the-art combustion design	0.07 LB/H		0.30
OH-0366	08/25/2015 &nbsp;ACT	Emergency generator (P003)	17.11	Diesel fuel	2346 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	State-of-the-art combustion design	0.77 LB/H		0.20
OH-0367	09/23/2016 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	311 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	State-of-the-art combustion design	0.1 LB/H		0.20
OH-0367	09/23/2016 &nbsp;ACT	Emergency generator (P003)	17.11	Diesel fuel	2947 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	State-of-the-art combustion design	0.97 LB/H		0.20
OH-0368	04/19/2017 &nbsp;ACT	Emergency Fire Pump Diesel Engine (P008)	17.21	Diesel fuel	460 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	good combustion control and operating practices and engines designed to meet the stands of 40 CFR Part 60, Subpart IIII	0.02 LB/H		0.02
OH-0368	04/19/2017 &nbsp;ACT	Emergency Generator (P009)	17.11	Diesel fuel	5000 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	good combustion control and operating practices and engines designed to meet the stands of 40 CFR Part 60, Subpart IIII	0.2 LB/H		0.03
OH-0370	09/07/2017 &nbsp;ACT	Emergency generator (P003)	17.11	Diesel fuel	1529 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Ultra low sulfur diesel fuel	0.5 LB/H		0.20
OH-0370	09/07/2017 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Ultra low sulfur diesel fuel	0.1 LB/H		0.20
OH-0372	09/27/2017 &nbsp;ACT	Emergency generator (P003)	17.11	Diesel fuel	1529 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Ultra low sulfur diesel fuel	0.5 LB/H		0.20
OH-0372	09/27/2017 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Ultra low sulfur diesel fuel	0.1 LB/H		0.20
OH-0374	10/23/2017 &nbsp;ACT	Emergency Generators (2 identical, P004 and P005)	17.11	Diesel fuel	2206 HP		Particulate matter, total (TPM)	Certified to the meet the emissions standards in 40 CFR 89.112 and 89.113 pursuant to 40 CFR 60.4205(b) and 60.4202(a)(2). Good combustion practices per the manufacturerâ€™s operating manual.	0.73 LB/H		0.20
OH-0374	10/23/2017 &nbsp;ACT	Emergency Fire Pump (P006)	17.21	Diesel fuel	410 HP		Particulate matter, total (TPM)	Certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII. Good combustion practices per the manufacturerâ€™s operating manual.	0.13 LB/H		0.20
OH-0375	11/07/2017 &nbsp;ACT	Emergency Diesel Generator Engine (P001)	17.11	Diesel fuel	2206 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion design	0.73 LB/H		0.20
OH-0375	11/07/2017 &nbsp;ACT	Emergency Diesel Fire Pump Engine (P002)	17.11	Diesel fuel	700 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion design	0.23 LB/H		0.20

**BACT Determinations for Emergency Diesel Engines - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
OH-0376	02/09/2018 &nbsp;ACT	Emergency diesel-fueled fire pump (P006)	17.21	Diesel fuel	250 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Comply with NSPS 40 CFR 60 Subpart IIII	0.1 LB/H		0.24
OH-0376	02/09/2018 &nbsp;ACT	Emergency diesel-fired generator (P007)	17.11	Diesel fuel	2682 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Comply with NSPS 40 CFR 60 Subpart IIII	1.01 LB/H		0.23
OH-0377	04/19/2018 &nbsp;ACT	Emergency Diesel Generator (P003)	17.11	Diesel fuel	1860 HP		Particulate matter, total (TPM)	Good combustion practices (ULSD) and compliance with 40 CFR Part 60, Subpart IIII	0.62 LB/H		0.20
OH-0377	04/19/2018 &nbsp;ACT	Emergency Fire Pump (P004)	17.21	Diesel fuel	320 HP		Particulate matter, total (TPM)	Good combustion practices (ULSD) and compliance with 40 CFR Part 60, Subpart IIII	0.11 LB/H		0.20
OH-0378	12/21/2018 &nbsp;ACT	Emergency Diesel-fired Generator Engine (P007)	17.11	Diesel fuel	3353 HP		Particulate matter, total (TPM)	certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII, shall employ good combustion practices per the manufacturerâ€™s operating manual	1.1 LB/H		0.20
OH-0378	12/21/2018 &nbsp;ACT	1,000 kW Emergency Generators (P008 - P010)	17.11	Diesel fuel	1341 HP		Particulate matter, total (TPM)	certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII, shall employ good combustion practices per the manufacturerâ€™s operating manual	0.44 LB/H		0.20
OH-0379	02/06/2019 &nbsp;ACT	Emergency Generators (P005 and P006)	17.11	Diesel fuel	3131 HP		Particulate matter, filterable &lt; 10 Åµ (FPM10)	Tier IV engine Good combustion practices	0.15 LB/H		0.03
OK-0154	07/02/2013 &nbsp;ACT	DIESEL-FIRED EMERGENCY GENERATOR ENGINE	17.11	DIESEL	1341 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	COMBUSTION CONTROL.	0.44 LB/HR		0.20
OK-0156	07/31/2013 &nbsp;ACT	Fire Pump Engine	17.11	Diesel	550 hp		Particulate matter, total &lt; 10 Åµ (TPM10)		0.2 GM/HP-HR		0.27
PA-0275	10/24/2011 &nbsp;ACT	Fire Water Pump	17.29	Diesel	0		Particulate matter, filterable &lt; 10 Åµ (FPM10)		0.08 LB/H		
PA-0278	10/10/2012 &nbsp;ACT	Emergency Generator	17.11	Diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)		0.02 G/B-HP-H		0.03
PA-0278	10/10/2012 &nbsp;ACT	Fire Pump	17.21	Diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)		0.09 G/B-HP-H		0.12
PA-0286	01/31/2013 &nbsp;ACT	Fire Pump Engine - 460 BHP	17.21	Diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)		0.09 G/HP-H		0.12
PA-0286	01/31/2013 &nbsp;ACT	EMERGENCY GENERATOR-ENGINE	17.13	Diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)		0.02 GM/B-HP-H		0.027
PA-0291	04/23/2013 &nbsp;ACT	EMERGENCY FIREWATER PUMP	17.21	ULTRA LOW SULFUR DISTILLATE	3.25 MMBTU/H		Particulate matter, total (TPM)		0.15 LB/H		
PA-0291	04/23/2013 &nbsp;ACT	EMERGENCY GENERATOR	17.11	Ultra Low sulfur Distillate	7.8 MMBTU/H		Particulate matter, total (TPM)		0.02 TPY		
PA-0296	12/17/2013 &nbsp;ACT	Emergency Firewater Pump	17.21	Diesel	16 Gal/hr		Particulate matter, filterable &lt; 10 Åµ (FPM10)		0.005 T/YR		

**BACT Determinations for Emergency Diesel Engines - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
PA-0309	12/23/2015 &nbsp;ACT	Fire pump engine	17.21	Ultra-low sulfur diesel	15 gal/hr		Particulate matter, total &lt; 10 Åµ (TPM10)		0.11 GM/HP-HR		0.15
PA-0309	12/23/2015 &nbsp;ACT	2000 kW Emergency Generator	17.11	Ultra-low sulfur Diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)		0.025 GM/HP-HR		0.03
PA-0310	09/02/2016 &nbsp;ACT	Emergency Generator Engines	17.11	ULSD	0		Particulate matter, total (TPM)		0.15 G/BHP-HR		0.201
PA-0310	09/02/2016 &nbsp;ACT	Emergency Fire Pump Engine	17.21	ULSD	0		Particulate matter, total (TPM)		0.15 G/BHP-HR		0.20
PA-0311	09/01/2015 &nbsp;ACT	Fire Pump Engine	17.11	diesel	0		Particulate matter, total (TPM)		0.2 G/HP-HR		0.27
*PA-0313	07/27/2017 &nbsp;ACT	Emergency Generator	17.11	Diesel	2500 bhp		Particulate matter, total (TPM)		0.2 G		0.27
*PA-0326	02/18/2021 &nbsp;ACT	Emergency Generator Parking Garage	17.21	Diesel	0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	LAER PM2.5 BACT PM/PM25 certified engines,include turbocharger and intercooler/aftercooler GCP ULSD	0.06 G		0.080
*PA-0326	02/18/2021 &nbsp;ACT	Emergency GeneratorTelecom Hut &amp; Tower	17.21	diesel	0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	LAER PM2.5 BACT PM/PM25 certified engines,include turbocharger and intercooler/aftercooler GCP ULSD	0.22 G		0.295
PR-0009	04/10/2014 &nbsp;ACT	Emergency Diesel Fire Pump	17.21	ULSD Fuel Oil #2	0		Particulate matter, total &lt; 10 Åµ (TPM10)		0.15 G/B-HP-H		0.20
PR-0009	04/10/2014 &nbsp;ACT	Emergency Diesel Generator	17.11	ULSD Fuel oil # 2	0		Particulate matter, total &lt; 10 Åµ (TPM10)		0.15 G/B-HP-H		0.20
SC-0193	04/15/2016 &nbsp;ACT	Emergency Generators and Fire Pump	17.11	No. 2 Fuel Oil	1500 hp		Particulate matter, total (TPM)	Meet emission standards of 40 CFR 60, Subpart IIII	100 HRS/YR		
*SD-0005	06/29/2010 &nbsp;ACT	Emergency Generator	17.11	Distillate Oil	2000 Kilowatts		Particulate matter, filterable (FPM)		0		
*SD-0005	06/29/2010 &nbsp;ACT	Fire Water Pump	17.11	Distillate Oil	577 horsepower		Particulate matter, filterable (FPM)		0		
TX-0728	04/01/2015 &nbsp;ACT	Emergency Diesel Generator	17.11	Diesel	1500 hp		Particulate matter, filterable &lt; 10 Åµ (FPM10)	Minimized hours of operations Tier II engine	0.15 LB/H		0.061
TX-0846	09/23/2018 &nbsp;ACT	FIRE PUMP DIESEL ENGINE	17.21	NO 2 DIESEL	214 kW		Particulate matter, total &lt; 10 Åµ (TPM10)	Meets EPA Tier 4 requirements	0.02 G/KW		0.02
TX-0864	09/09/2019 &nbsp;ACT	EMERGENCY DIESEL ENGINE	17.21	Ultra-low sulfur diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Tier 4 exhaust emission standards specified at 40 CFR Å§ 1039.101(b)	0		
TX-0876	02/06/2020 &nbsp;ACT	Emergency generator	17.11	DIESEL	0		Particulate matter, filterable &lt; 10 Åµ (FPM10)	Tier 4 exhaust emission standards specified in 40 CFR Å§ 1039.101, limited to 100 hours per year of non-emergency operation	0		
TX-0882	01/17/2020 &nbsp;ACT	EMERGENCY ENGINES	17.12	DIESEL	0		Particulate matter, total (TPM)	GOOD COMBUSTION PRACTICES, CLEAN FUEL, 100 HR/YR, ULTRA LOW SULFUR FUEL	0.0001 LB/MMBTU		
TX-0882	01/17/2020 &nbsp;ACT	EMERGENCY ENGINES	17.12	DIESEL	0		Particulate matter, total &lt; 10 Åµ (TPM10)	GOOD COMBUSTION PRACTICES, CLEAN FUEL, 100 HR/YR, ULTRA LOW SULFUR FUEL	0.0001 LB/MMBTU		

**BACT Determinations for Emergency Diesel Engines - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
TX-0882	01/17/2020 &nbsp;ACT	EMERGENCY ENGINES	17.12	DIESEL	0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	GOOD COMBUSTION PRACTICES, CLEAN FUEL, 100 HR/YR, ULTRA LOW SULFUR FUEL	0.0001 LB/MMBTU		
TX-0888	04/23/2020 &nbsp;ACT	EMERGENCY GENERATORS & FIRE WATER PUMP ENGINES	17.11	Ultra-low Sulfur Diesel	0		Particulate matter, filterable &lt; 10 Åµ (FPM10)	well-designed and properly maintained engines and each limited to 100 hours per year of non-emergency use.	0		
*TX-0904	09/09/2020 &nbsp;ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	0		Particulate matter, filterable &lt; 10 Åµ (FPM10)	100 HOURS OPERATIONS, Tier 4 exhaust emission standards specified in 40 CFR Å§ 1039.101	0		
TX-0905	09/16/2020 &nbsp;ACT	EMERGENCY GENERATOR	17.11	ULTRA LOW SULFUR DIESEL	0		Particulate matter, filterable &lt; 10 Åµ (FPM10)	limited to 100 hours per year of non- emergency operation	0		
VA-0319	08/27/2012 &nbsp;ACT	FIRE WATER PUMP	17.21	diesel (ultra low sulfur)	1.86 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Clean burning ULSD fuel and good combustion practices	0.15 G/HP-H		0.201
VA-0319	08/27/2012 &nbsp;ACT	FIRE WATER PUMP	17.21	diesel (ultra low sulfur)	1.86 MMBTU/H		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Clean burning ULSD fuel and good combustion practices.	0.15 G/HP-H		0.201
VA-0325	06/17/2016 &nbsp;ACT	DIESEL-FIRED EMERGENCY GENERATOR 3000 kW (1)	17.11	DIESEL FUEL	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Ultra Low Sulfur Diesel/Fuel (15 ppm max)	0.4 G/KW		0.400
VA-0328	04/26/2018 &nbsp;ACT	Emergency Diesel GEN	17.11	Ultra Low Sulfur Diesel	500 H/YR		Particulate matter, total &lt; 10 Åµ (TPM10)	good combustion practices and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	0.15 G/HP H		0.201
VA-0328	04/26/2018 &nbsp;ACT	Emergency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Particulate matter, total &lt; 10 Åµ (TPM10)	good combustion practices and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	0.15 G/HP HR		0.201
VA-0332	06/24/2019 &nbsp;ACT	Emergency Diesel Generator - 300 kW	17.11	Ultra Low Sulfur Diesel	500 H/YR		Particulate matter, total &lt; 10 Åµ (TPM10)	good combustion practices, high efficiency design, and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	0.15 G/HP-HR		-
VA-0332	06/24/2019 &nbsp;ACT	Emergency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Particulate matter, total &lt; 10 Åµ (TPM10)	good combustion practices, high efficiency design, and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	0.15 G/HP-HR		-
*VA-0333	12/09/2020 &nbsp;ACT	One (1) emergency engine generator	17.11	ULSD	2220 HP		Particulate matter, total &lt; 10 Åµ (TPM10)		1.1 LB		-
WI-0263	02/15/2016 &nbsp;ACT	Fire pump (process P05)	17.21	Diesel	1.27 mmBtu/hr		Particulate matter, total (TPM)	Good combustion practices, use diesel fuel with sulfur content < 15 ppm, and operate <500 hr/yr	0		
*WI-0271	06/05/2015 &nbsp;ACT	P10K Å¢ Diesel Powered Emergency Generator	17.21	Distillate Fuel	0		Particulate matter, total &lt; 10 Åµ (TPM10)	BACT is the use of ultra-low sulfur distillate in the generator. Compliance with this requirement will be determined using sulfur content testing for all shipments of fuel received.	0.29 ;B/HR		
*WI-0284	04/24/2018 &nbsp;ACT	Diesel-Fired Emergency Generators	17.11	Diesel Fuel	0		Particulate matter, total (TPM)	The Use of Ultra-Low Sulfur Fuel and Good Combustion Practices	0.17 G/KWH		-
*WI-0286	04/24/2018 &nbsp;ACT	P42 -Diesel Fired Emergency Generator	17.11	Diesel Fuel	0		Particulate matter, total (TPM)	Good Combustion Practices and The Use of Ultra-low Sulfur Fuel	17 G/KWH		-

BACT Determinations for Emergency Diesel Engines - PM (Oil-Fired)

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
WV-0025	11/21/2014 &nbsp;  ACT	Emergency Generator	17.11	Diesel	2015.7 HP		Particulate matter, filterable &lt; 2.5 Åµ (FPM2.5)		0		-
WV-0025	11/21/2014 &nbsp;  ACT	Fire Pump Engine	17.21	Diesel	251 HP		Particulate matter, filterable &lt; 2.5 Åµ (FPM2.5)		0		0.20
WV-0027	09/15/2017 &nbsp;  ACT	Emergency Generator - ESDG14	17.11	ULSD	900 bhp		Particulate matter, total &lt; 10 Åµ (TPM10)	ULSD	0.2 G/HP-HR		0.27

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
AK-0082	01/23/2015 &nbsp;ACT	Airstrip Generator Engine	17.21	Ultra Low Sulfur Diesel	490 hp		Carbon Monoxide		2.6 GRAMS/HP-H		3.486652
AK-0082	01/23/2015 &nbsp;ACT	Agitator Generator Engine	17.21	Ultra Low Sulfur Diesel	98 hp		Carbon Monoxide		3.7 GRAMS/HP-H		4.961774
AK-0082	01/23/2015 &nbsp;ACT	Incinerator Generator Engine	17.21	Ultra Low Sulfur Diesel	102 hp		Carbon Monoxide		3.7 GRAMS/HP-H		4.961774
AK-0083	01/06/2015 &nbsp;ACT	Diesel Fired Well Pump	17.21	Diesel	2.7 MMBTU/H		Carbon Monoxide	Limited Operation of 168 hr/yr.	0.95 LB/MMBTU		
AK-0084	06/30/2017 &nbsp;ACT	Fire Pump Diesel Internal Combustion Engines	17.21	Diesel	252 hp		Carbon Monoxide	Good Combustion Practices	3.3 G/KW-HR		3.3
*AK-0085	08/13/2020 &nbsp;ACT	Three (3) Firewater Pump Engines and two (2) Emergency Diesel Generators	17.21	ULSD	19.4 gph		Carbon Monoxide	Good combustion practices, limit operation to 500 hours per year per engine	3.3 G/HP-HR		4.425366
*AK-0086	03/26/2021 &nbsp;ACT	Diesel Fired Well Pump	17.21	Diesel	2.7 MMBtu/hr		Carbon Monoxide	Good Combustion Practices and Limited Use	0.95 LB/MMBTU		
AR-0168	03/17/2021 &nbsp;ACT	Emergency Engines	17.21	Diesel	0		Carbon Monoxide	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	3.5 G/KW-HR		3.5
AR-0171	02/14/2019 &nbsp;ACT	SN-106 Cold Mill 1 Diesel Fired Emergency Generator	17.21	Diesel	1073 bhp		Carbon Monoxide	Good operating practices.	4 G/KW-HR		4
CA-1192	06/21/2011 &nbsp;ACT	EMERGENCY FIREWATER PUMP ENGINE	17.21	DIESEL	288 HP		Carbon Monoxide	EQUIPPED W/ A TURBOCHARGER AND AN INTERCOOLER/AFTERCOOLER	0.447 G/HP-H		0.5994359
CA-1212	10/18/2011 &nbsp;ACT	EMERGENCY IC ENGINE	17.21	DIESEL	182 HP		Carbon Monoxide		3.5 G/KW-H		3.5
FL-0338	05/30/2012 &nbsp;ACT	Wireline Unit Engines - C.R. Luigs	17.21	diesel	300 hp		Carbon Monoxide	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, turbocharger with aftercooler, high pressure fuel injection with aftercooler	2.9 T/12MO ROLLING TOTAL		
FL-0338	05/30/2012 &nbsp;ACT	Fast Rescue Craft Diesel Engine - Development Driller 1	17.21	Diesel	142 hp		Carbon Monoxide	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, and turbocharger	0		
FL-0338	05/30/2012 &nbsp;ACT	Life Boat Diesel Engines - Development Driller 1	17.21	Diesel	110 hp		Carbon Monoxide	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines and use of low sulfur diesel fuel	0		
FL-0338	05/30/2012 &nbsp;ACT	Port and Stb Fwd and Aft Crane Diesel Engines - C.R. Luigs	17.21	diesel	305 HP		Carbon Monoxide	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	17.85 T/12MO ROLLING TOTAL		
FL-0338	05/30/2012 &nbsp;ACT	Seismic Operations Diesel Engines - Development Driller 1	17.21	Diesel	415 hp		Carbon Monoxide	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, and turbocharger	1.94 TONS		
FL-0338	05/30/2012 &nbsp;ACT	Life Boat Diesel Engines - C.R. Luigs	17.21	diesel	39 hp		Carbon Monoxide	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel	0		
FL-0338	05/30/2012 &nbsp;ACT	Cementing and Nitrogen Pump Diesel Engines - Development Driller 1	17.21	Diesel	0		Carbon Monoxide	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger, and high pressure fuel injection with aftercooler	3.73 T/12MO ROLLING TOTAL		



**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kw-hr
FL-0338	05/30/2012 &nbsp;ACT	Wireline Unit Diesel Engines - Development Driller 1	17.21	Diesel	0		Carbon Monoxide	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, turbocharger with aftercooler, high pressure fuel injection with aftercooler	2.9 TONS		
FL-0338	05/30/2012 &nbsp;ACT	Black Start Air Compressor - C.R. Luigs	17.21	diesel	6 hp		Carbon Monoxide	Use of good combustion practices based on the current manufacturerâ€™s specifications for the engine and the use of low sulfur diesel fuel	0		
FL-0338	05/30/2012 &nbsp;ACT	Cementing and Nitrogen Pump Diesel Engines - C.R. Luigs	17.21	diesel	0		Carbon Monoxide	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger, and high pressure fuel injection with aftercooler	3.3 T/12MO ROLLING TOTAL		
FL-0346	04/22/2014 &nbsp;ACT	Emergency fire pump engine (300 HP)	17.21	USLD	29 MMBTU/H		Carbon Monoxide	Good combustion practice.	3.5 GRAM PER KW-HR		3.5
FL-0347	09/16/2014 &nbsp;ACT	Diesel Powered Forklift Engine	17.21	Diesel	30 hp		Carbon Monoxide	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine	0		
FL-0347	09/16/2014 &nbsp;ACT	Wireline Diesel Engines	17.21	Diesel	0		Carbon Monoxide	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine and with turbocharger, aftercooler, and high injection pressure	0		
FL-0347	09/16/2014 &nbsp;ACT	Water Blasting Diesel Engine	17.21	Diesel	208 hp		Carbon Monoxide	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine and with turbocharger, aftercooler, and high injection pressure	0		
FL-0347	09/16/2014 &nbsp;ACT	Well Evaluation Diesel Engine	17.21	Diesel	140 hp		Carbon Monoxide	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine	0		
FL-0347	09/16/2014 &nbsp;ACT	Fast Rescue Craft Diesel Engine	17.21	Diesel	230 hp		Carbon Monoxide	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine and with turbocharger, aftercooler, and high injection pressure	0		
FL-0347	09/16/2014 &nbsp;ACT	Escape Capsule Diesel Engine	17.21	Diesel	39 hp		Carbon Monoxide	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine	0		
FL-0347	09/16/2014 &nbsp;ACT	Remotely Operated Vehicle Emergency Generator	17.21	Diesel	427 hp		Carbon Monoxide	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0		
FL-0354	08/25/2015 &nbsp;ACT	Emergency fire pump engine, 300 HP	17.21	Diesel	29 MMBTU/H		Carbon Monoxide	Low-emitting fuel and certified engine	3.5 G / KWH		3.5
FL-0356	03/09/2016 &nbsp;ACT	One 422-hp emergency fire pump engine	17.21	ULSD	0		Carbon Monoxide	Use of clean engine technology	3.5 G / KW-HR		3.5
*FL-0363	12/04/2017 &nbsp;ACT	Emergency Fire Pump Engine (422 hp)	17.21	ULSD	0		Carbon Monoxide	Certified engine	3.5 G / KWH		3.5
*FL-0367	07/27/2018 &nbsp;ACT	Emergency Fire Pump Engine (347 HP)	17.21	ULSD	8700 gal/year		Carbon Monoxide	Operate and maintain the engine according to the manufacturer's written instructions	3.5 G/KW-HOUR		3.5
IA-0105	10/26/2012 &nbsp;ACT	Fire Pump	17.21	diesel fuel	14 GAL/H		Carbon Monoxide	good combustion practices	3.5 G/KW-H		3.5
IL-0114	09/05/2014 &nbsp;ACT	Firewater Pump Engine	17.21	distillate fuel oil	373 hp		Carbon Monoxide	Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7.	3.5 G/KW-H		3.5
IL-0129	07/30/2018 &nbsp;ACT	Firewater Pump Engine	17.21	Ultra-low sulfur diesel	0		Carbon Monoxide		0		3.5

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
IL-0130	12/31/2018 &nbsp;   ACT	Firewater Pump Engine	17.21	Ultra-Low Sulfur Diesel	420 horsepower		Carbon Monoxide		3.5 G/KW-HR		3.5
IN-0158	12/03/2012 &nbsp;   ACT	TWO (2) FIREWATER PUMP DIESEL ENGINES	17.21	DIESEL	371 BHP, EACH		Carbon Monoxide	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	2.6 G/HP-H		3.486652
IN-0173	06/04/2014 &nbsp;   ACT	FIRE PUMP	17.21		500 HP		Carbon Monoxide	GOOD COMBUSTION PRACTICES	2.6 G/BHP-H		3.486652
IN-0173	06/04/2014 &nbsp;   ACT	RAW WATER PUMP	17.21	DIESEL, NO. 2	500 HP		Carbon Monoxide	GOOD COMBUSTION PRACTICES	2.6 G/BHP-H		3.486652
IN-0179	09/25/2013 &nbsp;   ACT	DIESEL-FIRED EMERGENCY WATER PUMP	17.21	NO. 2 FUEL OIL	481 BHP		Carbon Monoxide	GOOD COMBUSTION PRACTICES	2.6 G/B-HP-H		3.486652
IN-0180	06/04/2014 &nbsp;   ACT	FIRE PUMP	17.21		500 HP		Carbon Monoxide	GOOD COMBUSTION PRACTICES	2.6 G/B-HP-H		3.486652
IN-0180	06/04/2014 &nbsp;   ACT	RAW WATER PUMP	17.21	DIESEL, NO. 2	500 HP		Carbon Monoxide	GOOD COMBUSTION PRACTICES	2.6 G/B-HP-H		3.486652
IN-0234	12/08/2015 &nbsp;   ACT	EMERGENCY FIRE PUMP ENGINE	17.21	DISTILLATE OIL	0		Carbon Monoxide	GOOD COMBUSTION PRACTICES	2.01 G/HP-H		2.6954502
IN-0295	02/23/2018 &nbsp;   ACT	Emergency Diesel Generators	17.21	Deisel	150 hp		Carbon Monoxide		3.08 G/KW-HR		3.08
IN-0295	02/23/2018 &nbsp;   ACT	Emergency Diesel Generators	17.21	Diesel	250 hp		Carbon Monoxide		3.08 G/HP-HR		4.1303416
*KS-0036	03/18/2013 &nbsp;   ACT	Cummins 6BTA 5.9F-1 Diesel Engine Fire Pump	17.21	No. 2 Fuel Oil	182 BHP		Carbon Monoxide	utilize efficient combustion/design technology	0.53 LB/HR		1.7713452
KY-0110	07/23/2020 &nbsp;   ACT	EP 11-01 - Melt Shop Emergency Generator	17.21	Diesel	260 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.61 G/HP-HR		3.5000622
KY-0110	07/23/2020 &nbsp;   ACT	EP 11-02 - Reheat Furnace Emergency Generator	17.21	Diesel	190 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.61 G/HP-HR		3.5000622
KY-0110	07/23/2020 &nbsp;   ACT	EP 11-03 - Rolling Mill Emergency Generator	17.21	Diesel	440 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.61 G/HP-HR		3.5000622
KY-0110	07/23/2020 &nbsp;   ACT	EP 11-04 - IT Emergency Generator	17.21	Diesel	190 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.61 G/HP-HR		3.5000622
KY-0110	07/23/2020 &nbsp;   ACT	EP 11-05 - Radio Tower Emergency Generator	17.21	Diesel	61 HP		Carbon Monoxide	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	3.73 G/HP-HR		5.0020046
KY-0115	04/19/2021 &nbsp;   ACT	Cold Mill Complex Emergency Generator (EP 09-05)	17.21	Diesel	350 HP		Carbon Monoxide	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		3.486652
LA-0251	04/26/2011 &nbsp;   ACT	Small Generator Engine	17.21	diesel	193 hp		Carbon Monoxide		0.16 LB/H		3.5
LA-0251	04/26/2011 &nbsp;   ACT	Fire Pump Engines - 2 units	17.21	diesel	444 hp		Carbon Monoxide	good equipment design and proper combustion practices	0.65 LB/H		0.8904901
LA-0254	08/16/2011 &nbsp;   ACT	EMERGENCY FIRE PUMP	17.21	DIESEL	350 HP		Carbon Monoxide	ULTRA LOW SULFUR DIESEL AND GOOD COMBUSTION PRACTICES	2.6 G/HP-H		3.486652
LA-0301	05/23/2014 &nbsp;   ACT	Firewater Pump Nos. 1-3 (EQTs 997, 998, & 999)	17.21	Diesel	500 HP		Carbon Monoxide	Compliance with 40 CFR 60 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures (consistent with safe operation) designed to maximize combustion efficiency and minimize fuel usage	2.87 LB/HR		3.486652
*LA-0306	12/20/2016 &nbsp;   ACT	Genenerator Engine DEG-16-1 (EQT035)	17.21	Diesel	460 horsepower		Carbon Monoxide	Meet NSPS Subpart IIII Limitations and Good Combustion Practices	3.18 LB/H		3.5
*LA-0306	12/20/2016 &nbsp;   ACT	Pump Engines DFP-16-1 (EQT036)	17.21	Diesel	225 horsepower		Carbon Monoxide	Meet NSPS Subpart IIII Limitations and Good Combustion Practices	1.55 LB/H		2.6
*LA-0306	12/20/2016 &nbsp;   ACT	Pump Engine DFP-16-2 (EQT037)	17.21	Diesel	225 horsepower		Carbon Monoxide	Meet NSPS Subpart IIII Limitations and Good Combustion Practices	1.55 LB/H		2.6
LA-0309	06/04/2015 &nbsp;   ACT	Firewater Pump Engines	17.21	Diesel	288 hp (each)		Carbon Monoxide	Complying with 40 CFR 60 Subpart IIII	0		
LA-0313	08/31/2016 &nbsp;   ACT	SCPS Emergency Diesel Firewater Pump 1	17.21	Diesel	282 HP		Carbon Monoxide	Compliance with NESHAP 40 CFR 63 Subpart ZZZZ and NSPS 40 CFR 60 Subpart IIII, and good combustion practices (use of ultra-low sulfur diesel fuel).	1.62 LB/H		3.486652

Std Units  
Limit

Appendix C, Page C2-157

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
MI-0433	06/29/2018 &nbsp;   ACT	EUPENGINE (North Plant): Fire pump engine	17.21	Diesel	300 HP		Carbon Monoxide	Good combustion practices and meeting NSPS Subpart IIII requirements.	2.6 G/BHP-H		3.486652
MI-0435	07/16/2018 &nbsp;   ACT	EUPENGINE: Fire pump engine	17.21	Diesel	399 BHP		Carbon Monoxide	State of the art combustion design.	3.5 G/KW-H		3.5
MI-0441	12/21/2018 &nbsp;   ACT	EUPPRICE--A 315 HP diesel fueled emergency engine	17.21	Diesel	2.5 MMBTU/H		Carbon Monoxide	Good combustion practices.	2.6 G/HP-H		3.486652
*MI-0445	11/26/2019 &nbsp;   ACT	EUPENGINE (Emergency engine-diesel fire pump	17.21	diesel fuel	1.66 MMBTU/H		Carbon Monoxide	Good Combustion Practices and meeting NSPS Subpart IIII requirements	2.6 G/BHP-H		3.486652
MI-0447	01/07/2021 &nbsp;   ACT	EUPPRICE--A 315 HP diesel fueled emergency engine	17.21	Diesel	2.5 MMBTU/H		Carbon Monoxide	Good combustion practices	2.6 G/HP-H		3.486652
MS-0092	05/08/2014 &nbsp;   ACT	firewater pumps, diesel	17.21	diesel	325 HP, EACH		Carbon Monoxide		0		
NJ-0081	03/07/2014 &nbsp;   ACT	Emergency diesel fire pump	17.21	Ultra Low Sulfur Distillate oil	0		Carbon Monoxide		0.079 LB/H		3.486652
NJ-0084	03/10/2016 &nbsp;   ACT	Emergency Diesel Fire Pump	17.21	ULSD	100 H/YR		Carbon Monoxide	use of ULSD a clean burning fuel, and limited hours of operation	1.1 LB/H		
NJ-0085	07/19/2016 &nbsp;   ACT	EMERGENCY GENERATOR DIESEL	17.21	DIESEL OIL	0 100 H/YR		Carbon Monoxide	Use of Ultra Low Sulfur Diesel (ULSD) Oil a clean burning fuel and limited hours of operation (<= 100 H/YR)	11.6 LB/H		
NJ-0085	07/19/2016 &nbsp;   ACT	EMERGENCY DIESEL FIRE PUMP	17.21	ULSD	100 H/YR		Carbon Monoxide	Use of Ultra Low Sulfur Diesel (ULSD) Oil a clean burning fuel and limited hours of operation	1.87 LB/H		
NY-0103	02/03/2016 &nbsp;   ACT	Emergency fire pump	17.21	ultra low sulfur diesel	460 hp		Carbon Monoxide	Compliance demonstrated with vendor emission certification and adherence to vendor-specified maintenance recommendations.	0.53 G/BHP-H		0.7107406
NY-0104	08/01/2013 &nbsp;   ACT	Fire pump	17.21	ultra low sulfur diesel	0		Carbon Monoxide	Good combustion practice.	0.75 LB/MMBTU		
OH-0352	06/18/2013 &nbsp;   ACT	Emergency fire pump engine	17.21	diesel	300 HP		Carbon Monoxide	Purchased certified to the standards in NSPS Subpart IIII	1.7 LB/H		3.5
OH-0360	11/05/2013 &nbsp;   ACT	Emergency fire pump engine (P004)	17.21	diesel	400 HP		Carbon Monoxide	Purchased certified to the standards in NSPS Subpart IIII	2.3 LB/H		3.486652
OH-0363	11/05/2014 &nbsp;   ACT	Emergency Fire Pump Engine (P003)	17.21	Diesel fuel	260 HP		Carbon Monoxide	Emergency operation only, < 500 hours/year each for maintenance checks and readiness testing designed to meet NSPS Subpart IIII	0.69 LB/H		1.609224
OH-0366	08/25/2015 &nbsp;   ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	140 HP		Carbon Monoxide	State-of-the-art combustion design	1.15 LB/H		5
OH-0367	09/23/2016 &nbsp;   ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	311 HP		Carbon Monoxide	State-of-the-art combustion design	1.79 LB/H		3.5
OH-0368	04/19/2017 &nbsp;   ACT	Emergency Fire Pump Diesel Engine (P008)	17.21	Diesel fuel	460 HP		Carbon Monoxide	good combustion control and operating practices and engines designed to meet the stands of 40 CFR Part 60, Subpart IIII	2.6 LB/H		3.486652
OH-0370	09/07/2017 &nbsp;   ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Carbon Monoxide	State-of-the-art combustion design	1.73 LB/H		3.5
OH-0372	09/27/2017 &nbsp;   ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Carbon Monoxide	state of the art combustion design	1.73 LB/H		3.486652
OH-0374	10/23/2017 &nbsp;   ACT	Emergency Fire Pump (P006)	17.21	Diesel fuel	410 HP		Carbon Monoxide	Certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII. Good combustion practices per the manufacturer's operating manual.	2.36 LB/H		3.486652
OH-0376	02/09/2018 &nbsp;   ACT	Emergency diesel-fueled fire pump (P006)	17.21	Diesel fuel	250 HP		Carbon Monoxide	Comply with NSPS 40 CFR 60 Subpart IIII	1.4 LB/H		3.486652
OH-0377	04/19/2018 &nbsp;   ACT	Emergency Fire Pump (P004)	17.21	Diesel fuel	320 HP		Carbon Monoxide	Good combustion practices (ULSD) and compliance with 40 CFR Part 60, Subpart IIII	1.83 LB/H		3.486652

## Std Units

Limit  
g/kW-hr

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - CO (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
VA-0328	04/26/2018 &nbsp;   ACT	Emergency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Carbon Monoxide	good combustion practices and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	2.6 G/HP HR		3.486652
VA-0332	06/24/2019 &nbsp;   ACT	Emergency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Carbon Monoxide	good combustion practices, high efficiency design, and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	2.6 G/HP-H		3.486652
WI-0263	02/15/2016 &nbsp;   ACT	Fire pump (process P05)	17.21	Diesel	1.27 mmBtu/hr		Carbon Monoxide	Good combustion practices, use diesel fuel, and operate <500 hr/yr	0		
*WI-0291	01/28/2019 &nbsp;   ACT	P04 Emergency Diesel Generator	17.21	Diesel Fuel	0.22 mmBTU/hr		Carbon Monoxide	Good Combustion Practices	5 G/KWH		5
WV-0025	11/21/2014 &nbsp;   ACT	Fire Pump Engine	17.21	Diesel	251 HP		Carbon Monoxide		1.44 LB/H		3.4896952
WY-0070	08/28/2012 &nbsp;   ACT	Diesel Fire Pump Engine (EP16)	17.21	Ultra Low Sulfur Diesel	327 hp		Carbon Monoxide	EPA Tier 3 rated	0		
WY-0071	10/15/2012 &nbsp;   ACT	Emergency Air Compressor	17.21	Ultra Low Sulfur Diesel	400 hp		Carbon Monoxide	EPA Tier 3 Rated Diesel Engine	0		

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - NOx (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
AK-0082	01/23/2015 &nbsp;ACT	Airstrip Generator Engine	17.21	Ultra Low Sulfur Diesel	490 hp		Nitrogen Oxides (NOx)		4.8 GRAMS/HP-H		6.4
AK-0082	01/23/2015 &nbsp;ACT	Agitator Generator Engine	17.21	Ultra Low Sulfur Diesel	98 hp		Nitrogen Oxides (NOx)		5.6 GRAMS/HP-H		7.5
AK-0082	01/23/2015 &nbsp;ACT	Incinerator Generator Engine	17.21	Ultra Low Sulfur Diesel	102 hp		Nitrogen Dioxide (NO2)		4.9 GRAMS/HP-H		6.6
AK-0083	01/06/2015 &nbsp;ACT	Diesel Fired Well Pump	17.21	Diesel	2.7 MMBTU/H		Nitrogen Oxides (NOx)	Limited Operation of 168 hr/yr.	4.41 LB/MMBTU		
AK-0084	06/30/2017 &nbsp;ACT	Fire Pump Diesel Internal Combustion Engines	17.21	Diesel	252 hp		Nitrogen Oxides (NOx)	Good Combustion Practices	3.7 G/KW-HR		3.7
*AK-0085	08/13/2020 &nbsp;ACT	Three (3) Firewater Pump Engines and two (2) Emergency Diesel Generators	17.21	ULSD	19.4 gph		Nitrogen Oxides (NOx)	Good combustion practices, limit operation to 500 hours per year per engine	3.6 G/HP-HR		4.8
*AK-0086	03/26/2021 &nbsp;ACT	Diesel Fired Well Pump	17.21	Diesel	2.7 MMBtu/hr		Nitrogen Oxides (NOx)	Good Combustion Practices and Limited Use	4.41 LB/MMBTU		
AR-0168	03/17/2021 &nbsp;ACT	Emergency Engines	17.21	Diesel	0		Nitrogen Oxides (NOx)	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	4.86 G/KW-HR		4.9
AR-0171	02/14/2019 &nbsp;ACT	SN-106 Cold Mill 1 Diesel Fired Emergency Generator	17.21	Diesel	1073 bhp		Nitrogen Oxides (NOx)	Good operating practices.	2 G/KW-HR		2.0
CA-1192	06/21/2011 &nbsp;ACT	EMERGENCY FIREWATER PUMP ENGINE	17.21	DIESEL	288 HP		Nitrogen Oxides (NOx)	EQUIPPED W/ A TURBOCHARGER AND AN INTERCOOLER/ AFTERCOOLER	3.4 G/HP-H		4.6
CA-1212	10/18/2011 &nbsp;ACT	EMERGENCY IC ENGINE	17.21	DIESEL	182 HP		Nitrogen Oxides (NOx)		4 G/KW-H		4.0
CA-1217	08/23/2012 &nbsp;ACT	Internal Combustion Engine - 450 bhp	17.21	diesel	450 bhp		Nitrogen Oxides (NOx)		1.8 G/KW-H		1.8
FL-0338	05/30/2012 &nbsp;ACT	Wireline Unit Engines - C.R. Luigs	17.21	diesel	300 hp		Nitrogen Oxides (NOx)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, turbocharger with aftercooler, high pressure fuel injection with aftercooler	8.92 T/12MO ROLLING TOTAL		
FL-0338	05/30/2012 &nbsp;ACT	Fast Rescue Craft Diesel Engine - Development Driller 1	17.21	Diesel	142 hp		Nitrogen Oxides (NOx)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, and turbocharger	0		
FL-0338	05/30/2012 &nbsp;ACT	Life Boat Diesel Engines - Development Driller 1	17.21	Diesel	110 hp		Nitrogen Dioxide (NO2)	Use of good combustion practices based on the current manufacturer's specifications for these engines and use of low sulfur diesel fuel	0		
FL-0338	05/30/2012 &nbsp;ACT	Port and Stb Fwd and Aft Crane Diesel Engines - C.R. Luigs	17.21	diesel	305 HP		Nitrogen Oxides (NOx)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	82.83 T/12MO ROLLING TOTAL		
FL-0338	05/30/2012 &nbsp;ACT	Seismic Operations Diesel Engines - Development Driller 1	17.21	Diesel	415 hp		Nitrogen Oxides (NOx)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, and turbocharger	3.54 TONS		
FL-0338	05/30/2012 &nbsp;ACT	Life Boat Diesel Engines - C.R. Luigs	17.21	diesel	39 hp		Nitrogen Oxides (NOx)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel	0		

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - NOx (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
FL-0338	05/30/2012 &nbsp;ACT	Cementing and Nitrogen Pump Diesel Engines - Development Driller 1	17.21	Diesel	0		Nitrogen Oxides (NOx)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger, and high pressure fuel injection with aftercooler	9.5 T/12MO ROLLING TOTAL		
FL-0338	05/30/2012 &nbsp;ACT	Wireline Unit Diesel Engines - Development Driller 1	17.21	Diesel	0		Nitrogen Oxides (NOx)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, turbocharger with aftercooler, high pressure fuel injection with aftercooler	8.92 TONS		
FL-0338	05/30/2012 &nbsp;ACT	Black Start Air Compressor - C.R. Luigs	17.21	diesel	6 hp		Nitrogen Dioxide (NO2)	Use of good combustion practices based on the current manufacturer's specifications for the engine and the use of low sulfur diesel fuel	0		
FL-0338	05/30/2012 &nbsp;ACT	Cementing and Nitrogen Pump Diesel Engines - C.R. Luigs	17.21	diesel	0		Nitrogen Oxides (NOx)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger, and high pressure fuel injection with aftercooler	8.69 T/12MO ROLLING TOTAL		
FL-0347	09/16/2014 &nbsp;ACT	Diesel Powered Forklift Engine	17.21	Diesel	30 hp		Nitrogen Oxides (NOx)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine	0		
FL-0347	09/16/2014 &nbsp;ACT	Wireline Diesel Engines	17.21	Diesel	0		Nitrogen Oxides (NOx)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine and with turbocharger, aftercooler, and high injection pressure	0		
FL-0347	09/16/2014 &nbsp;ACT	Water Blasting Diesel Engine	17.21	Diesel	208 hp		Nitrogen Oxides (NOx)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine and with turbocharger, aftercooler, and high injection pressure	0		
FL-0347	09/16/2014 &nbsp;ACT	Well Evaluation Diesel Engine	17.21	Diesel	140 hp		Nitrogen Oxides (NOx)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine	0		
FL-0347	09/16/2014 &nbsp;ACT	Fast Rescue Craft Diesel Engine	17.21	Diesel	230 hp		Nitrogen Oxides (NOx)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine and with turbocharger, aftercooler, and high injection pressure	0		
FL-0347	09/16/2014 &nbsp;ACT	Escape Capsule Diesel Engine	17.21	Diesel	39 hp		Nitrogen Oxides (NOx)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine	0		
FL-0347	09/16/2014 &nbsp;ACT	Remotely Operated Vehicle Emergency Generator	17.21	Diesel	427 hp		Nitrogen Oxides (NOx)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0		
FL-0348	05/15/2012 &nbsp;ACT	Main Propulsion Generators	17.21	Diesel	4425 hp		Nitrogen Oxides (NOx)	Use of engine with turbo charger with after cooler, an enhanced work practice power management, NOx emissions maintenance system, and good combustion and maintenance practices based on the current manufacturer's specifications for each engine	26 G/KW-H		26.0
FL-0354	08/25/2015 &nbsp;ACT	Emergency fire pump engine, 300 HP	17.21	Diesel	29 MMBTU/H		Nitrogen Oxides (NOx)	Low-emitting fuel and certified engine	4 G / KWH		4.0



**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - NOx (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
*FL-0367	07/27/2018 &nbsp;ACT	Emergency Fire Pump Engine (347 HP)	17.21	ULSD	8700 gal/year		Nitrogen Oxides (NOx)	Operate and maintain the engine according to the manufacturer's written instructions	4 G/KW-HR		4.0
IA-0105	10/26/2012 &nbsp;ACT	Fire Pump	17.21	diesel fuel	14 GAL/H		Nitrogen Oxides (NOx)	good combustion practices	3.75 G/KW-H		3.8
IL-0114	09/05/2014 &nbsp;ACT	Firewater Pump Engine	17.21	distillate fuel oil	373 hp		Nitrogen Oxides (NOx)	Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7.	3.5 G/KW-H		3.5
IL-0129	07/30/2018 &nbsp;ACT	Firewater Pump Engine	17.21	Ultra-low sulfur diesel	0		Nitrogen Oxides (NOx)		0		
IL-0130	12/31/2018 &nbsp;ACT	Firewater Pump Engine	17.21	Ultra-Low Sulfur Diesel	420 horsepower		Nitrogen Oxides (NOx)		4 G/KW-HR		4.0
IN-0158	12/03/2012 &nbsp;ACT	TWO (2) FIREWATER PUMP DIESEL ENGINES	17.21	DIESEL	371 BHP, EACH		Nitrogen Oxides (NOx)	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	3 G/HP-H		4.0
IN-0173	06/04/2014 &nbsp;ACT	FIRE PUMP	17.21		500 HP		Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES	2.83 G/BHP-H		3.8
IN-0173	06/04/2014 &nbsp;ACT	RAW WATER PUMP	17.21	DIESEL, NO. 2	500 HP		Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES	2.83 G/BHP-H		3.8
IN-0179	09/25/2013 &nbsp;ACT	DIESEL-FIRED EMERGENCY WATER PUMP	17.21	NO. 2 FUEL OIL	481 BHP		Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES	2.86 G/B-HP-H		3.8
IN-0180	06/04/2014 &nbsp;ACT	FIRE PUMP	17.21		500 HP		Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES	2.83 G/B-HP-H		3.8
IN-0180	06/04/2014 &nbsp;ACT	RAW WATER PUMP	17.21	DIESEL, NO. 2	500 HP		Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES	2.83 G/B-HP-H		3.8
IN-0234	12/08/2015 &nbsp;ACT	EMERGENCY FIRE PUMP ENGINE	17.21	DISTILLATE OIL	0		Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES	9.5 G/HP-H		12.7
IN-0295	02/23/2018 &nbsp;ACT	Emergency Diesel Generators	17.21	Deisel	150 hp		Nitrogen Oxides (NOx)		14.06 G/HP-HR		18.9
IN-0295	02/23/2018 &nbsp;ACT	Emergency Diesel Generators	17.21	Diesel	250 hp		Nitrogen Oxides (NOx)		9.2 G/KW-HR		9.2
*KS-0030	03/31/2016 &nbsp;ACT	Compression ignition RICE emergency fire pump	17.21	Ultra-lowsulfur diesel (ULSD)	197 HP		Nitrogen Oxides (NOx)		3 G/HP-HR		4.0
*KS-0036	03/18/2013 &nbsp;ACT	Cummins 6BTA 5.9F-1 Diesel Engine Fire Pump	17.21	No. 2 Fuel Oil	182 BHP		Nitrogen Oxides (NOx)	utilize efficient combustion/ design technology	2 LB/HR		6.7
KY-0110	07/23/2020 &nbsp;ACT	EP 11-01 - Melt Shop Emergency Generator	17.21	Diesel	260 HP		Nitrogen Oxides (NOx)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.98 G/HP-HR		4.0
KY-0110	07/23/2020 &nbsp;ACT	EP 11-02 - Reheat Furnace Emergency Generator	17.21	Diesel	190 HP		Nitrogen Oxides (NOx)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.98 G/HP-HR		4.0
KY-0110	07/23/2020 &nbsp;ACT	EP 11-03 - Rolling Mill Emergency Generator	17.21	Diesel	440 HP		Nitrogen Oxides (NOx)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.98 G/HP-HR		4.0
KY-0110	07/23/2020 &nbsp;ACT	EP 11-04 - IT Emergency Generator	17.21	Diesel	190 HP		Nitrogen Oxides (NOx)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	2.98 G/HP-HR		4.0
KY-0110	07/23/2020 &nbsp;ACT	EP 11-05 - Radio Tower Emergency Generator	17.21	Diesel	61 HP		Nitrogen Oxides (NOx)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	3.5 G/HP-HR		4.7
KY-0115	04/19/2021 &nbsp;ACT	Cold Mill Complex Emergency Generator (EP 09-05)	17.21	Diesel	350 HP		Nitrogen Oxides (NOx)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0		4.0
LA-0251	04/26/2011 &nbsp;ACT	Small Generator Engine	17.21	diesel	193 hp		Nitrogen Oxides (NOx)		1.28 LB/H		4.0
LA-0251	04/26/2011 &nbsp;ACT	Fire Pump Engines - 2 units	17.21	diesel	444 hp		Nitrogen Oxides (NOx)		5.82 LB/H		4.0

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - NOx (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
LA-0301	05/23/2014 &nbsp;ACT	Firewater Pump Nos. 1-3 (EQTs 997, 998, & 999)	17.21	Diesel	500 HP		Nitrogen Oxides (NOx)	Compliance with 40 CFR 60 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures (consistent with safe operation) designed to maximize combustion efficiency and minimize fuel usage	3.21 LB/HR		4.0
LA-0308	09/26/2013 &nbsp;ACT	380 HP Diesel Fired Pump Engine	17.21	Diesel	2.3 MMBTU/hr		Nitrogen Oxides (NOx)	Good combustion and maintenance practices, and compliance with NSPS 40 CFR 60 Subpart IIII	2.92 LB/H		3.0
LA-0309	06/04/2015 &nbsp;ACT	Firewater Pump Engines	17.21	Diesel	288 hp (each)		Nitrogen Oxides (NOx)	Complying with 40 CFR 60 Subpart IIII	3 G/BHP-HR		4.0
LA-0313	08/31/2016 &nbsp;ACT	SCPS Emergency Diesel Firewater Pump 1	17.21	Diesel	282 HP		Nitrogen Oxides (NOx)	Compliance with NESHAP 40 CFR 63 Subpart ZZZZ and NSPS 40 CFR 60 Subpart IIII, and good combustion practices (use of ultra-low sulfur diesel fuel).	1.87 LB/H		4.0
LA-0314	08/03/2016 &nbsp;ACT	Diesel Firewater pump engines (6 units)	17.21	diesel	425 hp		Nitrogen Oxides (NOx)	complying with 40 CFR 63 subpart ZZZZ	0		
LA-0314	08/03/2016 &nbsp;ACT	Diesel emergency generator engine - EGEN	17.21	diesel	350 hp		Nitrogen Oxides (NOx)	complying with 40 CFR 63 subpart ZZZZ	0		
LA-0316	02/17/2017 &nbsp;ACT	firewater pump engines (8 units)	17.21	diesel	460 hp		Nitrogen Dioxide (NO2)	Complying with 40 CFR 60 Subpart IIII	0		
LA-0323	01/09/2017 &nbsp;ACT	Standby Generator No. 9 Engine	17.21	Diesel Fuel	400 hp		Nitrogen Oxides (NOx)	Proper operation and limits on hours of operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0		
LA-0328	05/02/2018 &nbsp;ACT	Emergency Diesel Engine Pump P-39A	17.21	Diesel Fuel	375 HP		Nitrogen Oxides (NOx)	Good combustion practices and NSPS IIII	4 G/KW-H		4.0
LA-0328	05/02/2018 &nbsp;ACT	Emergency Diesel Engine Pump P-39B	17.21	Diesel Fuel	300 HP		Nitrogen Oxides (NOx)	Good combustion practices and NSPS Subpart IIII	4 G/KW-H		4.0
LA-0345	06/13/2019 &nbsp;ACT	IC engines (14 units)	17.21	Diesel	0		Nitrogen Oxides (NOx)	Comply with requirements of 40 CFR 60 Subpart IIII	0		
LA-0349	07/10/2018 &nbsp;ACT	IC Engines (18)	17.21	diesel	0		Nitrogen Oxides (NOx)	Comply with 40 CFR 60 Subpart IIII and Good Combustion Practices	0		
*LA-0370	04/27/2020 &nbsp;ACT	Emergency Fire Pump Engine (EQT0021, ENG-1)	17.21	Diesel	1.1 MM BTU/hr		Nitrogen Oxides (NOx)	The use of low sulfur fuels and compliance with 40 CFR 60 Subpart IIII	1.15 LB/HR		
MA-0039	01/30/2014 &nbsp;ACT	Fire Pump Engine	17.21	ULSD	2.7 MMBTU/H		Nitrogen Oxides (NOx)		3 GM/BHP-H		4.0
MD-0041	04/23/2014 &nbsp;ACT	EMERGENCY GENERATOR	17.21	ULTRA-LOW SULFUR DIESEL	1500 KW		Nitrogen Oxides (NOx)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES, AND LIMITING THE HOURS OF OPERATION	4.8 G/HP-H		6.4
MD-0041	04/23/2014 &nbsp;ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA-LOW SULFUR DIESEL	300 HP		Nitrogen Oxides (NOx)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES, AND LIMITING THE HOURS OF OPERATION	3 G/HP-H		4.0
MD-0042	04/08/2014 &nbsp;ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA LOW SULFUR DIESEL	477 HP		Nitrogen Oxides (NOx)	LIMITED OPERATING HOURS, USE OF ULTRA- LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	3 G/HP-H		4.0
MD-0043	07/01/2014 &nbsp;ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRAL LOW SULFUR DIESEL	350 HP		Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES, LIMITED HOURS OF OPERATION, AND EXCLUSIVE USE OF ULSD	3 G/HP-H		4.0
MD-0044	06/09/2014 &nbsp;ACT	5 EMERGENCY FIRE WATER PUMP ENGINES	17.21	ULTRA LOW SULFUR DIESEL	350 HP		Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES AND DESIGNED TO ACHIEVE EMISSION LIMIT	3 G/HP-H		4.0
MD-0045	11/13/2015 &nbsp;ACT	EMERGENCY GENERATOR	17.21	ULTRA-LOW SULFUR DIESEL	1490 HP		Nitrogen Oxides (NOx)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	6.4 G/KW-H		6.4
MD-0045	11/13/2015 &nbsp;ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA-LOW SULFUR DIESEL	305 HP		Nitrogen Oxides (NOx)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	4 G/KW-H		4.0

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - NOx (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
MD-0046	10/31/2014 &nbsp;ACT	DIESEL-FIRED AUXILIARY (EMERGENCY) ENGINES (TWO)	17.21	ULTRA-LOW SULFUR DIESEL	1500 KW		Nitrogen Oxides (NOx)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	6.4 G/KW-H		6.4
MD-0046	10/31/2014 &nbsp;ACT	DIESEL-FIRED FIRE PUMP ENGINE	17.21	ULTRA-LOW SULFUR DIESEL	300 HP		Nitrogen Oxides (NOx)	EXCLUSIVE USE OF ULTRA LOW SULFUR DIESEL FUEL AND GOOD COMBUSTION PRACTICES	4 G/KW-H		4.0
MI-0400	06/29/2011 &nbsp;ACT	Fire Pump	17.21	Diesel	420 HP		Nitrogen Oxides (NOx)		3 G/HP-H		4.0
MI-0410	07/25/2013 &nbsp;ACT	EU-FPENGINE: Diesel fuel fired emergency backup fire pump	17.21	diesel fuel	315 hp nameplate		Nitrogen Oxides (NOx)	Proper combustion design and ultra low sulfur diesel fuel.	3 G/HP-H		4.0
MI-0412	12/04/2013 &nbsp;ACT	Emergency Engine -- Diesel Fire Pump (EUFENGINE)	17.21	Diesel	165 HP		Nitrogen Oxides (NOx)	Good combustion practices	3 G/HP-H		4.0
MI-0423	01/04/2017 &nbsp;ACT	EUFENGINE (Emergency engine--diesel fire pump)	17.21	Diesel	1.66 MMBTU/H		Nitrogen Oxides (NOx)	Good combustion practices and meeting NSPS Subpart IIII requirements.	3 G/BHP-H		4.0
MI-0424	12/05/2016 &nbsp;ACT	EUFENGINE (Emergency engine--diesel fire pump)	17.21	diesel	500 H/YR		Nitrogen Oxides (NOx)	Good combustion practices.	3 G/HP-H		4.0
MI-0433	06/29/2018 &nbsp;ACT	EUFENGINE (South Plant): Fire pump engine	17.21	Diesel	300 HP		Nitrogen Oxides (NOx)	Good combustion practices and meeting NSPS Subpart IIII requirements.	3 G/BHP-H		4.0
MI-0433	06/29/2018 &nbsp;ACT	EUFENGINE (North Plant): Fire pump engine	17.21	Diesel	300 HP		Nitrogen Oxides (NOx)	Good combustion practices and meeting NSPS Subpart IIII requirements.	3 G/BHP-H		4.0
MI-0434	03/22/2018 &nbsp;ACT	EUFIREPUMPENGs (2 emergency fire pump engines)	17.21	Diesel	250 BHP		Nitrogen Oxides (NOx)	Good combustion practices.	3 G/B-HP-H		4.0
MI-0434	03/22/2018 &nbsp;ACT	EULIFESAFETYENG - One diesel-fueled emergency engine/generator	17.21	Diesel	500 KW		Nitrogen Oxides (NOx)	Good combustion practices.	4 G/KW-H		4.0
MI-0435	07/16/2018 &nbsp;ACT	EUFENGINE: Fire pump engine	17.21	Diesel	399 BHP		Nitrogen Oxides (NOx)	State of the art combustion design.	4 G/KW-H		4.0
*MI-0445	11/26/2019 &nbsp;ACT	EUFENGINE (Emergency engine-diesel fire pump)	17.21	diesel fuel	1.66 MMBTU/H		Nitrogen Oxides (NOx)	Good Combustion Practices and meeting NSPS Subpart IIII requirements	3 G/BHP-H		4.0
NJ-0081	03/07/2014 &nbsp;ACT	Emergency diesel fire pump	17.21	Ultra Low Sulfur Distillate oil	0		Nitrogen Oxides (NOx)		1.75 LB/H		4.0
NJ-0084	03/10/2016 &nbsp;ACT	Emergency Diesel Fire Pump	17.21	ULSD	100 H/YR		Nitrogen Oxides (NOx)	use of ULSD a clean burning fuel, and limited hours of operation	1.7 LB/H		
NJ-0085	07/19/2016 &nbsp;ACT	EMERGENCY GENERATOR DIESEL	17.21	DIESEL OIL	0 100 H/YR		Nitrogen Oxides (NOx)	Use of Ultra Low Sulfur Diesel (ULSD) Oil a clean burning fuel and limited hours of operation	20.6 LB/H		
NJ-0085	07/19/2016 &nbsp;ACT	EMERGENCY DIESEL FIRE PUMP	17.21	ULSD	100 H/YR		Nitrogen Oxides (NOx)	Use of Ultra Low Sulfur Diesel (ULSD) Oil a clean burning fuel and limited hours of operation	2.05 LB/H		
NY-0103	02/03/2016 &nbsp;ACT	Emergency fire pump	17.21	ultra low sulfur diesel	460 hp		Nitrogen Oxides (NOx)	Compliance demonstrated with vendor emission certification and adherence to vendor-specified maintenance recommendations.	2.6 G/BHP-H		3.5
OH-0352	06/18/2013 &nbsp;ACT	Emergency fire pump engine	17.21	diesel	300 HP		Nitrogen Oxides (NOx)	Purchased certified to the standards in NSPS Subpart IIII	1.7 LB/H		3.5
OH-0360	11/05/2013 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	diesel	400 HP		Nitrogen Oxides (NOx)	Purchased certified to the standards in NSPS Subpart IIII	2.3 LB/H		3.5
OH-0363	11/05/2014 &nbsp;ACT	Emergency Fire Pump Engine (P003)	17.21	Diesel fuel	260 HP		Nitrogen Oxides (NOx)	Emergency operation only, < 500 hours/year each for maintenance checks and readiness testing designed to meet NSPS Subpart IIII	1.72 LB/H		4.0

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - NOx (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
OH-0366	08/25/2015 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	140 HP		Nitrogen Oxides (NOx)	State-of-the-art combustion design	0.81 LB/H		3.5
OH-0367	09/23/2016 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	311 HP		Nitrogen Oxides (NOx)	State-of-the-art combustion design	1.79 LB/H		3.5
OH-0368	04/19/2017 &nbsp;ACT	Emergency Fire Pump Diesel Engine (P008)	17.21	Diesel fuel	460 HP		Nitrogen Oxides (NOx)	good combustion control and operating practices and engines designed to meet the stands of 40 CFR Part 60, Subpart IIII	0.3 LB/H		0.4
OH-0370	09/07/2017 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Nitrogen Oxides (NOx)	State-of-the-art combustion design	1.97 LB/H		4.0
OH-0372	09/27/2017 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Nitrogen Oxides (NOx)	State-of-the-art combustion design	1.97 LB/H		4.0
OH-0374	10/23/2017 &nbsp;ACT	Emergency Fire Pump (P006)	17.21	Diesel fuel	410 HP		Nitrogen Oxides (NOx)	Certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII. Good combustion practices per the manufacturera€™s operating manual	2.7 LB/H		4.0
OH-0376	02/09/2018 &nbsp;ACT	Emergency diesel-fueled fire pump (P006)	17.21	Diesel fuel	250 HP		Nitrogen Oxides (NOx)	Comply with NSPS 40 CFR 60 Subpart IIII	1.6 LB/H		4.0
OH-0377	04/19/2018 &nbsp;ACT	Emergency Fire Pump (P004)	17.21	Diesel fuel	320 HP		Nitrogen Oxides (NOx)	Good combustion practices (ULSD) and compliance with 40 CFR Part 60, Subpart IIII	2.12 LB/H		4.0
OH-0378	12/21/2018 &nbsp;ACT	Firewater Pumps (P005 and P006)	17.21	Diesel fuel	402 HP		Nitrogen Oxides (NOx)	Certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII and employ good combustion practices per the manufacturera€™s operating manual	2.64 LB/H		4.0
OH-0379	02/06/2019 &nbsp;ACT	Black Start Generator (P007)	17.21	Diesel fuel	158 HP		Nitrogen Oxides (NOx)	Tier IV engine Tier IV NSPS standards certified by engine manufacturer.	0.104 LB/H		0.4
PA-0278	10/10/2012 &nbsp;ACT	Fire Pump	17.21	Diesel	0		Nitrogen Oxides (NOx)		2.6 G/B-HP-H		3.5
*PA-0282	06/01/2012 &nbsp;ACT	400-KW DIESEL EMERGENCY GENERATOR	17.21	#2 Oil	29.2 GAL/H		Nitrogen Oxides (NOx)		6.9 G/B-HP-H		9.3
PA-0286	01/31/2013 &nbsp;ACT	Fire Pump Engine - 460 BHP	17.21	Diesel	0		Nitrogen Oxides (NOx)		2.6 G/HP-H		3.5
PA-0291	04/23/2013 &nbsp;ACT	EMERGENCY FIREWATER PUMP	17.21	ULTRA LOW SULFUR DISTILLATE	3.25 MMBTU/H		Nitrogen Oxides (NOx)		1.86 LB/H		
PA-0296	12/17/2013 &nbsp;ACT	Emergency Firewater Pump	17.21	Diesel	16 Gal/hr		Nitrogen Oxides (NOx)		0.09 T/YR		
PA-0309	12/23/2015 &nbsp;ACT	Fire pump engine	17.21	Ultra-low sulfur diesel	15 gal/hr		Nitrogen Oxides (NOx)		3 GM/HP-HR		4.0
PA-0310	09/02/2016 &nbsp;ACT	Emergency Fire Pump Engine	17.21	ULSD	0		Nitrogen Oxides (NOx)		3 G/BHP-HR		4.0
*PA-0326	02/18/2021 &nbsp;ACT	Emergency Generator Parking Garage	17.21	Diesel	0		Nitrogen Oxides (NOx)	Use of certified engines, design of engines to include turbocharger and an intercooler/aftercooler, good combustion practices and proper operation and maintenance including certification to applicable federal emission standards	2.37 GRAM		3.2
*PA-0326	02/18/2021 &nbsp;ACT	Emergency GeneratorTelecom Hut & Tower	17.21	diesel	0		Nitrogen Oxides (NOx)	The use of certified engines, design of engines to include turbocharger and an intercooler/aftercooler, good combustion practices and proper operation and maintenance including certification to applicable federal emission standards	2.83 G		3.8
PR-0009	04/10/2014 &nbsp;ACT	Emergency Diesel Fire Pump	17.21	ULSD Fuel Oil #2	0		Nitrogen Oxides (NOx)		2.85 G/B-HP-H		3.8
SC-0113	02/08/2012 &nbsp;ACT	EMERGENCY ENGINE 1 THRU 8	17.21	DIESEL	29 HP		Nitrogen Oxides (NOx)	PURCHASE OF CERTIFIED ENGINE.	7.5 GR/KW-H		7.5

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - NOx (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
SC-0113	02/08/2012 &nbsp;ACT	FIRE PUMP	17.21	DIESEL	500 HP		Nitrogen Oxides (NOx)	PURCHASE OF CERTIFIED ENGINE BASED ON NSPS, SUBPART IIII.	4 GR/KW-H		4.0
SC-0182	10/31/2017 &nbsp;ACT	Emergency Fire Pumps	17.21		0		Nitrogen Oxides (NOx)	Use of Ultra Low Sulfur Diesel Fuel (15 ppm), good combustion, operation, and maintenance practices; compliance with NESHAP Subpart ZZZZ.	200 OPERATING HR/YR		
TX-0706	01/23/2014 &nbsp;ACT	Emergency Engines	17.21	Ultra-low sulfur diesel	0		Nitrogen Oxides (NOx)		0.33 TPY		
TX-0846	09/23/2018 &nbsp;ACT	FIRE PUMP DIESEL ENGINE	17.21	NO 2 DIESEL	214 kW		Nitrogen Oxides (NOx)	Meets EPA Tier 4 requirements	0.4 G/KW		0.4
TX-0864	09/09/2019 &nbsp;ACT	EMERGENCY DIESEL ENGINE	17.21	Ultra-low sulfur diesel	0		Nitrogen Oxides (NOx)	Tier 4 exhaust emission standards specified at 40 CFR Â§ 1039.101(b)	0		
TX-0886	03/31/2020 &nbsp;ACT	EMERGENCY DIESEL ENGINE	17.21	Ultra-low sulfur diesel	0		Nitrogen Oxides (NOx)	Limited operating hours, good combustion practices meets NSPS IIII Tier 3 engine	0		
*TX-0908	08/27/2021 &nbsp;ACT	Emergency Engine	17.21	natural gas	74 KW		Nitrogen Oxides (NOx)	Meet the requirements of 40 CFR Part 60, Subpart IIII. Firing ultra-low diesel fuel. Limited to 100 hrs/yr of non-emergency operation.	100 HR/YR		
VA-0325	06/17/2016 &nbsp;ACT	DIESEL-FIRED WATER PUMP 376 bph (1)	17.21	DIESEL FUEL	0		Nitrogen Oxides (NOx)	Good Combustion Practices/Maintenance	0		
VA-0328	04/26/2018 &nbsp;ACT	Emergency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Nitrogen Oxides (NOx)	Good combustion practices and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	3 G/HP-HR		4.0
VA-0332	06/24/2019 &nbsp;ACT	Emegency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Nitrogen Oxides (NOx)	good combustion practices, high efficiency design, and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	3 G/HP-HR		4.0
WI-0263	02/15/2016 &nbsp;ACT	Fire pump (process P05)	17.21	Diesel	1.27 mmBtu/hr		Nitrogen Oxides (NOx)	Good combustion practices, use diesel fuel, and operate <500 hr/yr	0		
*WI-0271	06/05/2015 &nbsp;ACT	P10K â€ Diesel Powered Emergency Generator	17.21	Distillate Fuel	0		Nitrogen Oxides (NOx)	Expected NOx emission without controls are 0.59 tons/year and 5.9 pounds/hour. Given this low rate of NOx emissions, due to the 200 hour/year operational limitation, the Department believes, based on engineering judgment, that controls are not economically feasible for this unit. Thus, the RICE MACT remains the only control option.	5.9 LB/HR		
*WI-0291	01/28/2019 &nbsp;ACT	P04 Emergency Diesel Generator	17.21	Diesel Fuel	0.22 mmBTU/hr		Nitrogen Oxides (NOx)	Good Combustion Practices	4.7 G/KWH		4.7
WV-0025	11/21/2014 &nbsp;ACT	Fire Pump Engine	17.21	Diesel	251 HP		Nitrogen Oxides (NOx)		0		4.0
WY-0070	08/28/2012 &nbsp;ACT	Diesel Fire Pump Engine (EP16)	17.21	Ultra Low Sulfur Diesel	327 hp		Nitrogen Oxides (NOx)	EPA Tier 3 rated	0		
WY-0071	10/15/2012 &nbsp;ACT	Emergency Air Compressor	17.21	Ultra Low Sulfur Diesel	400 hp		Nitrogen Oxides (NOx)	EPA Tier 3 Rated Diesel Engine	0		

## Std Units

Limit
g/kW-hr
0.20

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
AR-0168	03/17/2021 &nbsp;ACT	Emergency Engines	17.21	Diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	0.2 G/KW-HR		0.20
AR-0168	03/17/2021 &nbsp;ACT	Emergency Engines	17.21	Diesel	0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	0.2 G/KW-HR		0.20
AR-0171	02/14/2019 &nbsp;ACT	SN-106 Cold Mill 1 Diesel Fired Emergency Generator	17.21	Diesel	1073 bhp		Particulate matter, filterable (FPM)	Good operating practices.	0.25 G/KW-HR		0.25
AR-0171	02/14/2019 &nbsp;ACT	SN-106 Cold Mill 1 Diesel Fired Emergency Generator	17.21	Diesel	1073 bhp		Particulate matter, total &lt; 10 Åµ (TPM10)	Good operating practices.	0.2 G/KW-HR		0.20
AR-0171	02/14/2019 &nbsp;ACT	SN-106 Cold Mill 1 Diesel Fired Emergency Generator	17.21	Diesel	1073 bhp		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Good operating practices.	0.2 G/KW-HR		0.20
CA-1192	06/21/2011 &nbsp;ACT	EMERGENCY FIREWATER PUMP ENGINE	17.21	DIESEL	288 HP		Particulate matter, total (TPM)	USE ULTRA LOW SULFUR FUELNOT TO EXCEED 15 PPMVD FUEL SULFUR, OPERATIONAL LIMIT OF 50 HRS/YR	0		
CA-1192	06/21/2011 &nbsp;ACT	EMERGENCY FIREWATER PUMP ENGINE	17.21	DIESEL	288 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	USE ULTRA LOW SULFUR FUEL NOT TO EXCEED 15 PPMVD FUEL SULFUR, OPERATIONAL LIMIT OF 50 HRS/YR	0		
CA-1212	10/18/2011 &nbsp;ACT	EMERGENCY IC ENGINE	17.21	DIESEL	182 HP		Particulate matter, total (TPM)	USE ULTRA LOW SULFUR FUEL	0.2 G/KW-H		0.20
CA-1212	10/18/2011 &nbsp;ACT	EMERGENCY IC ENGINE	17.21	DIESEL	182 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	USE ULTRA LOW SULFUR FUEL	0.2 G/KW-H		0.20
CA-1212	10/18/2011 &nbsp;ACT	EMERGENCY IC ENGINE	17.21	DIESEL	182 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	USE ULTRA LOW SULFUR FUEL	0.2 G/KW-H		0.20
FL-0338	05/30/2012 &nbsp;ACT	Wireline Unit Engines - C.R. Luigs	17.21	diesel	300 hp		Particulate matter, total (TPM)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel	0.6 T/12MO ROLLING TOTAL		
FL-0338	05/30/2012 &nbsp;ACT	Fast Rescue Craft Diesel Engine - Development Driller 1	17.21	Diesel	142 hp		Particulate matter, total (TPM)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel	0		
FL-0338	05/30/2012 &nbsp;ACT	Life Boat Diesel Engines - Development Driller 1	17.21	Diesel	110 hp		Particulate matter, total (TPM)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines and use of low sulfur diesel	0		
FL-0338	05/30/2012 &nbsp;ACT	Port and Stb Fwd and Aft Crane Diesel Engines - C.R. Luigs	17.21	diesel	305 HP		Particulate matter, total (TPM)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel	5.88 T/12MO ROLLING TOTAL		
FL-0338	05/30/2012 &nbsp;ACT	Port and Stb Fwd and Aft Crane Diesel Engines - C.R. Luigs	17.21	diesel	305 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel	5.88 T/12MO ROLLING TOTAL		
FL-0338	05/30/2012 &nbsp;ACT	Port and Stb Fwd and Aft Crane Diesel Engines - C.R. Luigs	17.21	diesel	305 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel	5.88 T/12MO ROLLING TOTAL		
FL-0338	05/30/2012 &nbsp;ACT	Seismic Operations Diesel Engines - Development Driller 1	17.21	Diesel	415 hp		Particulate matter, total (TPM)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel	0.11 TONS		
FL-0338	05/30/2012 &nbsp;ACT	Life Boat Diesel Engines - C.R. Luigs	17.21	diesel	39 hp		Particulate matter, fugitive	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel	0		
FL-0338	05/30/2012 &nbsp;ACT	Cementing and Nitrogen Pump Diesel Engines - Development Driller 1	17.21	Diesel	0		Particulate matter, total (TPM)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel	0.41 T/12MO ROLLING TOTAL		
FL-0338	05/30/2012 &nbsp;ACT	Cementing and Nitrogen Pump Diesel Engines - Development Driller 1	17.21	Diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel	0.25 T/12MO ROLLING TOTAL		

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
FL-0338	05/30/2012 &nbsp;   ACT	Cementing and Nitrogen Pump Diesel Engines - Development Driller 1	17.21	Diesel	0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel	0.25 T/12MO ROLLING TOTAL		
FL-0338	05/30/2012 &nbsp;   ACT	Wireline Unit Diesel Engines - Development Driller 1	17.21	Diesel	0		Particulate matter, total (TPM)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel	0.6 TONS		
FL-0338	05/30/2012 &nbsp;   ACT	Black Start Air Compressor - C.R. Luigs	17.21	diesel	6 hp		Particulate matter, total (TPM)	Use of good combustion practices based on the current manufacturerâ€™s specifications for the engine and the use of low sulfur	0		
FL-0338	05/30/2012 &nbsp;   ACT	Cementing and Nitrogen Pump Diesel Engines - C.R. Luigs	17.21	diesel	0		Particulate matter, total (TPM)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel	0.38 T/12MO ROLLING TOTAL		
FL-0338	05/30/2012 &nbsp;   ACT	Cementing and Nitrogen Pump Diesel Engines - C.R. Luigs	17.21	diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel	0.23 TONS		
FL-0338	05/30/2012 &nbsp;   ACT	Cementing and Nitrogen Pump Diesel Engines - C.R. Luigs	17.21	diesel	0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel	0.22 TONS		
FL-0346	04/22/2014 &nbsp;   ACT	Emergency fire pump engine (300 HP)	17.21	USLD	29 MMBTU/H		Particulate matter, total (TPM)	Good combustion practice	0.2 GRAM PER HP-HR		0.27
FL-0347	09/16/2014 &nbsp;   ACT	Diesel Powered Forklift Engine	17.21	Diesel	30 hp		Particulate matter, total (TPM)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine	0		
FL-0347	09/16/2014 &nbsp;   ACT	Wireline Diesel Engines	17.21	Diesel	0		Particulate matter, total (TPM)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine and with turbocharger,	0		
FL-0347	09/16/2014 &nbsp;   ACT	Water Blasting Diesel Engine	17.21	Diesel	208 hp		Particulate matter, total (TPM)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine and with turbocharger,	0		
FL-0347	09/16/2014 &nbsp;   ACT	Well Evaluation Diesel Engine	17.21	Diesel	140 hp		Particulate matter, total (TPM)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine	0		
FL-0347	09/16/2014 &nbsp;   ACT	Fast Rescue Craft Diesel Engine	17.21	Diesel	230 hp		Particulate matter, total (TPM)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine and with turbocharger,	0		
FL-0347	09/16/2014 &nbsp;   ACT	Escape Capsule Diesel Engine	17.21	Diesel	39 hp		Particulate matter, total (TPM)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine	0		
FL-0347	09/16/2014 &nbsp;   ACT	Remotely Operated Vehicle Emergency Generator	17.21	Diesel	427 hp		Particulate matter, total (TPM)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger,	0		
FL-0354	08/25/2015 &nbsp;   ACT	Emergency fire pump engine, 300 HP	17.21	Diesel	29 MMBTU/H		Particulate matter, total (TPM)	Low-emitting fuel and certified engine	0.2 G / KWH		0.20
FL-0356	03/09/2016 &nbsp;   ACT	One 422-hp emergency fire pump engine	17.21	ULSD	0		Particulate matter, total (TPM)	Use of clean fuel	0.2 G / KW-HR		0.20
*FL-0363	12/04/2017 &nbsp;   ACT	Emergency Fire Pump Engine (422 hp)	17.21	ULSD	0		Particulate matter, filterable (FPM)	Certified engine	0.2 G / KWH		0.20
*FL-0367	07/27/2018 &nbsp;   ACT	Emergency Fire Pump Engine (347 HP)	17.21	ULSD	8700 gal/year		Particulate matter, filterable (FPM)	Operate and maintain the engine according to the manufacturer's written instructions	0.2 G/KW-HOUR		0.20
IA-0105	10/26/2012 &nbsp;   ACT	Fire Pump	17.21	diesel fuel	14 GAL/H		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	good combustion practices	0.2 G/KW-H		0.20
IA-0105	10/26/2012 &nbsp;   ACT	Fire Pump	17.21	diesel fuel	14 GAL/H		Particulate matter, total &lt; 10 Åµ (TPM10)	good combustion practices	0.2 G/KW-H		0.20



**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
IA-0105	10/26/2012 &nbsp;   ACT	Fire Pump	17.21	diesel fuel	14 GAL/H		Particulate matter, total (TPM)	good combustion practices	0.2 G/KW-H		0.20
IL-0114	09/05/2014 &nbsp;   ACT	Firewater Pump Engine	17.21	distillate fuel oil	373 hp		Particulate matter, filterable (FPM)	Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7.	0.1 G/KW-H		0.10
IL-0114	09/05/2014 &nbsp;   ACT	Firewater Pump Engine	17.21	distillate fuel oil	373 hp		Particulate matter, total &lt; 10 Åµ (TPM10)	Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7.	0.1 G/KW-H		0.10
IL-0114	09/05/2014 &nbsp;   ACT	Firewater Pump Engine	17.21	distillate fuel oil	373 hp		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7.	0.1 G/KW-H		0.10
IL-0129	07/30/2018 &nbsp;   ACT	Firewater Pump Engine	17.21	Ultra-low sulfur diesel	0		Particulate matter, total (TPM)		0		
IL-0130	12/31/2018 &nbsp;   ACT	Firewater Pump Engine	17.21	Ultra-Low Sulfur Diesel	420 horsepower		Particulate matter, total (TPM)		0.2 G/KW-HR		0.20
IN-0158	12/03/2012 &nbsp;   ACT	TWO (2) FIREWATER PUMP DIESEL ENGINES	17.21	DIESEL	371 BHP, EACH		Particulate matter, filterable (FPM)	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	0.15 G/HP-H		0.20
IN-0158	12/03/2012 &nbsp;   ACT	TWO (2) FIREWATER PUMP DIESEL ENGINES	17.21	DIESEL	371 BHP, EACH		Particulate matter, filterable &lt; 10 Åµ (FPM10)	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	0.15 G/HP-H		0.20
IN-0158	12/03/2012 &nbsp;   ACT	TWO (2) FIREWATER PUMP DIESEL ENGINES	17.21	DIESEL	371 BHP, EACH		Particulate matter, filterable &lt; 2.5 Åµ (FPM2.5)	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	0.15 G/HP-H		0.20
IN-0173	06/04/2014 &nbsp;   ACT	FIRE PUMP	17.21		500 HP		Particulate matter, filterable (FPM)	GOOD COMBUSTION PRACTICES	0.15 G/BHP-H		0.20
IN-0173	06/04/2014 &nbsp;   ACT	FIRE PUMP	17.21		500 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	GOOD COMBUSTION PRACTICES	0.15 G/BHP-H		0.20
IN-0173	06/04/2014 &nbsp;   ACT	FIRE PUMP	17.21		500 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	GOOD COMBUSTION PRACTICES	0.15 G/BHP-H		0.20
IN-0173	06/04/2014 &nbsp;   ACT	RAW WATER PUMP	17.21	DIESEL, NO. 2	500 HP		Particulate matter, filterable (FPM)	GOOD COMBUSTION PRACTICES	0.15 G/BHP-H		0.20
IN-0173	06/04/2014 &nbsp;   ACT	RAW WATER PUMP	17.21	DIESEL, NO. 2	500 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	GOOD COMBUSTION PRACTICES	0.15 G/BHP-H		0.20
IN-0173	06/04/2014 &nbsp;   ACT	RAW WATER PUMP	17.21	DIESEL, NO. 2	500 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	GOOD COMBUSTION PRACTICES	0.15 G/BHP-H		0.20
IN-0179	09/25/2013 &nbsp;   ACT	DIESEL-FIRED EMERGENCY WATER PUMP	17.21	NO. 2 FUEL OIL	481 BHP		Particulate matter, filterable (FPM)	GOOD COMBUSTION PRACTICES	0.15 G/B-HP-H		0.20
IN-0179	09/25/2013 &nbsp;   ACT	DIESEL-FIRED EMERGENCY WATER PUMP	17.21	NO. 2 FUEL OIL	481 BHP		Particulate matter, total &lt; 10 Åµ (TPM10)	GOOD COMBUSTION PRACTICES	0.15 G/B-HP-H		0.20
IN-0179	09/25/2013 &nbsp;   ACT	DIESEL-FIRED EMERGENCY WATER PUMP	17.21	NO. 2 FUEL OIL	481 BHP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	GOOD COMBUSTION PRACTICES	0.15 G/B-HP-H		0.20
IN-0180	06/04/2014 &nbsp;   ACT	FIRE PUMP	17.21		500 HP		Particulate matter, filterable (FPM)	GOOD COMBUSTION PRACTICES	0.15 G/B-HP-H		0.20
IN-0180	06/04/2014 &nbsp;   ACT	FIRE PUMP	17.21		500 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	GOOD COMBUSTION PRACTICES	0.15 G/B-HP-H		0.20

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
IN-0180	06/04/2014 &nbsp;ACT	FIRE PUMP	17.21		500 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	GOOD COMBUSTION PRACTICES	0.15 G/B-HP-H		0.20
IN-0180	06/04/2014 &nbsp;ACT	RAW WATER PUMP	17.21	DIESEL, NO. 2	500 HP		Particulate matter, filterable (FPM)	GOOD COMBUSTION PRACTICES	0.15 G/B-HP-H		0.20
IN-0180	06/04/2014 &nbsp;ACT	RAW WATER PUMP	17.21	DIESEL, NO. 2	500 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	GOOD COMBUSTION PRACTICES	0.15 G/B-HP-H		0.20
IN-0180	06/04/2014 &nbsp;ACT	RAW WATER PUMP	17.21	DIESEL, NO. 2	500 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	GOOD COMBUSTION PRACTICES	0.15 G/B-HP-H		0.20
IN-0234	12/08/2015 &nbsp;ACT	EMERGENCY FIRE PUMP ENGINE	17.21	DISTILLATE OIL	0		Particulate matter, filterable (FPM)	GOOD COMBUSTION PRACTICES	0.16 G/HP-H		0.21
IN-0234	12/08/2015 &nbsp;ACT	EMERGENCY FIRE PUMP ENGINE	17.21	DISTILLATE OIL	0		Particulate matter, total &lt; 10 Åµ (TPM10)	GOOD COMBUSTION PRACTICES	0.16 G/HP-H		0.21
IN-0295	02/23/2018 &nbsp;ACT	Emergency Diesel Generators	17.21	Deisel	150 hp		Particulate matter, filterable (FPM)		1.34 G/KW-HR		1.34
IN-0295	02/23/2018 &nbsp;ACT	Emergency Diesel Generators	17.21	Deisel	150 hp		Particulate matter, filterable &lt; 10 Åµ (FPM10)		1.34 G/KW-HR		1.34
IN-0295	02/23/2018 &nbsp;ACT	Emergency Diesel Generators	17.21	Diesel	250 hp		Particulate matter, filterable (FPM)		0.54 G/KW-HR		0.54
IN-0295	02/23/2018 &nbsp;ACT	Emergency Diesel Generators	17.21	Diesel	250 hp		Particulate matter, filterable &lt; 10 Åµ (FPM10)		1.34 G/KW-HR		1.34
KS-0029	07/14/2015 &nbsp;ACT	Emergency diesel engine	17.21	diesel	750 KW		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Low sulfur fuel oil (<15 ppm sulfur)	0.15 G PER BHP-HR		0.20
KS-0029	07/14/2015 &nbsp;ACT	Emergency diesel engine	17.21	diesel	750 KW		Particulate matter, total &lt; 10 Åµ (TPM10)	Low sulfur fuel oil (<15 ppm sulfur)	0.15 G PER BHP-HR		0.20
KS-0029	07/14/2015 &nbsp;ACT	Emergency diesel engine	17.21	diesel	750 KW		Particulate matter, total (TPM)	Low sulfur fuel oil (<15 ppm sulfur)	0.15 G PER BHP-HR		0.20
*KS-0030	03/31/2016 &nbsp;ACT	Compression ignition RICE emergency fire pump	17.21	Ultra-lowsulfur diesel (ULSD)	197 HP		Particulate matter, total (TPM)		0.15 G/HP-HR		0.20
*KS-0030	03/31/2016 &nbsp;ACT	Compression ignition RICE emergency fire pump	17.21	Ultra-lowsulfur diesel (ULSD)	197 HP		Particulate matter, total &lt; 10 Åµ (TPM10)		0.15 G/HP-HR		0.20
*KS-0030	03/31/2016 &nbsp;ACT	Compression ignition RICE emergency fire pump	17.21	Ultra-lowsulfur diesel (ULSD)	197 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)		0.15 G/HP-HR		0.20
*KS-0036	03/18/2013 &nbsp;ACT	Cummins 6BTA 5.9F-1 Diesel Engine Fire Pump	17.21	No. 2 Fuel Oil	182 BHP		Particulate matter, total &lt; 10 Åµ (TPM10)	utilize efficient combustion/design technology	0.25 G/BHP-H		0.34
*KS-0036	03/18/2013 &nbsp;ACT	Cummins 6BTA 5.9F-1 Diesel Engine Fire Pump	17.21	No. 2 Fuel Oil	182 BHP		Particulate matter, total (TPM)	utilize efficient combustion/design technology	0.25 G/BHP-H		0.34
KY-0110	07/23/2020 &nbsp;ACT	EP 11-01 - Melt Shop Emergency Generator	17.21	Diesel	260 HP		Particulate matter, filterable (FPM)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		0.20
KY-0110	07/23/2020 &nbsp;ACT	EP 11-01 - Melt Shop Emergency Generator	17.21	Diesel	260 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		0.20

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
KY-0110	07/23/2020 &nbsp;ACT	EP 11-01 - Melt Shop Emergency Generator	17.21	Diesel	260 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		0.20
KY-0110	07/23/2020 &nbsp;ACT	EP 11-02 - Reheat Furnace Emergency Generator	17.21	Diesel	190 HP		Particulate matter, filterable (FPM)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		0.20
KY-0110	07/23/2020 &nbsp;ACT	EP 11-02 - Reheat Furnace Emergency Generator	17.21	Diesel	190 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		0.20
KY-0110	07/23/2020 &nbsp;ACT	EP 11-02 - Reheat Furnace Emergency Generator	17.21	Diesel	190 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		0.20
KY-0110	07/23/2020 &nbsp;ACT	EP 11-03 - Rolling Mill Emergency Generator	17.21	Diesel	440 HP		Particulate matter, filterable (FPM)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		0.20
KY-0110	07/23/2020 &nbsp;ACT	EP 11-03 - Rolling Mill Emergency Generator	17.21	Diesel	440 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		0.20
KY-0110	07/23/2020 &nbsp;ACT	EP 11-03 - Rolling Mill Emergency Generator	17.21	Diesel	440 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		0.20
KY-0110	07/23/2020 &nbsp;ACT	EP 11-04 - IT Emergency Generator	17.21	Diesel	190 HP		Particulate matter, filterable (FPM)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		0.20
KY-0110	07/23/2020 &nbsp;ACT	EP 11-04 - IT Emergency Generator	17.21	Diesel	190 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		0.20
KY-0110	07/23/2020 &nbsp;ACT	EP 11-04 - IT Emergency Generator	17.21	Diesel	190 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.15 G/HP-HR		0.20
KY-0110	07/23/2020 &nbsp;ACT	EP 11-05 - Radio Tower Emergency Generator	17.21	Diesel	61 HP		Particulate matter, filterable (FPM)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.3 G/HP-HR		0.40
KY-0110	07/23/2020 &nbsp;ACT	EP 11-05 - Radio Tower Emergency Generator	17.21	Diesel	61 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.3 G/HP-HR		0.40
KY-0110	07/23/2020 &nbsp;ACT	EP 11-05 - Radio Tower Emergency Generator	17.21	Diesel	61 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0.3 G/HP-HR		0.40
KY-0115	04/19/2021 &nbsp;ACT	Cold Mill Complex Emergency Generator (EP 09-05)	17.21	Diesel	350 HP		Particulate matter, filterable (FPM)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0.15 G/HP-HR		0.20
KY-0115	04/19/2021 &nbsp;ACT	Cold Mill Complex Emergency Generator (EP 09-05)	17.21	Diesel	350 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0.15 G/HP-HR		0.20
KY-0115	04/19/2021 &nbsp;ACT	Cold Mill Complex Emergency Generator (EP 09-05)	17.21	Diesel	350 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	The permittee must develop a Good Combustion and Operating Practices (GCOP) Plan	0.15 G/HP-HR		0.20
LA-0251	04/26/2011 &nbsp;ACT	Small Generator Engine	17.21	diesel	193 hp		Particulate matter, filterable &lt; 10 Åµ (FPM10)		0.01 LB/H		0.20
LA-0251	04/26/2011 &nbsp;ACT	Fire Pump Engines - 2 units	17.21	diesel	444 hp		Particulate matter, filterable &lt; 10 Åµ (FPM10)		0.01 LB/H		0.20
LA-0254	08/16/2011 &nbsp;ACT	EMERGENCY FIRE PUMP	17.21	DIESEL	350 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	ULTRA LOW SULFUR DIESEL AND GOOD COMBUSTION PRACTICES	0.15 G/HP-H		0.20
LA-0254	08/16/2011 &nbsp;ACT	EMERGENCY FIRE PUMP	17.21	DIESEL	350 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	ULTRA LOW SULFUR DIESEL AND GOOD COMBUSTION PRACTICES	0.15 G/HP-H		0.20

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
LA-0301	05/23/2014 &nbsp;   ACT	Firewater Pump Nos. 1-3 (EQTs 997, 998, &nbsp;& 999)	17.21	Diesel	500 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Compliance with 40 CFR 60 Subpart IIII and operating the engine in accordance with the engine manufacturerâ€™s instructions	0.17 LB/HR		0.20
LA-0301	05/23/2014 &nbsp;   ACT	Firewater Pump Nos. 1-3 (EQTs 997, 998, &nbsp;& 999)	17.21	Diesel	500 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Compliance with 40 CFR 60 Subpart IIII and operating the engine in accordance with the engine manufacturerâ€™s instructions	0.17 LB/HR		0.20
*LA-0306	12/20/2016 &nbsp;   ACT	Genenerator Engine DEG-16-1 (EQT035)	17.21	Diesel	460 horsepower		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Meet NSPS Subpart IIII Limitations and Good Combustion Practices	0.18 LB/H		0.24
*LA-0306	12/20/2016 &nbsp;   ACT	Pump Engines DFP-16-1 (EQT036)	17.21	Diesel	225 horsepower		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Meet NSPS Subpart IIII Limitations and Good Combustion Practices	0.09 LB/H		0.24
*LA-0306	12/20/2016 &nbsp;   ACT	Pump Engine DFP-16-2 (EQT037)	17.21	Diesel	225 horsepower		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Meet NSPS Subpart IIII Limitations and Good Combustion Practices	0.09 LB/H		0.24
LA-0308	09/26/2013 &nbsp;   ACT	380 HP Diesel Fired Pump Engine	17.21	Diesel	2.3 MMBTU/hr		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion and maintenance practices, and compliance with NSPS 40 CFR 60 Subpart IIII	0.15 LB/H		0.20
LA-0308	09/26/2013 &nbsp;   ACT	380 HP Diesel Fired Pump Engine	17.21	Diesel	2.3 MMBTU/hr		Particulate matter, filterable &lt; 2.5 Åµ (FPM2.5)	Good combustion and maintenance practices, and compliance with NSPS 40 CFR 60 Subpart IIII	0.15 LB/H		0.20
LA-0309	06/04/2015 &nbsp;   ACT	Firewater Pump Engines	17.21	Diesel	288 hp (each)		Particulate matter, total &lt; 10 Åµ (TPM10)	Complying with 40 CFR 60 Subpart IIII	0.15 G/BHP-HR		0.20
LA-0309	06/04/2015 &nbsp;   ACT	Firewater Pump Engines	17.21	Diesel	288 hp (each)		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Complying with 40 CFR 60 Subpart IIII	0.15 G/BHP-HR		0.20
LA-0313	08/31/2016 &nbsp;   ACT	SCPS Emergency Diesel Firewater Pump 1	17.21	Diesel	282 HP		Particulate matter, filterable &lt; 10 Åµ (FPM10)	Compliance with NESHAP 40 CFR 63 Subpart ZZZZ and NSPS 40 CFR 60 Subpart IIII, and good combustion practices (use of	0.09 LB/H		0.20
LA-0313	08/31/2016 &nbsp;   ACT	SCPS Emergency Diesel Firewater Pump 1	17.21	Diesel	282 HP		Particulate matter, filterable &lt; 2.5 Åµ (FPM2.5)	Compliance with NESHAP 40 CFR 63 Subpart ZZZZ and NSPS 40 CFR 60 Subpart IIII, and good combustion practices (use of	0.09 LB/H		0.19
LA-0314	08/03/2016 &nbsp;   ACT	Diesel Firewater pump engines (6 units)	17.21	diesel	425 hp		Particulate matter, total &lt; 10 Åµ (TPM10)	complying with 40 CFR 63 subpart ZZZZ	0		
LA-0314	08/03/2016 &nbsp;   ACT	Diesel Firewater pump engines (6 units)	17.21	diesel	425 hp		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	complying with 40 CFR 63 subpart ZZZZ	0		
LA-0314	08/03/2016 &nbsp;   ACT	Diesel emergency generator engine - EGEN	17.21	diesel	350 hp		Particulate matter, total &lt; 10 Åµ (TPM10)	complying with 40 CFR 63 subpart ZZZZ	0		
LA-0314	08/03/2016 &nbsp;   ACT	Diesel emergency generator engine - EGEN	17.21	diesel	350 hp		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	complying with 40 CFR 63 subpart ZZZZ	0		
LA-0316	02/17/2017 &nbsp;   ACT	firewater pump engines (8 units)	17.21	diesel	460 hp		Particulate matter, total &lt; 10 Åµ (TPM10)	Complying with 40 CFR 60 Subpart IIII	0		
LA-0316	02/17/2017 &nbsp;   ACT	firewater pump engines (8 units)	17.21	diesel	460 hp		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Complying with 40 CFR 60 Subpart IIII	0		
LA-0323	01/09/2017 &nbsp;   ACT	Standby Generator No. 9 Engine	17.21	Diesel Fuel	400 hp		Particulate matter, total &lt; 10 Åµ (TPM10)	Proper operation and limits on hours of operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0		
LA-0323	01/09/2017 &nbsp;   ACT	Standby Generator No. 9 Engine	17.21	Diesel Fuel	400 hp		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Proper operation and limits on hours of operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0		
LA-0328	05/02/2018 &nbsp;   ACT	Emergency Diesel Engine Pump P-39A	17.21	Diesel Fuel	375 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Compliance with 40 CFR 60 Subpart IIII.	0.2		0.20

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
LA-0328	05/02/2018 &nbsp;ACT	Emergency Diesel Engine Pump P-39A	17.21	Diesel Fuel	375 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Compliance with 40 CFR 60 Subpart IIII	0.2		0.20
LA-0328	05/02/2018 &nbsp;ACT	Emergency Diesel Engine Pump P-39B	17.21	Diesel Fuel	300 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Compliance with 40 CFR 60 Subpart IIII	0.2		0.20
LA-0328	05/02/2018 &nbsp;ACT	Emergency Diesel Engine Pump P-39B	17.21	Diesel Fuel	300 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Compliance with 40 CFR 60 Subpart III	0.2		0.20
LA-0345	06/13/2019 &nbsp;ACT	IC engines (14 units)	17.21	Diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Comply with requirements of 40 CFR 60 Subpart IIII	0		
LA-0345	06/13/2019 &nbsp;ACT	IC engines (14 units)	17.21	Diesel	0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Comply with requirements of 40 CFR 60 Subpart IIII	0		
LA-0349	07/10/2018 &nbsp;ACT	IC Engines (18)	17.21	diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Comply with 40 CFR 60 Subpart IIII and Good Combustion Practices	0		
LA-0349	07/10/2018 &nbsp;ACT	IC Engines (18)	17.21	diesel	0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Comply with 40 CFR 60 Subpart IIII and Good Combustion Practices	0		
*LA-0370	04/27/2020 &nbsp;ACT	Emergency Fire Pump Engine (EQT0021, ENG-1)	17.21	Diesel	1.1 MM BTU/hr		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	The use of low sulfur fuels and compliance with 40 CFR 60 Subpart IIII	0.04 LB/HR		
*LA-0370	04/27/2020 &nbsp;ACT	Emergency Fire Pump Engine (EQT0021, ENG-1)	17.21	Diesel	1.1 MM BTU/hr		Particulate matter, total &lt; 10 Åµ (TPM10)	The use of low sulfur fuels and compliance with 40 CFR 60 Subpart IIII	0.04 LB/HR		
MA-0039	01/30/2014 &nbsp;ACT	Fire Pump Engine	17.21	ULSD	2.7 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)		0.15 GM/BHP-H		0.20
MA-0039	01/30/2014 &nbsp;ACT	Fire Pump Engine	17.21	ULSD	2.7 MMBTU/H		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)		0.15 GM/BHP-H		0.20
MD-0041	04/23/2014 &nbsp;ACT	EMERGENCY GENERATOR	17.21	ULTRA-LOW SULFUR DIESEL	1500 KW		Particulate matter, filterable (FPM)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	0.15 G/HP-H		0.20
MD-0041	04/23/2014 &nbsp;ACT	EMERGENCY GENERATOR	17.21	ULTRA-LOW SULFUR DIESEL	1500 KW		Particulate matter, total &lt; 10 Åµ (TPM10)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	0.15 G/HP-H		0.20
MD-0041	04/23/2014 &nbsp;ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA-LOW SULFUR DIESEL	300 HP		Particulate matter, filterable (FPM)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	0.15 G/HP-H		0.20
MD-0041	04/23/2014 &nbsp;ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA-LOW SULFUR DIESEL	300 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	0.15 G/HP-H		0.20
MD-0042	04/08/2014 &nbsp;ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA LOW SULFUR DIESEL	477 HP		Particulate matter, filterable (FPM)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES, LIMITED HOURS OF OPERATION, AND DESIGNED	0.15 G/HP-H		0.20
MD-0042	04/08/2014 &nbsp;ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA LOW SULFUR DIESEL	477 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES, LIMITED HOURS OF OPERATION, AND DESIGNED	0.15 G/HP-H		0.23
MD-0042	04/08/2014 &nbsp;ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA LOW SULFUR DIESEL	477 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES, LIMITED HOURS OF OPERATION, AND DESIGNED	0.15 G/HP-H		0.23
MD-0043	07/01/2014 &nbsp;ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRAL LOW SULFUR DIESEL	350 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	GOOD COMBUSTION PRACTICES, LIMITED HOURS OF OPERATION, AND EXCLUSIVE USE OF ULSD	0.17 G/HP-H		0.23
MD-0044	06/09/2014 &nbsp;ACT	5 EMERGENCY FIRE WATER PUMP ENGINES	17.21	ULTRA LOW SULFUR DIESEL	350 HP		Particulate matter, filterable (FPM)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES AND DESIGNED TO ACHIEVE EMISSION	0.15 G/BHP-H		0.20

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
MD-0044	06/09/2014 &nbsp;   ACT	5 EMERGENCY FIRE WATER PUMP ENGINES	17.21	ULTRA LOW SULFUR DIESEL	350 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES AND DESIGNED TO ACHIEVE EMISSION	0.17 G/BHP-H		0.23
MD-0044	06/09/2014 &nbsp;   ACT	5 EMERGENCY FIRE WATER PUMP ENGINES	17.21	ULTRA LOW SULFUR DIESEL	350 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES AND DESIGNED TO ACHIEVE EMISSION	0.17 G/BHP-H		0.23
MD-0045	11/13/2015 &nbsp;   ACT	EMERGENCY GENERATOR	17.21	ULTRA-LOW SULFUR DIESEL	1490 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES.	0.18 G/HP-H		0.24
MD-0045	11/13/2015 &nbsp;   ACT	EMERGENCY GENERATOR	17.21	ULTRA-LOW SULFUR DIESEL	1490 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AN DGOOD COMBUSTION PRACTICES	0.18 G/HP-H		0.24
MD-0045	11/13/2015 &nbsp;   ACT	EMERGENCY GENERATOR	17.21	ULTRA-LOW SULFUR DIESEL	1490 HP		Particulate matter, filterable (FPM)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	0.2 G/KW-H		0.20
MD-0045	11/13/2015 &nbsp;   ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA-LOW SULFUR DIESEL	305 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES.	0.18 G/HP-H		0.24
MD-0045	11/13/2015 &nbsp;   ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA-LOW SULFUR DIESEL	305 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	0.18 G/HP-H		0.24
MD-0045	11/13/2015 &nbsp;   ACT	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.21	ULTRA-LOW SULFUR DIESEL	305 HP		Particulate matter, filterable (FPM)	EXCLUSIVE USE OF ULTRA LOW SULFUR FUEL AND GOOD COMBUSTION PRACTICES	0.2 G/KW-H		0.20
MD-0046	10/31/2014 &nbsp;   ACT	DIESEL-FIRED AUXILIARY (EMERGENCY) ENGINES	17.21	ULTRA-LOW SULFUR DIESEL	1500 KW		Particulate matter, filterable (FPM)	USE OF ULTRA LOW SULFUR DIESEL AND GOOD COMBUSTION PRACTICES	0.2 G/KW-H		0.20
MD-0046	10/31/2014 &nbsp;   ACT	DIESEL-FIRED AUXILIARY (EMERGENCY) ENGINES	17.21	ULTRA-LOW SULFUR DIESEL	1500 KW		Particulate matter, total &lt; 10 Åµ (TPM10)	USE OF ULTRA LOW SULFUR DIESEL AND GOOD COMBUSTION PRACTICES.	0.18 G/HP-H		0.24
MD-0046	10/31/2014 &nbsp;   ACT	DIESEL-FIRED FIRE PUMP ENGINE	17.21	ULTRA-LOW SULFUR DIESEL	300 HP		Particulate matter, filterable (FPM)	EXCLUSIVE USE OF ULTRA LOW SULFUR DIESEL FUEL AND GOOD COMBUSTION PRACTICES	0.2 G/KW-H		0.20
MD-0046	10/31/2014 &nbsp;   ACT	DIESEL-FIRED FIRE PUMP ENGINE	17.21	ULTRA-LOW SULFUR DIESEL	300 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	EXCLUSIVE USE OF ULTRA LOW SULFUR DIESEL FUEL AND GOOD COMBUSTION PRACTICES	0.18 G/HP-H		0.24
MI-0400	06/29/2011 &nbsp;   ACT	Fire Pump	17.21	Diesel	420 HP		Particulate matter, filterable (FPM)		0.15 G/HP-H		0.20
MI-0400	06/29/2011 &nbsp;   ACT	Fire Pump	17.21	Diesel	420 HP		Particulate matter, total &lt; 10 Åµ (TPM10)		0.14 LB/H		0.20
MI-0400	06/29/2011 &nbsp;   ACT	Fire Pump	17.21	Diesel	420 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)		0.14 LB/H		0.20
MI-0410	07/25/2013 &nbsp;   ACT	EU-FPENGINE: Diesel fuel fired emergency backup fire pump	17.21	diesel fuel	315 hp nameplate		Particulate matter, filterable (FPM)	Proper combustion design and ultra low sulfur diesel fuel.	0.15 G/HP-H		0.20
MI-0410	07/25/2013 &nbsp;   ACT	EU-FPENGINE: Diesel fuel fired emergency backup fire pump	17.21	diesel fuel	315 hp nameplate		Particulate matter, total &lt; 10 Åµ (TPM10)	Proper combustion design and ultra low sulfur diesel fuel	0.6 LB/H		1.16
MI-0410	07/25/2013 &nbsp;   ACT	EU-FPENGINE: Diesel fuel fired emergency backup fire pump	17.21	diesel fuel	315 hp nameplate		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Proper combustion design and ultra low sulfur diesel fuel.	0.6 LB/H		1.16
MI-0412	12/04/2013 &nbsp;   ACT	Emergency Engine -- Diesel Fire Pump (EUFENGINE)	17.21	Diesel	165 HP		Particulate matter, filterable (FPM)	Good combustion practices	0.22 G/HP-H		0.30
MI-0412	12/04/2013 &nbsp;   ACT	Emergency Engine -- Diesel Fire Pump (EUFENGINE)	17.21	Diesel	165 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices	0.09 LB/MMBTU		

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
MI-0412	12/04/2013 &nbsp;   ACT	Emergency Engine -- Diesel Fire Pump (EUPENGINE)	17.21	Diesel	165 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Good combustion practices	0.09 LB/MMBTU		
MI-0423	01/04/2017 &nbsp;   ACT	EUPENGINE (Emergency engine--diesel fire pump)	17.21	Diesel	1.66 MMBTU/H		Particulate matter, filterable (FPM)	Good combustion practices and meeting NSPS Subpart IIII requirements.	0.15 G/BHP-H		0.20
MI-0423	01/04/2017 &nbsp;   ACT	EUPENGINE (Emergency engine--diesel fire pump)	17.21	Diesel	1.66 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices	0.57 LB/H		
MI-0423	01/04/2017 &nbsp;   ACT	EUPENGINE (Emergency engine--diesel fire pump)	17.21	Diesel	1.66 MMBTU/H		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Good combustion practices	0.57 LB/H		
MI-0424	12/05/2016 &nbsp;   ACT	EUPENGINE (Emergency engine--diesel fire pump)	17.21	diesel	500 H/YR		Particulate matter, filterable (FPM)	Good combustion practices.	0.22 G/HP-H		0.30
MI-0424	12/05/2016 &nbsp;   ACT	EUPENGINE (Emergency engine--diesel fire pump)	17.21	diesel	500 H/YR		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices.	0.09 LB/MMBTU		
MI-0424	12/05/2016 &nbsp;   ACT	EUPENGINE (Emergency engine--diesel fire pump)	17.21	diesel	500 H/YR		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Good combustion practices.	0.09 LB/MMBTU		
MI-0433	06/29/2018 &nbsp;   ACT	EUPENGINE (South Plant): Fire pump engine	17.21	Diesel	300 HP		Particulate matter, filterable (FPM)	Diesel particulate filter, good combustion practices and meeting NSPS Subpart IIII requirements.	0.15 G/BHP-H		0.20
MI-0433	06/29/2018 &nbsp;   ACT	EUPENGINE (South Plant): Fire pump engine	17.21	Diesel	300 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Diesel particulate filter, good combustion practices and meeting NSPS Subpart IIII requirements.	0.66 LB/H		1.34
MI-0433	06/29/2018 &nbsp;   ACT	EUPENGINE (South Plant): Fire pump engine	17.21	Diesel	300 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Diesel particulate filter, good combustion practices and meeting NSPS Subpart IIII requirements.	0.66 LB/H		1.34
MI-0433	06/29/2018 &nbsp;   ACT	EUPENGINE (North Plant): Fire pump engine	17.21	Diesel	300 HP		Particulate matter, filterable (FPM)	Diesel particulate filter, good combustion practices and meeting NSPS Subpart IIII requirements.	0.15 G/BHP-H		0.20
MI-0433	06/29/2018 &nbsp;   ACT	EUPENGINE (North Plant): Fire pump engine	17.21	Diesel	300 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Diesel particulate filter, good combustion practices and meeting NSPS Subpart IIII requirements.	0.66 LB/H		1.34
MI-0433	06/29/2018 &nbsp;   ACT	EUPENGINE (North Plant): Fire pump engine	17.21	Diesel	300 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Diesel particulate filter, good combustion practices and meeting NSPS Subpart IIII requirements.	0.66 LB/H		1.34
MI-0435	07/16/2018 &nbsp;   ACT	EUPENGINE: Fire pump engine	17.21	Diesel	399 BHP		Particulate matter, filterable (FPM)	State of the art combustion design	0.2 G/KW-H		0.20
MI-0435	07/16/2018 &nbsp;   ACT	EUPENGINE: Fire pump engine	17.21	Diesel	399 BHP		Particulate matter, total &lt; 10 Åµ (TPM10)	State of the art combustion design.	0.13 LB/H		0.20
MI-0435	07/16/2018 &nbsp;   ACT	EUPENGINE: Fire pump engine	17.21	Diesel	399 BHP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	State of the art combustion design.	0.13 LB/H		0.20
MI-0441	12/21/2018 &nbsp;   ACT	EUPPRICE--A 315 HP diesel fueled emergency engine	17.21	Diesel	2.5 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Ultra low sulfur diesel fuel and good combustion practices.	0.12 LB/H		
MI-0441	12/21/2018 &nbsp;   ACT	EUPPRICE--A 315 HP diesel fueled emergency engine	17.21	Diesel	2.5 MMBTU/H		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Ultra low sulfur diesel fuel and good combustion practices.	0.12 LB/H		
*MI-0445	11/26/2019 &nbsp;   ACT	EUPENGINE (Emergency engine-diesel fire pump)	17.21	diesel fuel	1.66 MMBTU/H		Particulate matter, filterable (FPM)	Good Combustion Practices and meeting NSPS Subpart IIII requirements	0.15 G/BHP-H		0.20
*MI-0445	11/26/2019 &nbsp;   ACT	EUPENGINE (Emergency engine-diesel fire pump)	17.21	diesel fuel	1.66 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices	0.57 LB/H		

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
*MI-0445	11/26/2019 &nbsp;ACT	EUPENGINE (Emergency engine-diesel fire pump	17.21	diesel fuel	1.66 MMBTU/H		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Good combustion practices	0.57 LB/H		
MI-0447	01/07/2021 &nbsp;ACT	EUFPRICE--A 315 HP diesel fueled emergency engine	17.21	Diesel	2.5 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Ultra low sulfur diesel fuel and good combustion practices	0.12 LB/H		
MI-0447	01/07/2021 &nbsp;ACT	EUFPRICE--A 315 HP diesel fueled emergency engine	17.21	Diesel	2.5 MMBTU/H		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Ultra low sulfur diesel fuel and good combustion practices.	0.12 LB/H		
MO-0089	05/12/2016 &nbsp;ACT	emergency engines	17.21	ULSD	0		Particulate matter, filterable (FPM)	good operating practices	0 G/KW		
MS-0092	05/08/2014 &nbsp;ACT	firewater pumps, diesel	17.21	diesel	325 HP, EACH		Particulate matter, total (TPM)		0		
MS-0092	05/08/2014 &nbsp;ACT	firewater pumps, diesel	17.21	diesel	325 HP, EACH		Particulate matter, total &lt; 10 Åµ (TPM10)		0		
MS-0092	05/08/2014 &nbsp;ACT	firewater pumps, diesel	17.21	diesel	325 HP, EACH		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)		0		
NJ-0081	03/07/2014 &nbsp;ACT	Emergency diesel fire pump	17.21	Ultra Low Sulfur Distillate oil	0		Particulate matter, filterable (FPM)	Use of Ultra low sulfur distillate oil	0.15 G/B-HP-H		0.20
NJ-0081	03/07/2014 &nbsp;ACT	Emergency diesel fire pump	17.21	Ultra Low Sulfur Distillate oil	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Use of ultra low sulfur distillate oil	0.15 G/B-HP-H		0.20
NJ-0081	03/07/2014 &nbsp;ACT	Emergency diesel fire pump	17.21	Ultra Low Sulfur Distillate oil	0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Use of Ultra low sulfur distillate oil	0.15 G/B-HP-H		0.20
NJ-0084	03/10/2016 &nbsp;ACT	Emergency Diesel Fire Pump	17.21	ULSD	100 H/YR		Particulate matter, filterable (FPM)	use of ULSD a clean burning fuel, and limited hours of operation	0.1 LB/H		
NJ-0084	03/10/2016 &nbsp;ACT	Emergency Diesel Fire Pump	17.21	ULSD	100 H/YR		Particulate matter, total &lt; 10 Åµ (TPM10)	use of ULSD a clean burning fuel, and limited hours of operation	0.1 LB/H		
NJ-0084	03/10/2016 &nbsp;ACT	Emergency Diesel Fire Pump	17.21	ULSD	100 H/YR		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	use of ULSD a clean burning fuel, and limited hours of operation	0.1 LB/H		
NJ-0085	07/19/2016 &nbsp;ACT	EMERGENCY GENERATOR DIESEL	17.21	DIESEL OIL	0 100 H/YR		Particulate matter, filterable (FPM)	Use of Ultra Low Sulfur Diesel (ULSD) Oil a clean burning fuel and limited hours of operation	0.661 LB/H		
NJ-0085	07/19/2016 &nbsp;ACT	EMERGENCY GENERATOR DIESEL	17.21	DIESEL OIL	0 100 H/YR		Particulate matter, total &lt; 10 Åµ (TPM10)	Use of Ultra Low Sulfur Diesel (ULSD) Oil a clean burning fuel and limited hours of operation	0.661 LB/H		
NJ-0085	07/19/2016 &nbsp;ACT	EMERGENCY GENERATOR DIESEL	17.21	DIESEL OIL	0 100 H/YR		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Use of Ultra Low Sulfur Diesel (ULSD) Oil a clean burning fuel and limited hours of operation	0.661 LB/H		
NJ-0085	07/19/2016 &nbsp;ACT	EMERGENCY DIESEL FIRE PUMP	17.21	ULSD	100 H/YR		Particulate matter, filterable (FPM)	Use of Ultra Low Sulfur Diesel (ULSD) Oil a clean burning fuel and limited hours of operation	0.108 LB/H		
NJ-0085	07/19/2016 &nbsp;ACT	EMERGENCY DIESEL FIRE PUMP	17.21	ULSD	100 H/YR		Particulate matter, total &lt; 10 Åµ (TPM10)	Use of Ultra Low Sulfur Diesel (ULSD) Oil a clean burning fuel and limited hours of operation	0.108 LB/H		
NJ-0085	07/19/2016 &nbsp;ACT	EMERGENCY DIESEL FIRE PUMP	17.21	ULSD	100 H/YR		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Use of ULSD a clean burning fuel and limited hours of operation	0.108 LB/H		
NY-0103	02/03/2016 &nbsp;ACT	Emergency fire pump	17.21	ultra low sulfur diesel	460 hp		Particulate matter, filterable (FPM)	Compliance demonstrated with vendor emission certification and adherence to vendor-specified maintenance	0.087 G/BHP-H		0.12



**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
NY-0104	08/01/2013 &nbsp;  ACT	Fire pump	17.21	ultra low sulfur diesel	0		Particulate matter, filterable (FPM)	Ultra low sulfur diesel with maximum sulfur content 0.0015 percent.	0.043 LB/MMBTU		
OH-0352	06/18/2013 &nbsp;  ACT	Emergency fire pump engine	17.21	diesel	300 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Purchased certified to the standards in NSPS Subpart IIII	0.1 LB/H		0.20
OH-0360	11/05/2013 &nbsp;  ACT	Emergency fire pump engine (P004)	17.21	diesel	400 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Purchased certified to the standards in NSPS Subpart IIII	0.131 LB/H		0.20
OH-0360	11/05/2013 &nbsp;  ACT	Emergency fire pump engine (P004)	17.21	diesel	400 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Purchased certified to the standards in NSPS Subpart IIII	0.131 LB/H		0.20
OH-0363	11/05/2014 &nbsp;  ACT	Emergency Fire Pump Engine (P003)	17.21	Diesel fuel	260 HP		Particulate matter, total (TPM)	Emergency operation only, < 500 hours/year each for maintenance checks and readiness testing designed to meet NSPS Subpart IIII	0.09 LB/H		0.20
OH-0363	11/05/2014 &nbsp;  ACT	Emergency Fire Pump Engine (P003)	17.21	Diesel fuel	260 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Emergency operation only, < 500 hours/year each for maintenance checks and readiness testing designed to meet NSPS Subpart IIII	0.09 LB/H		0.20
OH-0363	11/05/2014 &nbsp;  ACT	Emergency Fire Pump Engine (P003)	17.21	Diesel fuel	260 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Emergency operation only, < 500 hours/year each for maintenance checks and readiness testing designed to meet NSPS Subpart IIII	0.09 LB/H		0.20
OH-0366	08/25/2015 &nbsp;  ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	140 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	State-of-the-art combustion design	0.07 LB/H		0.30
OH-0366	08/25/2015 &nbsp;  ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	140 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	State-of-the-art combustion design	0.07 LB/H		0.30
OH-0367	09/23/2016 &nbsp;  ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	311 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	State-of-the-art combustion design	0.1 LB/H		0.20
OH-0367	09/23/2016 &nbsp;  ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	311 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	State-of-the-art combustion design	0.1 LB/H		0.20
OH-0368	04/19/2017 &nbsp;  ACT	Emergency Fire Pump Diesel Engine (P008)	17.21	Diesel fuel	460 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	good combustion control and operating practices and engines designed to meet the stands of 40 CFR Part 60, Subpart IIII	0.02 LB/H		0.03
OH-0368	04/19/2017 &nbsp;  ACT	Emergency Fire Pump Diesel Engine (P008)	17.21	Diesel fuel	460 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	good combustion control and operating practices and engines designed to meet the stands of 40 CFR Part 60, Subpart IIII	0.02 LB/H		0.03
OH-0370	09/07/2017 &nbsp;  ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Ultra low sulfur diesel fuel	0.1 LB/H		0.20
OH-0370	09/07/2017 &nbsp;  ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Ultra low sulfur diesel fuel	0.1 LB/H		0.20
OH-0372	09/27/2017 &nbsp;  ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Ultra low sulfur diesel fuel	0.1 LB/H		0.20
OH-0372	09/27/2017 &nbsp;  ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Ultra low sulfur diesel fuel	0.1 LB/H		0.20
OH-0374	10/23/2017 &nbsp;  ACT	Emergency Fire Pump (P006)	17.21	Diesel fuel	410 HP		Particulate matter, total (TPM)	Certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII. Good combustion practices per the	0.13 LB/H		0.20
OH-0374	10/23/2017 &nbsp;  ACT	Emergency Fire Pump (P006)	17.21	Diesel fuel	410 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII. Good combustion practices per the	0.13 LB/H		0.20
OH-0374	10/23/2017 &nbsp;  ACT	Emergency Fire Pump (P006)	17.21	Diesel fuel	410 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII. Good combustion practices per the	0.13 LB/H		0.20

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
OH-0376	02/09/2018 &nbsp;   ACT	Emergency diesel-fueled fire pump (P006)	17.21	Diesel fuel	250 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Comply with NSPS 40 CFR 60 Subpart IIII	0.1 LB/H		0.24
OH-0376	02/09/2018 &nbsp;   ACT	Emergency diesel-fueled fire pump (P006)	17.21	Diesel fuel	250 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Comply with NSPS 40 CFR 60 Subpart IIII	0.1 LB/H		0.24
OH-0377	04/19/2018 &nbsp;   ACT	Emergency Fire Pump (P004)	17.21	Diesel fuel	320 HP		Particulate matter, total (TPM)	Good combustion practices (ULSD) and compliance with 40 CFR Part 60, Subpart IIII	0.11 LB/H		0.20
OH-0377	04/19/2018 &nbsp;   ACT	Emergency Fire Pump (P004)	17.21	Diesel fuel	320 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices (ULSD) and compliance with 40 CFR Part 60, Subpart IIII	0.11 LB/H		0.20
OH-0377	04/19/2018 &nbsp;   ACT	Emergency Fire Pump (P004)	17.21	Diesel fuel	320 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Good combustion practices (ULSD) and compliance with 40 CFR Part 60, Subpart IIII	0.11 LB/H		0.02
OH-0378	12/21/2018 &nbsp;   ACT	Firewater Pumps (P005 and P006)	17.21	Diesel fuel	402 HP		Particulate matter, total (TPM)	Certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII and employ good combustion practices per the	0.13 LB/H		0.20
OH-0378	12/21/2018 &nbsp;   ACT	Firewater Pumps (P005 and P006)	17.21	Diesel fuel	402 HP		Particulate matter, total &lt; 10 Åµ (TPM10)	Certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII and employ good combustion practices per the	0.13 LB/H		0.20
OH-0378	12/21/2018 &nbsp;   ACT	Firewater Pumps (P005 and P006)	17.21	Diesel fuel	402 HP		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII and employ good combustion practices per the	0.13 LB/H		0.20
OH-0379	02/06/2019 &nbsp;   ACT	Black Start Generator (P007)	17.21	Diesel fuel	158 HP		Particulate matter, filterable &lt; 10 Åµ (FPM10)	Tier IV engine Good combustion practices	5.22 X10-3 LB/H		0.02
OH-0379	02/06/2019 &nbsp;   ACT	Black Start Generator (P007)	17.21	Diesel fuel	158 HP		Particulate matter, filterable &lt; 2.5 Åµ (FPM2.5)	Tier IV engine Good combustion practices	5.22 X10-3 LB/H		0.02
PA-0278	10/10/2012 &nbsp;   ACT	Fire Pump	17.21	Diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)		0.09 G/B-HP-H		0.12
PA-0278	10/10/2012 &nbsp;   ACT	Fire Pump	17.21	Diesel	0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)		0.09 G/B-HP-H		0.12
PA-0286	01/31/2013 &nbsp;   ACT	Fire Pump Engine - 460 BHP	17.21	Diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)		0.09 G/HP-H		0.12
PA-0286	01/31/2013 &nbsp;   ACT	Fire Pump Engine - 460 BHP	17.21	Diesel	0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)		0.09 G/HP-H		0.12
PA-0291	04/23/2013 &nbsp;   ACT	EMERGENCY FIREWATER PUMP	17.21	ULTRA LOW SULFUR DISTILLATE	3.25 MMBTU/H		Particulate matter, total (TPM)		0.15 LB/H		
PA-0296	12/17/2013 &nbsp;   ACT	Emergency Firewater Pump	17.21	Diesel	16 Gal/hr		Particulate matter, filterable &lt; 10 Åµ (FPM10)		0.005 T/YR		
PA-0296	12/17/2013 &nbsp;   ACT	Emergency Firewater Pump	17.21	Diesel	16 Gal/hr		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)		0.005 T/YR		
PA-0309	12/23/2015 &nbsp;   ACT	Fire pump engine	17.21	Ultra-low sulfur diesel	15 gal/hr		Particulate matter, filterable (FPM)		0.11 GM/HP-HR		0.15
PA-0309	12/23/2015 &nbsp;   ACT	Fire pump engine	17.21	Ultra-low sulfur diesel	15 gal/hr		Particulate matter, total &lt; 10 Åµ (TPM10)		0.11 GM/HP-HR		0.15
PA-0309	12/23/2015 &nbsp;   ACT	Fire pump engine	17.21	Ultra-low sulfur diesel	15 gal/hr		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)		0.11 GM/HP-HR		0.15

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
PA-0310	09/02/2016 &nbsp;   ACT	Emergency Fire Pump Engine	17.21	ULSD	0		Particulate matter, total (TPM)		0.15 G/BHP-HR		0.20
*PA-0326	02/18/2021 &nbsp;   ACT	Emergency Generator Parking Garage	17.21	Diesel	0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	LAER PM2.5 BACT PM/PM25 certified engines,include turbocharger and intercooler/aftercooler GCP ULSD	0.06 G		0.08
*PA-0326	02/18/2021 &nbsp;   ACT	Emergency GeneratorTelecom Hut & Tower	17.21	diesel	0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	LAER PM2.5 BACT PM/PM25 certified engines,include turbocharger and intercooler/aftercooler GCP ULSD	0.22 G		0.30
PR-0009	04/10/2014 &nbsp;   ACT	Emergency Diesel Fire Pump	17.21	ULSD Fuel Oil #2	0		Particulate matter, filterable (FPM)		0.15 G/B-HP-H		0.20
PR-0009	04/10/2014 &nbsp;   ACT	Emergency Diesel Fire Pump	17.21	ULSD Fuel Oil #2	0		Particulate matter, total &lt; 10 Åµ (TPM10)		0.15 G/B-HP-H		0.20
PR-0009	04/10/2014 &nbsp;   ACT	Emergency Diesel Fire Pump	17.21	ULSD Fuel Oil #2	0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)		0.15 G/B-HP-H		0.20
SC-0182	10/31/2017 &nbsp;   ACT	Emergency Fire Pumps	17.21		0		Particulate matter, total (TPM)	Use of Ultra Low Sulfur Diesel Fuel (15 ppm), good combustion, operation, and maintenance practices; compliance with	200 OPERATING HR/YR		
SC-0182	10/31/2017 &nbsp;   ACT	Emergency Fire Pumps	17.21		0		Particulate matter, total &lt; 10 Åµ (TPM10)	Use of Ultra Low Sulfur Diesel Fuel (15 ppm), good combustion, operation, and maintenance practices; compliance with	200 OPERATING HR/YR		
SC-0182	10/31/2017 &nbsp;   ACT	Emergency Fire Pumps	17.21		0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Use of Ultra Low Sulfur Diesel Fuel (15 ppm), good combustion, operation, and maintenance practices; compliance with	200 OPERATING HR/YR		
TX-0846	09/23/2018 &nbsp;   ACT	FIRE PUMP DIESEL ENGINE	17.21	NO 2 DIESEL	214 kW		Particulate matter, total &lt; 10 Åµ (TPM10)	Meets EPA Tier 4 requirements	0.02 G/KW		0.02
TX-0846	09/23/2018 &nbsp;   ACT	FIRE PUMP DIESEL ENGINE	17.21	NO 2 DIESEL	214 kW		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Meets EPA Tier 4 requirements	0.02 G/KW		0.02
TX-0864	09/09/2019 &nbsp;   ACT	EMERGENCY DIESEL ENGINE	17.21	Ultra-low sulfur diesel	0		Particulate matter, total (TPM)	Tier 4 exhaust emission standards specified at 40 CFR Å§ 1039.101(b)	0		
TX-0864	09/09/2019 &nbsp;   ACT	EMERGENCY DIESEL ENGINE	17.21	Ultra-low sulfur diesel	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Tier 4 exhaust emission standards specified at 40 CFR Å§ 1039.101(b)	0		
TX-0864	09/09/2019 &nbsp;   ACT	EMERGENCY DIESEL ENGINE	17.21	Ultra-low sulfur diesel	0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Tier 4 exhaust emission standards specified at 40 CFR Å§ 1039.101(b)	0		
*TX-0908	08/27/2021 &nbsp;   ACT	Emergency Engine	17.21	natural gas	74 KW		Particulate matter, filterable (FPM)	Meet the requirements of 40 CFR Part 60, Subpart IIII. Firing ultra-low diesel fuel. Limited to 100 hrs/yr of non-emergency	0		
*TX-0908	08/27/2021 &nbsp;   ACT	Emergency Engine	17.21	natural gas	74 KW		Particulate matter, filterable &lt; 10 Åµ (FPM10)	Meet the requirements of 40 CFR Part 60, Subpart IIII. Firing ultra-low diesel fuel. Limited to 100 hrs/yr of non-emergency	0		
*TX-0908	08/27/2021 &nbsp;   ACT	Emergency Engine	17.21	natural gas	74 KW		Particulate matter, filterable &lt; 2.5 Åµ (FPM2.5)	Meet the requirements of 40 CFR Part 60, Subpart IIII. Firing ultra-low diesel fuel. Limited to 100 hrs/yr of non-emergency	0		
VA-0319	08/27/2012 &nbsp;   ACT	FIRE WATER PUMP	17.21	diesel (ultra low sulfur)	1.86 MMBTU/H		Particulate matter, total &lt; 10 Åµ (TPM10)	Clean burning ULSD fuel and good combustion practices	0.15 G/HP-H		0.20
VA-0319	08/27/2012 &nbsp;   ACT	FIRE WATER PUMP	17.21	diesel (ultra low sulfur)	1.86 MMBTU/H		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Clean burning ULSD fuel and good combustion practices.	0.15 G/HP-H		0.20
VA-0325	06/17/2016 &nbsp;   ACT	DIESEL-FIRED WATER PUMP 376 bph (1)	17.21	DIESEL FUEL	0		Particulate matter, total &lt; 10 Åµ (TPM10)	Ultra Low Sulfur Diesel/Fuel (15 ppm max)	0.3 G/HP-H		0.40

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - PM (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
VA-0325	06/17/2016 &nbsp;   ACT	DIESEL-FIRED WATER PUMP 376 bph (1)	17.21	DIESEL FUEL	0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Ultra Low Sulfur Diesel/Fuel (15 ppm max)	0.3 G/HP-H		0.40
VA-0328	04/26/2018 &nbsp;   ACT	Emergency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Particulate matter, filterable (FPM)	good combustion practices and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	15 G/HP/HR		20.12
VA-0328	04/26/2018 &nbsp;   ACT	Emergency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Particulate matter, total &lt; 10 Åµ (TPM10)	good combustion practices and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	0.15 G/HP HR		0.20
VA-0328	04/26/2018 &nbsp;   ACT	Emergency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	good combustion practices and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	0.15 G/HP HR		0.20
VA-0332	06/24/2019 &nbsp;   ACT	Emergency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	good combustion practices, high efficiency design, and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur	0.15 G/HP-HR		0.20
VA-0332	06/24/2019 &nbsp;   ACT	Emergency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Particulate matter, total &lt; 10 Åµ (TPM10)	good combustion practices, high efficiency design, and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur	0.15 G/HP-HR		0.20
VA-0332	06/24/2019 &nbsp;   ACT	Emergency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Particulate matter, filterable (FPM)	good combustion practices, high efficiency design, and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur	0.15 G/HP-HR		0.20
WI-0263	02/15/2016 &nbsp;   ACT	Fire pump (process P05)	17.21	Diesel	1.27 mmBtu/hr		Particulate matter, total (TPM)	Good combustion practices, use diesel fuel with sulfur content < 15 ppm, and operate <500 hr/yr	0		
WI-0263	02/15/2016 &nbsp;   ACT	Fire pump (process P05)	17.21	Diesel	1.27 mmBtu/hr		Particulate matter, total &lt; 10 Åµ (TPM10)	Good combustion practices, use diesel fuel with sulfur content < 15 ppm, and operate <500 hr/yr	0		
WI-0263	02/15/2016 &nbsp;   ACT	Fire pump (process P05)	17.21	Diesel	1.27 mmBtu/hr		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	Good combustion practices, use diesel fuel with sulfur content < 15 ppm, and operate <500 hr/yr	0		
*WI-0271	06/05/2015 &nbsp;   ACT	P10K â€ Diesel Powered Emergency Generator	17.21	Distillate Fuel	0		Particulate matter, total (TPM)	BACT is the use of ultra-low sulfur distillate in the generator. Compliance with this requirement will be determined using sulfur	0.29 LB/HR		
*WI-0271	06/05/2015 &nbsp;   ACT	P10K â€ Diesel Powered Emergency Generator	17.21	Distillate Fuel	0		Particulate matter, total &lt; 10 Åµ (TPM10)	BACT is the use of ultra-low sulfur distillate in the generator. Compliance with this requirement will be determined using sulfur	0.29 ;B/HR		
*WI-0271	06/05/2015 &nbsp;   ACT	P10K â€ Diesel Powered Emergency Generator	17.21	Distillate Fuel	0		Particulate matter, total &lt; 2.5 Åµ (TPM2.5)	BACT is the use of ultra-low sulfur distillate in the generator. Compliance with this requirement will be determined using sulfur	0.29 LB/HR		
WV-0025	11/21/2014 &nbsp;   ACT	Fire Pump Engine	17.21	Diesel	251 HP		Particulate matter, filterable &lt; 2.5 Åµ (FPM2.5)		0		0.20

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
AK-0082	01/23/2015 &nbsp;ACT	Airstrip Generator Engine	17.21	Ultra Low Sulfur Diesel	490 hp		Volatile Organic Compounds (VOC)		0.0025 LB/HP-H		1.5
AK-0082	01/23/2015 &nbsp;ACT	Agitator Generator Engine	17.21	Ultra Low Sulfur Diesel	98 hp		Volatile Organic Compounds (VOC)		0.0025 LB/HP-H		1.5
AK-0082	01/23/2015 &nbsp;ACT	Incinerator Generator Engine	17.21	Ultra Low Sulfur Diesel	102 hp		Volatile Organic Compounds (VOC)		0.0025 LB/HP-H		1.5
AK-0083	01/06/2015 &nbsp;ACT	Diesel Fired Well Pump	17.21	Diesel	2.7 MMBTU/H		Volatile Organic Compounds (VOC)	Limited Operation of 168 hr/yr.	0.36 LB/MMBTU		
*AK-0085	08/13/2020 &nbsp;ACT	Three (3) Firewater Pump Engines and two (2) Emergency Diesel Generators	17.21	ULSD	19.4 gph		Volatile Organic Compounds (VOC)	Good combustion practices, ULSD, and limit operation to 500 hours per year.	0.19 G/HP-HR		0.3
*AK-0086	03/26/2021 &nbsp;ACT	Diesel Fired Well Pump	17.21	Diesel	2.7 MMBtu/hr		Volatile Organic Compounds (VOC)	Good Combustion Practices and Limited Use	0.36 LB/MMBTU		
AR-0168	03/17/2021 &nbsp;ACT	Emergency Engines	17.21	Diesel	0		Volatile Organic Compounds (VOC)	Good Operating Practices, limited hours of operation, Compliance with NSPS Subpart IIII	1.55 G/KW-HR		1.6
AR-0171	02/14/2019 &nbsp;ACT	SN-106 Cold Mill 1 Diesel Fired Emergency Generator	17.21	Diesel	1073 bhp		Volatile Organic Compounds (VOC)	Good operating practices.	1 G/KW-HR		1.0
FL-0338	05/30/2012 &nbsp;ACT	Wireline Unit Engines - C.R. Luigs	17.21	diesel	300 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, turbocharger with aftercooler, high pressure fuel injection with aftercooler	1.17 T/12MO ROLLING TOTAL		
FL-0338	05/30/2012 &nbsp;ACT	Fast Rescue Craft Diesel Engine - Development Driller 1	17.21	Diesel	142 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, and turbocharger	0		
FL-0338	05/30/2012 &nbsp;ACT	Life Boat Diesel Engines - Development Driller 1	17.21	Diesel	110 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines and use of low sulfur diesel fuel	0		
FL-0338	05/30/2012 &nbsp;ACT	Port and Stb Fwd and Aft Crane Diesel Engines - C.R. Luigs	17.21	diesel	305 HP		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	6.72 T/12MO ROLLING TOTAL		
FL-0338	05/30/2012 &nbsp;ACT	Seismic Operations Diesel Engines - Development Driller 1	17.21	Diesel	415 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, and turbocharger	6.67 TONS		
FL-0338	05/30/2012 &nbsp;ACT	Life Boat Diesel Engines - C.R. Luigs	17.21	diesel	39 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel	0		
FL-0338	05/30/2012 &nbsp;ACT	Cementing and Nitrogen Pump Diesel Engines - Development Driller 1	17.21	Diesel	0		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger, and high pressure fuel injection with aftercooler	0.57 T/12MO ROLLING TOTAL		

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
FL-0338	05/30/2012 &nbsp;ACT	Wireline Unit Diesel Engines - Development Driller 1	17.21	Diesel	0		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, turbocharger with aftercooler, high pressure fuel injection with aftercooler	1.17 TONS		
FL-0338	05/30/2012 &nbsp;ACT	Black Start Air Compressor - C.R. Luigs	17.21	diesel	6 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the current manufacturerâ€™s specifications for the engine and the use of low sulfur diesel fuel	0		
FL-0338	05/30/2012 &nbsp;ACT	Cementing and Nitrogen Pump Diesel Engines - C.R. Luigs	17.21	diesel	0		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the current manufacturerâ€™s specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger, and high pressure fuel injection with aftercooler	0.38 TONS		
FL-0347	09/16/2014 &nbsp;ACT	Diesel Powered Forklift Engine	17.21	Diesel	30 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine	0		
FL-0347	09/16/2014 &nbsp;ACT	Wireline Diesel Engines	17.21	Diesel	0		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine and with turbocharger, aftercooler, and high injection pressure	0		
FL-0347	09/16/2014 &nbsp;ACT	Water Blasting Diesel Engine	17.21	Diesel	208 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine and with turbocharger, aftercooler, and high injection pressure	0		
FL-0347	09/16/2014 &nbsp;ACT	Well Evaluation Diesel Engine	17.21	Diesel	140 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine	0		
FL-0347	09/16/2014 &nbsp;ACT	Fast Rescue Craft Diesel Engine	17.21	Diesel	230 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine and with turbocharger, aftercooler, and high injection pressure	0		
FL-0347	09/16/2014 &nbsp;ACT	Escape Capsule Diesel Engine	17.21	Diesel	39 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engine	0		
FL-0347	09/16/2014 &nbsp;ACT	Remotely Operated Vehicle Emergency Generator	17.21	Diesel	427 hp		Volatile Organic Compounds (VOC)	Use of good combustion practices based on the most recent manufacturer's specifications issued for engines and with turbocharger, aftercooler, and high injection pressure	0		
IA-0105	10/26/2012 &nbsp;ACT	Fire Pump	17.21	diesel fuel	14 GAL/H		Volatile Organic Compounds (VOC)	good combustion practices	0.25 G/KW-H		0.3
IL-0114	09/05/2014 &nbsp;ACT	Firewater Pump Engine	17.21	distillate fuel oil	373 hp		Volatile Organic Compounds (VOC)	Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7.	0.4 G/KW-H		0.4
IN-0158	12/03/2012 &nbsp;ACT	TWO (2) FIREWATER PUMP DIESEL ENGINES	17.21	DIESEL	371 BHP, EACH		Volatile Organic Compounds (VOC)	COMBUSTION DESIGN CONTROLS AND USAGE LIMITS	0.16 LB/H		0.3
IN-0173	06/04/2014 &nbsp;ACT	FIRE PUMP	17.21		500 HP		Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES	0.141 G/BHP-H		0.2
IN-0173	06/04/2014 &nbsp;ACT	RAW WATER PUMP	17.21	DIESEL, NO. 2	500 HP		Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES	0.141 G/BHP-H		0.2

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
IN-0179	09/25/2013 &nbsp;ACT	DIESEL-FIRED EMERGENCY WATER PUMP	17.21	NO. 2 FUEL OIL	481 BHP		Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES	0.141	G/B-HP-H	0.2
IN-0180	06/04/2014 &nbsp;ACT	FIRE PUMP	17.21		500 HP		Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES	0.141	G/B-HP-H	0.2
IN-0180	06/04/2014 &nbsp;ACT	RAW WATER PUMP	17.21	DIESEL, NO. 2	500 HP		Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES	0.141	G/B-HP-H	0.2
IN-0234	12/08/2015 &nbsp;ACT	EMERGENCY FIRE PUMP ENGINE	17.21	DISTILLATE OIL	0		Volatile Organic Compounds (VOC)	GOOD COMBUSTION PRACTICES	0.05	G/HP-H	0.1
IN-0295	02/23/2018 &nbsp;ACT	Emergency Diesel Generators	17.21	Deisel	150 hp		Volatile Organic Compounds (VOC)		1.134	G/HP-HR	1.5
IN-0295	02/23/2018 &nbsp;ACT	Emergency Diesel Generators	17.21	Diesel	250 hp		Volatile Organic Compounds (VOC)		1.134	G/HP-HR	1.5
*KS-0030	03/31/2016 &nbsp;ACT	Compression ignition RICE emergency fire pump	17.21	Ultra-lowsulfur diesel (ULSD)	197 HP		Volatile Organic Compounds (VOC)		1.14	G/HP-HR	1.5
*KS-0036	03/18/2013 &nbsp;ACT	Cummins 6BTA 5.9F-1 Diesel Engine Fire Pump	17.21	No. 2 Fuel Oil	182 BHP		Volatile Organic Compounds (VOC)	utilize efficient combustion/design technology	0.77	G/BHP-H	1.0
KY-0110	07/23/2020 &nbsp;ACT	EP 11-01 - Melt Shop Emergency Generator	17.21	Diesel	260 HP		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0		
KY-0110	07/23/2020 &nbsp;ACT	EP 11-02 - Reheat Furnace Emergency Generator	17.21	Diesel	190 HP		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0		
KY-0110	07/23/2020 &nbsp;ACT	EP 11-03 - Rolling Mill Emergency Generator	17.21	Diesel	440 HP		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0		
KY-0110	07/23/2020 &nbsp;ACT	EP 11-04 - IT Emergency Generator	17.21	Diesel	190 HP		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0		
KY-0110	07/23/2020 &nbsp;ACT	EP 11-05 - Radio Tower Emergency Generator	17.21	Diesel	61 HP		Volatile Organic Compounds (VOC)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0		
LA-0254	08/16/2011 &nbsp;ACT	EMERGENCY FIRE PUMP	17.21	DIESEL	350 HP		Volatile Organic Compounds (VOC)	ULTRA LOW SULFUR DIESEL AND GOOD COMBUSTION PRACTICES	1	G/HP-H	1.3
LA-0301	05/23/2014 &nbsp;ACT	Firewater Pump Nos. 1-3 (EQTs 997, 998, & 999)	17.21	Diesel	500 HP		Volatile Organic Compounds (VOC)	Compliance with 40 CFR 60 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures (consistent with safe operation) designed to maximize combustion efficiency and minimize fuel usage	0.1	LB/HR	0.1
LA-0309	06/04/2015 &nbsp;ACT	Firewater Pump Engines	17.21	Diesel	288 hp (each)		Volatile Organic Compounds (VOC)	Complying with 40 CFR 60 Subpart IIII	0		
LA-0313	08/31/2016 &nbsp;ACT	SCPS Emergency Diesel Firewater Pump 1	17.21	Diesel	282 HP		Volatile Organic Compounds (VOC)	Good combustion practices	1.87	LB/H	4.0
LA-0314	08/03/2016 &nbsp;ACT	Diesel Firewater pump engines (6 units)	17.21	diesel	425 hp		Volatile Organic Compounds (VOC)	complying with 40 CFR 63 subpart ZZZZ	0		
LA-0314	08/03/2016 &nbsp;ACT	Diesel emergency generator engine - EGEN	17.21	diesel	350 hp		Volatile Organic Compounds (VOC)	complying with 40 CFR 63 subpart ZZZZ	0		

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
LA-0316	02/17/2017 &nbsp;ACT	firewater pump engines (8 units)	17.21	diesel	460 hp		Volatile Organic Compounds (VOC)	Complying with 40 CFR 60 Subpart IIII	0		
LA-0328	05/02/2018 &nbsp;ACT	Emergency Diesel Engine Pump P-39A	17.21	Diesel Fuel	375 HP		Volatile Organic Compounds (VOC)	Good combustion practices and NSPS Subpart IIII	4 G/KW-H		4.0
LA-0328	05/02/2018 &nbsp;ACT	Emergency Diesel Engine Pump P-39B	17.21	Diesel Fuel	300 HP		Volatile Organic Compounds (VOC)	Good combustion practices and NSPS Subpart IIII	4 G/KW-H		4.0
LA-0349	07/10/2018 &nbsp;ACT	IC Engines (18)	17.21	diesel	0		Volatile Organic Compounds (VOC)	Comply with 40 CFR 60 Subpart IIII and Good Combustion Practices	0		
LA-0366	02/03/2021 &nbsp;ACT	Fire Pump, Sawmill Emergency, and Planer Mill Emergency Generator Engines	17.21	Diesel	0		Volatile Organic Compounds (VOC)	Good Combustion Practices and Compliance with NSPS 40 CFR 60 Subpart IIII	804.6 HP		
MD-0041	04/23/2014 &nbsp;ACT	EMERGENCY GENERATOR	17.21	ULTRA-LOW SULFUR DIESEL	1500 KW		Volatile Organic Compounds (VOC)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES, AND LIMITING THE HOURS OF OPERATION	4.8 LB/MMBTU		
MD-0044	06/09/2014 &nbsp;ACT	5 EMERGENCY FIRE WATER PUMP ENGINES	17.21	ULTRA LOW SULFUR DIESEL	350 HP		Volatile Organic Compounds (VOC)	USE ONLY ULSD, GOOD COMBUSTION PRACTICES, AND DESIGNED TO ACHIEVE EMISSION LIMIT	3 G/HP-H		4.0
MI-0410	07/25/2013 &nbsp;ACT	EU-FPENGINE: Diesel fuel fired emergency backup fire pump	17.21	diesel fuel	315 hp nameplate		Volatile Organic Compounds (VOC)	Proper combustion design and ultra low sulfur diesel fuel.	0		
MI-0412	12/04/2013 &nbsp;ACT	Emergency Engine -- Diesel Fire Pump (EUFENGINE)	17.21	Diesel	165 HP		Volatile Organic Compounds (VOC)	Good combustion practices	0.001 LB/H		
MI-0423	01/04/2017 &nbsp;ACT	EUFENGINE (Emergency engine--diesel fire pump)	17.21	Diesel	1.66 MMBTU/H		Volatile Organic Compounds (VOC)	Good combustion practices	0.64 LB/H		
MI-0424	12/05/2016 &nbsp;ACT	EUFENGINE (Emergency engine--diesel fire pump)	17.21	diesel	500 H/YR		Volatile Organic Compounds (VOC)	Good combustion practices	0.47 LB/H		
MI-0433	06/29/2018 &nbsp;ACT	EUFENGINE (South Plant): Fire pump engine	17.21	Diesel	300 HP		Volatile Organic Compounds (VOC)	Good combustion practices.	0.75 LB/H		1.5
MI-0433	06/29/2018 &nbsp;ACT	EUFENGINE (North Plant): Fire pump engine	17.21	Diesel	300 HP		Volatile Organic Compounds (VOC)	Good combustion practices	0.75 LB/H		1.5
MI-0435	07/16/2018 &nbsp;ACT	EUFENGINE: Fire pump engine	17.21	Diesel	399 BHP		Volatile Organic Compounds (VOC)	State of the art combustion design.	0.13 LB/H		0.2
MI-0443	04/26/2019 &nbsp;ACT	EUFIREPUMP1	17.21	Diesel	500 h/yr		Volatile Organic Compounds (VOC)		0.1 G/B-HP-H		0.1
MI-0443	04/26/2019 &nbsp;ACT	EUFIREPUMP2	17.21	Diesel	500 h/yr		Volatile Organic Compounds (VOC)		0.1 G/B-HP-H		0.1
MI-0443	04/26/2019 &nbsp;ACT	EUFIREPUMP3	17.21	Diesel	500 h/yr		Volatile Organic Compounds (VOC)		0.1 G/B-HP-H		0.1
*MI-0446	10/30/2020 &nbsp;ACT	EUFIREPUMP1	17.21	diesel fuel	500 h/yr		Volatile Organic Compounds (VOC)		0.1 G/B-HP-H		0.1
*MI-0446	10/30/2020 &nbsp;ACT	EUFIREPUMP2	17.21	diesel fuel	500 h/yr		Volatile Organic Compounds (VOC)		0.1 G/B-HP-H		0.1
MS-0092	05/08/2014 &nbsp;ACT	firewater pumps, diesel	17.21	diesel	325 HP, EACH		Volatile Organic Compounds (VOC)		0		



**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
NJ-0081	03/07/2014 &nbsp;   ACT	Emergency diesel fire pump	17.21	Ultra Low Sulfur Distillate oil	0		Volatile Organic Compounds (VOC)		0.119 LB/H		
NJ-0084	03/10/2016 &nbsp;   ACT	Emergency Diesel Fire Pump	17.21	ULSD	100 H/YR		Volatile Organic Compounds (VOC)	use of ULSD a clean burning fuel, and limited hours of operation	0.1 LB/H		
NJ-0085	07/19/2016 &nbsp;   ACT	EMERGENCY GENERATOR DIESEL	17.21	DIESEL OIL	0 100 H/YR		Volatile Organic Compounds (VOC)	Use of Ultra Low Sulfur Diesel (ULSD) Oil a clean burning fuel and limited hours of operation	0.557 LB/H		
NJ-0085	07/19/2016 &nbsp;   ACT	EMERGENCY DIESEL FIRE PUMP	17.21	ULSD	100 H/YR		Volatile Organic Compounds (VOC)	Use of Ultra Low Sulfur Diesel (ULSD) Oil a clean burning fuel and limited hours of operation	0.117 LB/H		
NY-0103	02/03/2016 &nbsp;   ACT	Emergency fire pump	17.21	ultra low sulfur diesel	460 hp		Volatile Organic Compounds (VOC)	Compliance demonstrated with vendor emission certification and adherence to vendor-specified maintenance recommendations.	0.1 G/BHP-H		0.1
NY-0104	08/01/2013 &nbsp;   ACT	Fire pump	17.21	ultra low sulfur diesel	0		Volatile Organic Compounds (VOC)	Good combustion practice.	0.3612 LB/MMBTU		
OH-0352	06/18/2013 &nbsp;   ACT	Emergency fire pump engine	17.21	diesel	300 HP		Volatile Organic Compounds (VOC)	Purchased certified to the standards in NSPS Subpart IIII	0.25 LB/H		0.5
OH-0360	11/05/2013 &nbsp;   ACT	Emergency fire pump engine (P004)	17.21	diesel	400 HP		Volatile Organic Compounds (VOC)	Purchased certified to the standards in NSPS Subpart IIII	0.325 LB/H		0.5
OH-0366	08/25/2015 &nbsp;   ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	140 HP		Volatile Organic Compounds (VOC)	State-of-the-art combustion design	0.11 LB/H		0.5
OH-0367	09/23/2016 &nbsp;   ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	311 HP		Volatile Organic Compounds (VOC)	State-of-the-art combustion design	0.25 LB/H		0.5
OH-0368	04/19/2017 &nbsp;   ACT	Emergency Fire Pump Diesel Engine (P008)	17.21	Diesel fuel	460 HP		Volatile Organic Compounds (VOC)	good combustion control and operating practices and engines designed to meet the stands of 40 CFR Part 60, Subpart IIII	0.14 LB/H		0.2
OH-0370	09/07/2017 &nbsp;   ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Volatile Organic Compounds (VOC)	State-of-the-art combustion design	0.24 LB/H		0.5
OH-0372	09/27/2017 &nbsp;   ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Volatile Organic Compounds (VOC)	State-of-the-art combustion design	0.24 LB/H		0.5
OH-0374	10/23/2017 &nbsp;   ACT	Emergency Fire Pump (P006)	17.21	Diesel fuel	410 HP		Volatile Organic Compounds (VOC)	Certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII. Good combustion practices per the manufacturerâ€™s operating manual.	2.7 LB/H		4.0
OH-0377	04/19/2018 &nbsp;   ACT	Emergency Fire Pump (P004)	17.21	Diesel fuel	320 HP		Volatile Organic Compounds (VOC)	Good combustion practices (ULSD) and compliance with 40 CFR Part 60, Subpart IIII	2.12 LB/H		4.0
OH-0378	12/21/2018 &nbsp;   ACT	Firewater Pumps (P005 and P006)	17.21	Diesel fuel	402 HP		Volatile Organic Compounds (VOC)	Certified to the meet the emissions standards in Table 4 of 40 CFR Part 60, Subpart IIII and employ good combustion practices per the manufacturerâ€™s operating manual	2.64 LB/H		4.0
OK-0164	01/08/2015 &nbsp;   ACT	Diesel-Fueled Fire Pump Engines	17.21	Ultra-Low Sulfur Distillate Fuel	300 HP		Volatile Organic Compounds (VOC)	1. Good Combustion Practices.	0.15 GRAMS PER HP-HR		0.2
OK-0175	06/29/2017 &nbsp;   ACT	Emergency Use Engine less than or equal to 500 HP	17.21	Diesel	0		Volatile Organic Compounds (VOC)	Good combustion practices, certified to meet EPA Tier 3 engine standards. Gen-1, FP-1, and FP-2 shall be limited to operate no more than 500 hr/yr.	3 GM/HP-HR		4.0

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
OK-0176	07/19/2017 &nbsp;ACT	Emergency Generator	17.21	Diesel	400 HP		Volatile Organic Compounds (VOC)	Equipped with non-resettable hour meter. Fired with ultra-low sulfur diesel fuel (0.015 % or less by wt. sulfur.	217.24	TONS/YEAR/FACILITY	
OK-0181	09/11/2019 &nbsp;ACT	EMERGENCY USE ENGINES &lt; 500 HP	17.21	DIESEL	0		Volatile Organic Compounds (VOC)	Good Combustion Practices. Certified to meet EPA Tier 3 engine standards. Gen-1 and FP-1 shall be limited to operate not more than 500 hours per year. SP-1 shall be limited to operate not more than 876 hours per year.	3	GM/HP-HR	4.0
PA-0278	10/10/2012 &nbsp;ACT	Fire Pump	17.21	Diesel	0		Volatile Organic Compounds (VOC)		0.1	G/B-HP-H	0.1
PA-0286	01/31/2013 &nbsp;ACT	Fire Pump Engine - 460 BHP	17.21	Diesel	0		Volatile Organic Compounds (VOC)		0.1	G/HP-H	0.1
PA-0291	04/23/2013 &nbsp;ACT	EMERGENCY FIREWATER PUMP	17.21	ULTRA LOW SULFUR DISTILLATE	3.25 MMBTU/H		Volatile Organic Compounds (VOC)		1.11	LB/H	
PA-0296	12/17/2013 &nbsp;ACT	Emergency Firewater Pump	17.21	Diesel	16 Gal/hr		Volatile Organic Compounds (VOC)		0.013	T/YR	
PA-0309	12/23/2015 &nbsp;ACT	Fire pump engine	17.21	Ultra-low sulfur diesel	15 gal/hr		Volatile Organic Compounds (VOC)		0.12	GM/HP-HR	0.2
*PA-0326	02/18/2021 &nbsp;ACT	Emergency Generator Parking Garage	17.21	Diesel	0		Volatile Organic Compounds (VOC)	The use of certified engines, design of engines to include turbocharger and an intercooler/aftercooler, good combustion practices and proper operation and maintenance including certification to applicable federal emission standards	2.37	GRAM	3.2
*PA-0326	02/18/2021 &nbsp;ACT	Emergency Generator Telecom Hut & Tower	17.21	diesel	0		Volatile Organic Compounds (VOC)	The use of certified engines, design of engines to include turbocharger and an intercooler/aftercooler, good combustion practices and proper operation and maintenance including certification to applicable federal emission standards	2.83	G	3.8
PR-0009	04/10/2014 &nbsp;ACT	Emergency Diesel Fire Pump	17.21	ULSD Fuel Oil #2	0		Volatile Organic Compounds (VOC)		0.15	G/B-HP-H	0.2
SC-0113	02/08/2012 &nbsp;ACT	EMERGENCY ENGINE 1 THRU 8	17.21	DIESEL	29 HP		Volatile Organic Compounds (VOC)	PURCHASE OF CERTIFIED ENGINES. HOURS OF OPERATION LIMITED TO 100 HOURS FOR MAINTENANCE AND TESTING.	7.5	GR/KW-H	7.5
SC-0113	02/08/2012 &nbsp;ACT	FIRE PUMP	17.21	DIESEL	500 HP		Volatile Organic Compounds (VOC)	CERTIFIED ENGINES THAT COMPLY WITH NSPS, SUBPART IIII. HOURS OF OPERATION LIMITED TO 100 HOURS PER YEAR FOR MAINTENANCE AND TESTING.	4	GR/KW-H	4.0
SC-0159	07/09/2012 &nbsp;ACT	FIRE PUMPS, FIRE1, FIRE2, FIRE3	17.21	DIESEL	211 KW		Volatile Organic Compounds (VOC)	BACT HAS BEEN DETERMINED TO BE COMPLIANCE WITH NSPS, SUBPART IIII, 40 CFR60.4202 AND 40 CFR60.4205.	4	GKW-H	4.0
SC-0182	10/31/2017 &nbsp;ACT	Emergency Fire Pumps	17.21		0		Volatile Organic Compounds (VOC)	Use of Ultra Low Sulfur Diesel Fuel (15 ppm), good combustion, operation, and maintenance practices; compliance with NESHAP Subpart ZZZZ	200	OPERATING HR/YR	
TX-0706	01/23/2014 &nbsp;ACT	Emergency Engines	17.21	Ultra-low sulfur diesel	0		Volatile Organic Compounds (VOC)		0.03	TPY	
TX-0799	06/08/2016 &nbsp;ACT	EMERGENCY ENGINES	17.21	diesel	0		Volatile Organic Compounds (VOC)	Equipment specifications and good combustion practices. Operation limited to 100 hours per year.	0.0025	LB/HP-HR	1.5

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - VOC (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit g/kW-hr
TX-0846	09/23/2018 &nbsp;ACT	FIRE PUMP DIESEL ENGINE	17.21	NO 2 DIESEL	214 kW		Volatile Organic Compounds (VOC)	Meets EPA Tier 4 requirements	0.19 G/KW		0.2
TX-0864	09/09/2019 &nbsp;ACT	EMERGENCY DIESEL ENGINE	17.21	Ultra-low sulfur diesel	0		Volatile Organic Compounds (VOC)	Tier 4 exhaust emission standards specified at 40 CFR Â§ 1039.101(b), 100 HR / YR	0		
TX-0886	03/31/2020 &nbsp;ACT	EMERGENCY DIESEL ENGINE	17.21	Ultra-low sulfur diesel	0		Volatile Organic Compounds (VOC)	Limited operating hours, good combustion practices meets NSPS IIII Tier 3 engine	0		
*TX-0908	08/27/2021 &nbsp;ACT	Emergency Engine	17.21	natural gas	74 KW		Volatile Organic Compounds (VOC)	Meet the requirements of 40 CFR Part 60, Subpart IIII. Firing ultra-low diesel fuel. Limited to 100 hrs/yr of non-emergency operation.	0		
VA-0325	06/17/2016 &nbsp;ACT	DIESEL-FIRED WATER PUMP 376 bph (1)	17.21	DIESEL FUEL	0		Volatile Organic Compounds (VOC)	Good Combustion Practices/Maintenance	3 G/HP-H		4.0
VA-0328	04/26/2018 &nbsp;ACT	Emergency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Volatile Organic Compounds (VOC)	good combustion practices and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	0		4.0
VA-0332	06/24/2019 &nbsp;ACT	Emegency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Volatile Organic Compounds (VOC)	good combustion practices, high efficiency design, and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	0.11 G/HP-HR		0.1
*WI-0261	06/12/2014 &nbsp;ACT	EG7 - Diesel Emergency Electric Generator w/ tank	17.21	Diesel fuel oil	197 BHP		Volatile Organic Compounds (VOC)	NSPS engine [Tier 3 emergency engine]. EG7 Storage tank, conventional fuel oil storage tank, good operating practices; limiting leakage, spills. (FT01). Engine limited to 200 hours / year (total) and NSPS requirements.	3.75 GRAM / HP-HR		5.0
WI-0263	02/15/2016 &nbsp;ACT	Fire pump (process P05)	17.21	Diesel	1.27 mmBtu/hr		Volatile Organic Compounds (VOC)	Good combustion practices, use diesel fuel, and operate <500 hr/yr	0		
*WI-0279	10/02/2017 &nbsp;ACT	EG8 â€ Diesel Emergency Generator	17.21	Diesel Fuel	0		Volatile Organic Compounds (VOC)	Complying with NSPS Standards under 40 CFR Part 60 Subpart IIII	0		
*WI-0292	04/01/2019 &nbsp;ACT	P37 Diesel-Fired Emergency Fire Pump	17.21	Diesel Fuel	0		Volatile Organic Compounds (VOC)	Hours of Operation	200 HOURS		
WV-0025	11/21/2014 &nbsp;ACT	Fire Pump Engine	17.21	Diesel	251 HP		Volatile Organic Compounds (VOC)		0.17 LB/H		0.4

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - GHG (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT
AK-0082	01/23/2015 &nbsp;ACT	Airstrip Generator Engine	17.21	Ultra Low Sulfur Diesel	490 hp		Carbon Dioxide Equivalent (CO2e)		163 TONS/YEAR	
AK-0082	01/23/2015 &nbsp;ACT	Agitator Generator Engine	17.21	Ultra Low Sulfur Diesel	98 hp		Carbon Dioxide Equivalent (CO2e)		356 TONS/YEAR	
AK-0082	01/23/2015 &nbsp;ACT	Incinerator Generator Engine	17.21	Ultra Low Sulfur Diesel	102 hp		Carbon Dioxide Equivalent (CO2e)		516 TONS/YEAR	
AK-0083	01/06/2015 &nbsp;ACT	Diesel Fired Well Pump	17.21	Diesel	2.7 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Limited Operation of 168 hr/yr.	37.2 TONS/YEAR	
AK-0084	06/30/2017 &nbsp;ACT	Fire Pump Diesel Internal Combustion Engines	17.21	Diesel	252 hp		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices	216 TPY (COMBINED)	
*AK-0085	08/13/2020 &nbsp;ACT	Three (3) Firewater Pump Engines and two (2) Emergency Diesel Generators	17.21	ULSD	19.4 gph		Carbon Dioxide Equivalent (CO2e)	Good combustion practices and limit operation to 500 hours per year per engine	163.6 LB/MMBTU	
*AK-0086	03/26/2021 &nbsp;ACT	Diesel Fired Well Pump	17.21	Diesel	2.7 MMBtu/hr		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices and Limited Use	164 LB/MMBTU	
AR-0168	03/17/2021 &nbsp;ACT	Emergency Engines	17.21	Diesel	0		Carbon Dioxide	Good Combustion Practices	163 LB/MMBTU	
AR-0171	02/14/2019 &nbsp;ACT	SN-106 Cold Mill 1 Diesel Fired Emergency Generator	17.21	Diesel	1073 bhp		Carbon Dioxide Equivalent (CO2e)	Good operating practices.	163 LB/MMBTU	
FL-0338	05/30/2012 &nbsp;ACT	Wireline Unit Engines - C.R. Luigs	17.21	diesel	300 hp		Carbon Dioxide Equivalent (CO2e)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, turbocharger with aftercooler, high pressure fuel injection with aftercooler	536.6 T/12MO ROLLING TOTAL	
FL-0338	05/30/2012 &nbsp;ACT	Fast Rescue Craft Diesel Engine - Development Driller 1	17.21	Diesel	142 hp		Carbon Dioxide Equivalent (CO2e)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, and turbocharger	0	
FL-0338	05/30/2012 &nbsp;ACT	Life Boat Diesel Engines - Development Driller 1	17.21	Diesel	110 hp		Carbon Dioxide Equivalent (CO2e)	Use of good combustion practices based on the current manufacturer's specifications for these engines and use of low sulfur diesel fuel	0	
FL-0338	05/30/2012 &nbsp;ACT	Port and Stb Fwd and Aft Crane Diesel Engines - C.R. Luigs	17.21	diesel	305 HP		Carbon Dioxide Equivalent (CO2e)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger with aftercooler, high pressure fuel injection with aftercooler	3083 TONS	
FL-0338	05/30/2012 &nbsp;ACT	Life Boat Diesel Engines - C.R. Luigs	17.21	diesel	39 hp		Carbon Dioxide Equivalent (CO2e)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel	0	
FL-0338	05/30/2012 &nbsp;ACT	Cementing and Nitrogen Pump Diesel Engines - Development Driller 1	17.21	Diesel	0		Carbon Dioxide Equivalent (CO2e)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger, and high pressure fuel injection with aftercooler	715.5 T/12MO ROLLING TOTAL	
FL-0338	05/30/2012 &nbsp;ACT	Wireline Unit Diesel Engines - Development Driller 1	17.21	Diesel	0		Carbon Dioxide Equivalent (CO2e)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, turbocharger with aftercooler, high pressure fuel injection with aftercooler	536.6 TONS	
FL-0338	05/30/2012 &nbsp;ACT	Black Start Air Compressor - C.R. Luigs	17.21	diesel	6 hp		Carbon Dioxide Equivalent (CO2e)	Use of good combustion practices based on the current manufacturer's specifications for the engine and the use of low sulfur diesel fuel	0	

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - GHG (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT
FL-0338	05/30/2012 &nbsp;ACT	Cementing and Nitrogen Pump Diesel Engines - C.R. Luigs	17.21	diesel	0		Carbon Dioxide Equivalent (CO2e)	Use of good combustion practices based on the current manufacturer's specifications for these engines, use of low sulfur diesel fuel, positive crankcase ventilation, turbocharger, and high pressure fuel injection with aftercooler	628.9 TONS	
FL-0354	08/25/2015 &nbsp;ACT	Emergency fire pump engine, 300 HP	17.21	Diesel	29 MMBTU/H		Carbon Dioxide	Lowest-emitting available fuel	0	
IA-0105	10/26/2012 &nbsp;ACT	Fire Pump	17.21	diesel fuel	14 GAL/H		Carbon Dioxide	good combustion practices	1.55 G/KW-H	
IA-0105	10/26/2012 &nbsp;ACT	Fire Pump	17.21	diesel fuel	14 GAL/H		Carbon Dioxide Equivalent (CO2e)	good combustion practices	91 TONS/YR	
ID-0021	04/21/2014 &nbsp;ACT	EMERGENCY GENERATOR ENGINE	17.21	#2 Distillate w/sulfur content <= 15ppmw	2000 kW		Carbon Dioxide Equivalent (CO2e)		22.6 LBS	
ID-0021	04/21/2014 &nbsp;ACT	FIRE WATER PUMP ENGINE	17.21	#2 Distillate w/sulfur content <= 15ppmw	500 brake horsepower		Carbon Dioxide Equivalent (CO2e)		22.6 LBS.	
IL-0114	09/05/2014 &nbsp;ACT	Firewater Pump Engine	17.21	distillate fuel oil	373 hp		Carbon Dioxide Equivalent (CO2e)	Tier IV standards for non-road engines at 40 CFR 1039.102, Table 7.	72 TPY	
IL-0129	07/30/2018 &nbsp;ACT	Firewater Pump Engine	17.21	Ultra-low sulfur diesel	0		Carbon Dioxide Equivalent (CO2e)		0	
IL-0130	12/31/2018 &nbsp;ACT	Firewater Pump Engine	17.21	Ultra-Low Sulfur Diesel	420 horsepower		Carbon Dioxide Equivalent (CO2e)		241 TONS/YEAR	
IN-0158	12/03/2012 &nbsp;ACT	TWO (2) FIREWATER PUMP DIESEL ENGINES	17.21	DIESEL	371 BHP, EACH		Carbon Dioxide Equivalent (CO2e)	GOOD ENGINEERING DESIGN AND FUEL EFFICIENT DESIGN	172 TONS	
IN-0173	06/04/2014 &nbsp;ACT	FIRE PUMP	17.21		500 HP		Carbon Dioxide	GOOD COMBUSTION PRACTICES	527.4 G/BHP-H	
IN-0173	06/04/2014 &nbsp;ACT	RAW WATER PUMP	17.21	DIESEL, NO. 2	500 HP		Carbon Dioxide	GOOD COMBUSTION PRACTICES	527.4 G/BHP-H	
IN-0179	09/25/2013 &nbsp;ACT	DIESEL-FIRED EMERGENCY WATER PUMP	17.21	NO. 2 FUEL OIL	481 BHP		Carbon Dioxide	GOOD COMBUSTION PRACTICES	527.4 G/B-HP-H	
IN-0180	06/04/2014 &nbsp;ACT	FIRE PUMP	17.21		500 HP		Carbon Dioxide	GOOD COMBUSTION PRACTICES	527.4 G/B-HP-H	
IN-0180	06/04/2014 &nbsp;ACT	RAW WATER PUMP	17.21	DIESEL, NO. 2	500 HP		Carbon Dioxide	GOOD COMBUSTION PRACTICES	527.4 G/B-HP-H	
KS-0029	07/14/2015 &nbsp;ACT	Emergency diesel engine	17.21	diesel	750 KW		Carbon Dioxide Equivalent (CO2e)		59.5 TONS PER YEAR	
*KS-0030	03/31/2016 &nbsp;ACT	Compression ignition RICE emergency fire pump	17.21	Ultra-lowsulfur diesel (ULSD)	197 HP		Carbon Dioxide		2.6 G/HP-HR	
KY-0110	07/23/2020 &nbsp;ACT	EP 11-01 - Melt Shop Emergency Generator	17.21	Diesel	260 HP		Carbon Dioxide Equivalent (CO2e)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0	
KY-0110	07/23/2020 &nbsp;ACT	EP 11-02 - Reheat Furnace Emergency Generator	17.21	Diesel	190 HP		Carbon Dioxide Equivalent (CO2e)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0	
KY-0110	07/23/2020 &nbsp;ACT	EP 11-03 - Rolling Mill Emergency Generator	17.21	Diesel	440 HP		Carbon Dioxide Equivalent (CO2e)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0	
KY-0110	07/23/2020 &nbsp;ACT	EP 11-04 - IT Emergency Generator	17.21	Diesel	190 HP		Carbon Dioxide Equivalent (CO2e)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0	
KY-0110	07/23/2020 &nbsp;ACT	EP 11-05 - Radio Tower Emergency Generator	17.21	Diesel	61 HP		Carbon Dioxide Equivalent (CO2e)	This EP is required to have a Good Combustion and Operating Practices (GCOP) Plan.	0	
LA-0254	08/16/2011 &nbsp;ACT	EMERGENCY FIRE PUMP	17.21	DIESEL	350 HP		Carbon Dioxide	PROPER OPERATION AND GOOD COMBUSTION PRACTICES	163 LB/MMBTU	
LA-0301	05/23/2014 &nbsp;ACT	Firewater Pump Nos. 1-3 (EQTs 997, 998, & 999)	17.21	Diesel	500 HP		Carbon Dioxide Equivalent (CO2e)	Compliance with 40 CFR 60 Subpart IIII and operating the engine in accordance with the engine manufacturer's instructions and/or written procedures (consistent with safe operation) designed to maximize combustion efficiency and minimize fuel usage	10 TPY	

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - GHG (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT
*LA-0306	12/20/2016 &nbsp;ACT	Genenerator Engine DEG-16-1 (EQI035)	17.21	Diesel	460 horsepower		Carbon Dioxide Equivalent (CO2e)	Meet NSPS Subpart IIII Limitations and Good Combustion Practices	26 Y/YR	
*LA-0306	12/20/2016 &nbsp;ACT	Pump Engines DFP-16-1 (EQI036)	17.21	Diesel	225 horsepower		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices	13 T/YR	
*LA-0306	12/20/2016 &nbsp;ACT	Pump Engine DFP-16-2 (EQI037)	17.21	Diesel	225 horsepower		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices	13 T/YR	
LA-0308	09/26/2013 &nbsp;ACT	380 HP Diesel Fired Pump Engine	17.21	Diesel	2.3 MMBTU/hr		Carbon Dioxide	Good combustion practices	0	
LA-0309	06/04/2015 &nbsp;ACT	Firewater Pump Engines	17.21	Diesel	288 hp (each)		Carbon Dioxide Equivalent (CO2e)		0	
LA-0313	08/31/2016 &nbsp;ACT	SCPS Emergency Diesel Firewater Pump 1	17.21	Diesel	282 HP		Carbon Dioxide Equivalent (CO2e)	Good combustion practices	0	
LA-0314	08/03/2016 &nbsp;ACT	Diesel Firewater pump engines (6 units)	17.21	diesel	425 hp		Carbon Dioxide Equivalent (CO2e)		0	
LA-0314	08/03/2016 &nbsp;ACT	Diesel emergency generator engine - EGEN	17.21	diesel	350 hp		Carbon Dioxide Equivalent (CO2e)		0	
LA-0316	02/17/2017 &nbsp;ACT	firewater pump engines (8 units)	17.21	diesel	460 hp		Carbon Dioxide Equivalent (CO2e)	good combustion practices	0	
LA-0323	01/09/2017 &nbsp;ACT	Standby Generator No. 9 Engine	17.21	Diesel Fuel	400 hp		Carbon Dioxide Equivalent (CO2e)	Proper operation and limits on hours of operation for emergency engines and compliance with 40 CFR 60 Subpart IIII	0	
LA-0328	05/02/2018 &nbsp;ACT	Emergency Diesel Engine Pump P-39A	17.21	Diesel Fuel	375 HP		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices	28 T/YR	
LA-0328	05/02/2018 &nbsp;ACT	Emergency Diesel Engine Pump P-39B	17.21	Diesel Fuel	300 HP		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices	28 T/YR	
*LA-0370	04/27/2020 &nbsp;ACT	Emergency Fire Pump Engine (EQI0021, ENG-1)	17.21	Diesel	1.1 MM BTU/hr		Carbon Dioxide Equivalent (CO2e)	Good combustion practices in order to comply with 40 CFR 60 Subpart IIII	9 TPY	
MA-0039	01/30/2014 &nbsp;ACT	Fire Pump Engine	17.21	ULSD	2.7 MMBTU/H		Carbon Dioxide Equivalent (CO2e)		162.85 LB/MMBTU	
MI-0410	07/25/2013 &nbsp;ACT	EU-FPENGINE: Diesel fuel fired emergency backup fire pump	17.21	diesel fuel	315 hp nameplate		Carbon Dioxide Equivalent (CO2e)	Proper combustion design and ultra low sulfur diesel fuel.	15.6 T/YR	
MI-0412	12/04/2013 &nbsp;ACT	Emergency Engine --Diesel Fire Pump (EUPENGINE)	17.21	Diesel	165 HP		Carbon Dioxide Equivalent (CO2e)	Good combustion practices	0.29 T/YR	
MI-0423	01/04/2017 &nbsp;ACT	EUPENGINE (Emergency engine--diesel fire pump)	17.21	Diesel	1.66 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion practices	13.58 T/YR	
MI-0424	12/05/2016 &nbsp;ACT	EUPENGINE (Emergency engine--diesel fire pump)	17.21	diesel	500 H/YR		Carbon Dioxide Equivalent (CO2e)	Good combustion practices.	55.6 T/YR	
MI-0433	06/29/2018 &nbsp;ACT	EUPENGINE (South Plant): Fire pump engine	17.21	Diesel	300 HP		Carbon Dioxide Equivalent (CO2e)	Good combustion practices.	85.6 T/YR	
MI-0433	06/29/2018 &nbsp;ACT	EUPENGINE (North Plant): Fire pump engine	17.21	Diesel	300 HP		Carbon Dioxide Equivalent (CO2e)	Good combustion practices.	85.6 T/YR	
MI-0435	07/16/2018 &nbsp;ACT	EUPENGINE: Fire pump engine	17.21	Diesel	399 BHP		Carbon Dioxide Equivalent (CO2e)	Energy efficient design	86 T/YR	
MI-0441	12/21/2018 &nbsp;ACT	EUPPRICE--A 315 HP diesel fueled emergency engine	17.21	Diesel	2.5 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion practices and energy efficiency measures.	20 T/YR	
*MI-0445	11/26/2019 &nbsp;ACT	EUPENGINE (Emergency engine-diesel fire pump)	17.21	diesel fuel	1.66 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Good combustion practices	13.58 T/YR	
MI-0447	01/07/2021 &nbsp;ACT	EUPPRICE--A 315 HP diesel fueled emergency engine	17.21	Diesel	2.5 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Low carbon fuel (pipeline quality natural gas), good combustion practices and energy efficiency measures.	20 T/YR	
NY-0103	02/03/2016 &nbsp;ACT	Emergency fire pump	17.21	ultra low sulfur diesel	460 hp		Carbon Dioxide Equivalent (CO2e)	Good combustion practice and efficient engine design.	115 TPY	

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - GHG (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT
OH-0352	06/18/2013 &nbsp;ACT	Emergency fire pump engine	17.21	diesel	300 HP		Carbon Dioxide Equivalent (CO2e)		87 T/YR	
OH-0360	11/05/2013 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	diesel	400 HP		Carbon Dioxide Equivalent (CO2e)		115.75 T/YR	
OH-0363	11/05/2014 &nbsp;ACT	Emergency Fire Pump Engine (P003)	17.21	Diesel fuel	260 HP		Carbon Dioxide Equivalent (CO2e)	Emergency operation only, < 500 hours/year each for maintenance checks and readiness testing designed to meet NSPS Subpart IIII	75 T/YR	
OH-0366	08/25/2015 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	140 HP		Carbon Dioxide Equivalent (CO2e)	Efficient design	41 T/YR	
OH-0367	09/23/2016 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	311 HP		Carbon Dioxide Equivalent (CO2e)	Efficient design	90 T/YR	
OH-0368	04/19/2017 &nbsp;ACT	Emergency Fire Pump Diesel Engine (P008)	17.21	Diesel fuel	460 HP		Carbon Dioxide Equivalent (CO2e)	good combustion control and operating practices and engines designed to meet the stands of 40 CFR Part 60, Subpart IIII	123 T/YR	
OH-0370	09/07/2017 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Carbon Dioxide Equivalent (CO2e)	Efficient design	87 T/YR	
OH-0372	09/27/2017 &nbsp;ACT	Emergency fire pump engine (P004)	17.21	Diesel fuel	300 HP		Carbon Dioxide Equivalent (CO2e)	State-of-the-art combustion design	87 T/YR	
OH-0374	10/23/2017 &nbsp;ACT	Emergency Fire Pump (P006)	17.21	Diesel fuel	410 HP		Carbon Dioxide Equivalent (CO2e)	good operating practices (proper maintenance and operation)	29 T/YR	
OH-0376	02/09/2018 &nbsp;ACT	Emergency diesel-fueled fire pump (P006)	17.21	Diesel fuel	250 HP		Carbon Dioxide Equivalent (CO2e)	Equipment design and maintenance requirements	163.6 LB/MMBTU	
OH-0377	04/19/2018 &nbsp;ACT	Emergency Fire Pump (P004)	17.21	Diesel fuel	320 HP		Carbon Dioxide Equivalent (CO2e)	Efficient design and proper maintenance and operation	18.67 T/YR	
OH-0378	12/21/2018 &nbsp;ACT	Firewater Pumps (P005 and P006)	17.21	Diesel fuel	402 HP		Carbon Dioxide Equivalent (CO2e)	good operating practices (proper maintenance and operation)	23 T/YR	
OH-0379	02/06/2019 &nbsp;ACT	Black Start Generator (P007)	17.21	Diesel fuel	158 HP		Carbon Dioxide Equivalent (CO2e)	Tier IV engine Good combustion practices	181.7 LB/H	
OK-0164	01/08/2015 &nbsp;ACT	Diesel-Fueled Fire Pump Engines	17.21	Ultra-Low Sulfur Distillate Fuel	300 HP		Carbon Dioxide Equivalent (CO2e)	1. Good Combustion Practices. 2. Efficient Design.	44 TONS PER YEAR	
PA-0291	04/23/2013 &nbsp;ACT	EMERGENCY FIREWATER PUMP	17.21	ULTRA LOW SULFUR DISTILLATE	3.25 MMBTU/H		Carbon Dioxide Equivalent (CO2e)		33.8 TPY	
PA-0296	12/17/2013 &nbsp;ACT	Emergency Firewater Pump	17.21	Diesel	16 Gal/hr		Carbon Dioxide Equivalent (CO2e)		19 T/YR	
PA-0309	12/23/2015 &nbsp;ACT	Fire pump engine	17.21	Ultra-low sulfur diesel	15 gal/hr		Carbon Dioxide Equivalent (CO2e)		9 TON	
*PA-0326	02/18/2021 &nbsp;ACT	Emergency Generator Parking Garage	17.21	Diesel	0		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices - no feasible control technologies, 10 tons CO2e Year 12 month rolling basis for Parking Garage and Telecom emergency generators combined	10 TONS	
*PA-0326	02/18/2021 &nbsp;ACT	Emergency GeneratorTelecom Hut & Tower	17.21	diesel	0		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices - no feasible control technologies, 10 tons CO2e Year 12 month rolling basis for Parking Garage and Telecom emergency generators combined	10 TONS	
PR-0009	04/10/2014 &nbsp;ACT	Emergency Diesel Fire Pump	17.21	ULSD Fuel Oil #2	0		Carbon Dioxide Equivalent (CO2e)		91.3 T/YR	
SC-0182	10/31/2017 &nbsp;ACT	Emergency Fire Pumps	17.21		0		Carbon Dioxide Equivalent (CO2e)	Use of Ultra Low Sulfur Diesel Fuel (15 ppm), good combustion, operation, and maintenance practices; compliance with NESHAP Subpart ZZZZ	200 OPERATING HR/YR	
TX-0612	11/10/2011 &nbsp;ACT	FWP1-STK DIESEL FIRED FIRE WATER PUMP	17.21	DIESEL	617 HP		Carbon Dioxide Equivalent (CO2e)	Best Work practice	7027.8 LB/H	
TX-0753	12/02/2014 &nbsp;ACT	Fire Water Pump Engine	17.21	ULSD	1.92 MMBtu/hr (HHV)		Carbon Dioxide Equivalent (CO2e)		15.71 TPY CO2E	
TX-0757	05/12/2014 &nbsp;ACT	Firewater Pump Engine	17.21	ULSD	175 hp		Carbon Dioxide Equivalent (CO2e)		5.34 TPY CO2E	

**BACT Determinations for Small Internal Combustion Engine (< 500 HP) - GHG (Oil-Fired)**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT
TX-0758	08/01/2014 &nbsp;ACT	Firewater Pump Engine	17.21	Diesel	0		Carbon Dioxide Equivalent (CO2e)		5 TPY CO2E	
TX-0799	06/08/2016 &nbsp;ACT	EMERGENCY ENGINES	17.21	diesel	0		Carbon Dioxide Equivalent (CO2e)	Equipment specifications and good combustion practices. Operation limited to 100 hours per year.	6.79 T/YR	
TX-0824	06/30/2017 &nbsp;ACT	Emergency Diesel-Fired Equipment	17.21	DIESEL	160 HP		Carbon Dioxide Equivalent (CO2e)	Good operating and maintenance practices, efficient design, and low annual capacity	13 T/YR	
TX-0846	09/23/2018 &nbsp;ACT	FIRE PUMP DIESEL ENGINE	17.21	NO 2 DIESEL	214 kW		Carbon Dioxide Equivalent (CO2e)	Meets EPA Tier 4 requirements . Fuels with a low carbon density, regular equipment maintenance, the use of efficient equipment and operation limited to less than 100 hr/yr	0	
TX-0864	09/09/2019 &nbsp;ACT	EMERGENCY DIESEL ENGINE	17.21	Ultra-low sulfur diesel	0		Carbon Dioxide Equivalent (CO2e)	Tier 4 exhaust emission standards specified at 40 CFR Â§ 1039.101(b)	0	
TX-0889	08/08/2020 &nbsp;ACT	Emergency Generator Engines	17.21	Ultra-low sulfur diesel	0		Carbon Dioxide Equivalent (CO2e)	Good combustion practices and limited hours of operation	0	
*TX-0908	08/27/2021 &nbsp;ACT	Emergency Engine	17.21	natural gas	74 KW		Carbon Dioxide Equivalent (CO2e)	Meet the requirements of 40 CFR Part 60, Subpart IIII. Firing ultra-low diesel fuel. Limited to 100 hrs/yr of non-emergency operation.	0	
VA-0319	08/27/2012 &nbsp;ACT	FIRE WATER PUMP	17.21	diesel (ultra low sulfur)	1.86 MMBTU/H		Carbon Dioxide Equivalent (CO2e)	Fuel-efficient design	30.5 T/YR	
VA-0325	06/17/2016 &nbsp;ACT	DIESEL-FIRED WATER PUMP 376 bph (1)	17.21	DIESEL FUEL	0		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices/Maintenance	104 T/YR	
VA-0328	04/26/2018 &nbsp;ACT	Emergency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Carbon Dioxide Equivalent (CO2e)	good combustion practices and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	1040 T/YR	
VA-0332	06/24/2019 &nbsp;ACT	Emergency Fire Water Pump	17.21	Ultra Low Sulfur Diesel	500 HR/YR		Carbon Dioxide Equivalent (CO2e)	good combustion practices, high efficiency design, and the use of ultra low sulfur diesel (S15 ULSD) fuel oil with a maximum sulfur content of 15 ppmw.	106 T/YR	
*WI-0292	04/01/2019 &nbsp;ACT	P37 Diesel-Fired Emergency Fire Pump	17.21	Diesel Fuel	0		Carbon Dioxide Equivalent (CO2e)	Hours of Operation	200 HOURS	
WV-0025	11/21/2014 &nbsp;ACT	Fire Pump Engine	17.21	Diesel	251 HP		Carbon Dioxide Equivalent (CO2e)		309 LB/H	
WY-0076	07/01/2014 &nbsp;ACT	Fire Water Pump Engine	17.21	Diesel	200 HP		Carbon Dioxide Equivalent (CO2e)	limited to 500 hours of operation per year	58 T/YR	



### BACT Determinations for Furnaces - Particulates

BACT Determinations for Furnaces - Particulates											Std Units Limit gr/dscf
RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	
AK-0084	06/30/2017 &nbsp;  ACT	Induction Smelting Furnace	90.021	electricity		0	Particulate matter, total (TPM)	Dust Collector		0.005 GR/DSCF	0.01
AL-0275	07/22/2014 &nbsp;  ACT	Electric Arc Furnace	81.21			0	Particulate matter, filterable (FPM)	Baghouse		0.0018 GR	0.00
AL-0301	07/22/2014 &nbsp;  ACT	ELECTRIC ARC FURNACE BAGHOUSE # 2	81.21			600000 LB/H	Particulate matter, total &lt; 10 Åµ (TPM10)	Agency did not provide any information.		0.0052 GR/DSCF	0.01
AL-0309	03/02/2016 &nbsp;  ACT	TWO (2) ELECTRIC ARC FURNACES WITH TWO (2) MELTSHOP BAGHOUSES	81.21	ELECTRICTY		0	Particulate matter, total (TPM)	BAGHOUSE		0.0052 GR/DSCF	0.01
AL-0319	03/09/2017 &nbsp;  ACT	Electric Arc Furnace	81.21			0	Particulate matter, total &lt; 10 Åµ (TPM10)			0.0052 GR/DSCF	0.01
AL-0327	08/14/2019 &nbsp;  ACT	Electric Arc Furnaces	81.21			0	Particulate matter, total (TPM)	Baghouse		0.0052 GR/DSCF	0.01
CO-0066	11/30/2011 &nbsp;  ACT	Electric Arc Furnace (EAF 5)	81.21	Electric		185 ton/hour	Particulate matter, total (TPM)	Baghouse		0.0018 GRAIN PER DSCF	0.00
MI-0429	04/27/2017 &nbsp;  ACT	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42			0	Particulate matter, total &lt; 10 Åµ (TPM10)	Baghouses A and B		0.002 GR/DSCF	0.00
NE-0055	10/09/2013 &nbsp;  ACT	ELECTRIC ARC FURNACE	81.31	Electric		206 tons of scrap processed pe	Particulate matter, total &lt; 10 Åµ (TPM10)	The EAF and melthshop will be controlled by two baghouse. The existing positive pressure baghouse has a maximum design value of 965,000 acfm. The project will require Nucor to add a second negative pressure baghouse rated at 630,000 acfm. The source will also use Direct Evacuation Control to capture emissions.		0.0052 GRAIN/DSCF	0.01
OH-0350	07/18/2012 &nbsp;  ACT	Electric Arc Furnace	81.21	electric		150 T/H	Particulate matter, total &lt; 10 Åµ (TPM10)	Direct-Shell Evacuation Control system with adjustable air gap and water-cooled elbow and duct to Baghouse		0.0034 GR/DSCF	0.00
OH-0379	02/06/2019 &nbsp;  ACT	Electric Arc Furnace (EAF) (P901)	81.9			0	Particulate matter, total &lt; 10 Åµ (TPM10)	The baghouse is designed with a control efficiency of ninety-nine and nine tenths (99.9) percent for PM10/PM2.5 emissions.		0.074 LB/T	
OH-0381	09/27/2019 &nbsp;  ACT	Electric Arc Furnace #2 (P905)	81.21			250 T/H	Particulate matter, total &lt; 10 Åµ (TPM10)	Operation of a baghouse control system a consisting of the following: (a)direct evacuation control (DEC) system for collection of emissions from EAF and LMF; (b)roof canopy hood system for collection of emissions fugitive to the inside of Meltshop #2 from casting operations (P907-Caster #2) and emissions not captured by the DEC control systems;		26.57 LB/H	0.00
OK-0173	01/19/2016 &nbsp;  ACT	Electric Arc Furnace	81.31			0	Particulate matter, total &lt; 10 Åµ (TPM10)	P2 - Pre-cleaned Scrap Add-on - Baghouse		0.0024 GR/DSCF	0.00
SC-0183	05/04/2018 &nbsp;  ACT	Melt Shop Equipment (electric arc furnaces fugitives)	81.21			175	2 Particulate matter, filterable (FPM)	Good work practice standards and proper operation and maintenance of baghouses.		0	
TX-0651	10/02/2013 &nbsp;  ACT	ELECTRIC ARC FURNACE	81.21	electricity		316 TPH	Particulate matter, total (TPM)	ENCLOSURE, CAPTURE, FABRIC FILTER		0.0032 GR/DSCF	0.00
TX-0651	10/02/2013 &nbsp;  ACT	LADLE FURNACE	81.34	electricity		316 TPH	Particulate matter, total (TPM)	ENCLOSURE, CAPTURE, FABRIC FILTER		0.0052 GR/DSCF	0.01
TX-0882	01/17/2020 &nbsp;  ACT	Electric Arc Furnaces (EAF)	81.21	ELECTRIC		0	Particulate matter, filterable (FPM)	BAGHOUSE		0.0052 GR/DSCF	0.01

**BACT Determinations for Lime Transfers - Particulates**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit gr/dscf
AK-0084	06/30/2017 &nbsp;ACT	Reagent Handling for Water Treatment	90.019	1500	scfm	Particulate matter, total (TPM)	Dust Collector	0.02	GR/DSCF	0.020000
AK-0084	06/30/2017 &nbsp;ACT	Mill Reagents Handling	90.019	3002	ACFM	Particulate matter, total (TPM)	Dust Collector	0.02	GR/DSCF	0.020000
AK-0084	06/30/2017 &nbsp;ACT	Mill Reagents Handling	90.019	628	ACFM	Particulate matter, total (TPM)	Wet Scrubber	0.02	GR/DSCF	0.020000
AL-0313	05/04/2016 &nbsp;ACT	LIMESTONE FEED SYSTEM	90.019	110000	LB/H	Particulate matter, fugitive	WET LIMESTONE	7	% OPACITY	
AL-0313	05/04/2016 &nbsp;ACT	PRODUCT HANDLING SYSTEM	90.019	55000	LB/H OF LIME	Particulate matter, filterable &lt; 10 Åµ (FPM10)	FABRIC FILTER BAGHOUSE	0.002	GR/DSCF	0.002000
AL-0313	05/04/2016 &nbsp;ACT	CA-08 EAST LKD	90.019	0		Particulate matter, filterable &lt; 10 Åµ (FPM10)	FABRIC FILTER BAGHOUSE	0.002	GR/DSCF	0.002000
IL-0117	09/29/2015 &nbsp;ACT	Lime Barge Loadout	90.019	0		Particulate matter, filterable (FPM)	Telescoping loading spout with suction or aspiration at discharge end and a filter system.	0.004	GR/SCF	0.004000
IL-0117	09/29/2015 &nbsp;ACT	Truck and Rail Loadout	90.019	0		Particulate matter, filterable (FPM)	Partial enclosure; fabric filters to treat displaced air during loadout; and loadout practices to minimize spillage.	0.004	GR/SCF	0.004000
IL-0117	09/29/2015 &nbsp;ACT	Limestone Handling Operations (Stack Emissions)	90.019	0		Particulate matter, filterable (FPM)		0.014	GR/DSCF	0.014000
IL-0117	09/29/2015 &nbsp;ACT	Limestone Handling Operations (Fugitive Emissions)	90.019	0		Particulate matter, filterable (FPM)		0		
IN-0167	04/16/2013 &nbsp;ACT	LIMESTONE UNLOADING (TRUCK)	90.019	495	T/H	Particulate matter, total &lt; 10 Åµ (TPM10)	DEVELOPMENT, IMPLEMENTATION, AND MAINTENANCE OF SIRE-SPECIFIC FUGITIVE DUST CONTROL PLAN	0.0011	LB/H	
IN-0167	04/16/2013 &nbsp;ACT	LIMESTONE CONVEYOR & ENCLOSURE STORAGE (PILE)	90.019	495	T/H	Particulate matter, total &lt; 10 Åµ (TPM10)	DEVELOPMENT, MAINTENANCE, AND IMPLEMENTATION OF A SITE-SPECIFIC FUGITIVE DUST CONTROL PLAN AND ENCLOSURE	0.02	LB/H	
IN-0167	04/16/2013 &nbsp;ACT	WBE LIME STORAGE AREA	90.019	7	T/H	Particulate matter, total &lt; 10 Åµ (TPM10)	BIN VENT CE020	0.002	GR/DSCF	0.002000
IN-0167	04/16/2013 &nbsp;ACT	LIMESTONE/DOLOMIT E HOPPER, BELT FEEDER, GRIZZLY FEEDER/SCREENER	90.019	495	T/H	Particulate matter, total &lt; 10 Åµ (TPM10)	DEVELOPMENT, IMPLEMENTATION, AND MAINTENANCE OF A SITE-SPECIFIC FUGITIVE DUST CONTROL PLAN	0.33	LB/H	
IN-0167	04/16/2013 &nbsp;ACT	LIMESTONE/DOLOMIT E HOPPER, BELT FEEDER, GRIZZLY FEEDER/SCREENER	90.019	495	T/H	Particulate matter, filterable (FPM)	THROUGH THE DEVELOPMENT, MAINTENANCE, AND IMPLEMENTATION OF A SITE-SPECIFIC FUGITIVE DUST CONTROL PLAN	0.9	LB/H	
IN-0167	04/16/2013 &nbsp;ACT	LIMESTONE/DOLOMIT E GRINDING MILL BIN AREA	90.019	495	T/H	Particulate matter, total &lt; 10 Åµ (TPM10)	BAGHOUSE CE023	0.002	GR/DSCF	0.002000
IN-0167	04/16/2013 &nbsp;ACT	GROUND LIMESTONE/DOLOMIT E ADDITIVE SYSTEM	90.019	132	T/H	Particulate matter, total &lt; 10 Åµ (TPM10)	BAGHOUSE CE010	0.002	GR/DSCF	0.002000
IN-0185	04/24/2014 &nbsp;ACT	LIMESTONE AND DOLOMITE GRINDING MILL BIN AREA	90.019	0		Particulate matter, filterable &lt; 10 Åµ (FPM10)	BAGHOUSE	0.002	GR/DSCF	0.002000
IN-0185	04/24/2014 &nbsp;ACT	LIMESTONE UNLOADING & STORAGE AREA	90.019	495	T/H	Particulate matter, filterable &lt; 10 Åµ (FPM10)		0.07	LB/H	

### Std Units

Limit  
gr/dscf

**BACT Determinations for Fuel Tanks Greater than 10,000 Gallons - VOC**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units
											Limit tpy
AK-0084	06/30/2017 &nbsp;ACT	Fuel Tanks	42.005	Diesel	0		Volatile Organic Compounds (VOC)	Submerged Fill	1.7 TPY		1.70
*AK-0085	08/13/2020 &nbsp;ACT	Fuel Tanks	42.005	ULSD	0		Volatile Organic Compounds (VOC)	Submerged Fill	0.59 TPY		0.59
CA-1180	08/24/2011 &nbsp;ACT	Recovered oil storage tank, external floating roof with dome	42.006		0		Volatile Organic Compounds (VOC)	Requires domes on external floating roof tanks.	0		
CA-1236	03/30/2014 &nbsp;ACT	Internal floating roof storage tank	42.006	GASOLINE	0		Volatile Organic Compounds (VOC)	Dual rim seals	1763.25 LB		0.88
FL-0346	04/22/2014 &nbsp;ACT	Three ULSD fuel oil storage tanks	42.005		0		Volatile Organic Compounds (VOC)	The Department sets BACT for these storage tanks to minimize VOC emissions as the use of pressure relief valves/vapor condensers. In lieu of pressure relief valves/vapor condensers, FPL as an alternative, can use tanks with internal floating roofs or the equivalent to minimize VOC emissions.	0		
FL-0354	08/25/2015 &nbsp;ACT	Two 3-million gallon ULSD storage tanks	42.005		0		Volatile Organic Compounds (VOC)	Low vapor pressure prevents evaporative losses	0		
IL-0115	01/23/2015 &nbsp;ACT	STORAGE TANKS A-033-1 AND A-037-1	42.006		83000 BBL, EACH		Volatile Organic Compounds (VOC)	IFR; PRIMARY LIQUID-MOUNTED SEAL AND SECONDARY RIM-MOUNTED SEAL	4.7 TONS/YEAR		4.70
IL-0118	01/23/2015 &nbsp;ACT	Product Storage Tank (Tank 2003)	42.006		200000 bbl		Volatile Organic Compounds (VOC)	Internal Floating Roof; primary mechanical shoe seal; secondary rim-mounted seal.	0		
IL-0119	01/23/2015 &nbsp;ACT	Gasoline Storage Tank (Tank 2002)	42.006		200000 bbl		Volatile Organic Compounds (VOC)	IFR	0		
IL-0119	01/23/2015 &nbsp;ACT	Distillate Storage Tank (Tank 2001)	42.005		200000 bbl		Volatile Organic Compounds (VOC)	low vapor pressure material	0.1 PSIA		
*IL-0131	11/20/2020 &nbsp;ACT	New Storage Tank	42.006		360000 Barrels		Volatile Organic Compounds (VOC)	The storage tank will be equipped with an external welded floating roof with rim seals and fittings on the deck of floating roof that are designed meet applicable requirements for floating roof tanks in the NSPS Subpart Kb. A sloped, drain floor. An exterior shell that is painted white. For degassing of the tank, the forced ventilation of exhaust air through manways and other openings on the side of tank shall be controlled by flare or another control device with at least 98 % control of VOM emission	0		
*IL-0131	11/20/2020 &nbsp;ACT	Existing Storage Tanks	42.006		360000 barrels		Volatile Organic Compounds (VOC)	The storage tank will be equipped with an external welded floating roof with rim seals and fittings on the deck of floating roof that are designed meet applicable requirements for floating roof tanks in the NSPS Subpart Kb. A sloped, drain floor. An exterior shell that is painted white. For degassing of the tank, the forced ventilation of exhaust air through manways and other openings on the side of tank shall be controlled by flare or another control device with at least 98 % control of VOM emission	0		
IN-0158	12/03/2012 &nbsp;ACT	EMERGENCY GENERATOR ULSD TANKS	42.005		550 GALLONS EACH		Volatile Organic Compounds (VOC)	GOOD DESIGN AND OPERATING PRACTICES	0		
IN-0158	12/03/2012 &nbsp;ACT	FIRE PUMP ENGINE ULSD TANKS	42.005		70 GALLONS EACH		Volatile Organic Compounds (VOC)	GOOD CUMBUSTION PRACTICE AND FUEL SPECIFICATION	0		
IN-0158	12/03/2012 &nbsp;ACT	VEHICLE GASOLINE DISPENSING TANK	42.005		650 GALLONS		Volatile Organic Compounds (VOC)	SUBMERGED FILL PIPES AND STAGE 1 VAPOR CONTROL	0		
IN-0158	12/03/2012 &nbsp;ACT	VEHICLE DIESEL TANK	42.005		650 GALLONS		Volatile Organic Compounds (VOC)	GOOD CUMBUSTION PRACTICE AND FUEL SPECIFICATION	0		
IN-0158	12/03/2012 &nbsp;ACT	EMERGENCY GENERATOR ULSD TANK	42.005		300 GALLONS		Volatile Organic Compounds (VOC)	GOOD CUMBUSTION PRACTICE AND FUEL SPECIFICATION	0		

**BACT Determinations for Fuel Tanks Greater than 10,000 Gallons - VOC**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit tpy
IN-0273	06/22/2017 &nbsp;ACT	DIESEL STORAGE TANK TK11	42.005	DIESEL	650 GALLONS		Volatile Organic Compounds (VOC)	THE USE OF GOOD DESIGN AND OPERATING PRACTICES. EACH TANK SHALL UTILIZE A FIXED ROOF.	0		
IN-0273	06/22/2017 &nbsp;ACT	DIESEL STORAGE TANK TK50	42.005	DIESEL	5000 GALLONS		Volatile Organic Compounds (VOC)	THE USE OF GOOD DESIGN AND OPERATING PRACTICES. EACH TANK SHALL UTILIZE A FIXED ROOF.	0		
IN-0318	06/11/2019 &nbsp;ACT	Naphtha product tanks	42.006		0		Volatile Organic Compounds (VOC)	Tanks shall have an internal floating roof. Tanks shall use a white shell. Tanks shall use submerged filling. Tanks shall use good maintenance practices as described in the permit.	1.15 TONS		1.15
IN-0318	06/11/2019 &nbsp;ACT	Diesel product tanks	42.005		0		Volatile Organic Compounds (VOC)	Tanks shall use a white shell. Tanks shall use submerged filling. Tanks shall use good maintenance practices as described in the permit.	2.29 TONS		2.29
IN-0318	06/11/2019 &nbsp;ACT	Swing product tank T6	42.006		0		Volatile Organic Compounds (VOC)	Tank shall have an internal floating roof. Tank shall use a white shell. Tank shall use submerged filling. Tank shall use good maintenance practices as described in the permit.	1.15 TONS		1.15
IN-0318	06/11/2019 &nbsp;ACT	Residue tanks	42.005		0		Volatile Organic Compounds (VOC)	Tanks shall use a white shell. Tanks shall use submerged filling. Tanks shall use good maintenance practices as described in the permit.	0.0001 TONS		0.00
IN-0318	06/11/2019 &nbsp;ACT	Vacuum Gas Oil Tanks	42.005		0		Volatile Organic Compounds (VOC)	Tanks shall use a white shell. Tanks shall use submerged filling. Tanks shall use good maintenance practices as described in the permit.	0.175 TONS		0.18
IN-0318	06/11/2019 &nbsp;ACT	Diesel fuel tank T17	42.005		0		Volatile Organic Compounds (VOC)	Tanks shall use a white shell. Tanks shall use submerged filling. Tanks shall use good maintenance practices as described in the permit.	0.0114 TONS		0.01
IN-0318	06/11/2019 &nbsp;ACT	Emergency engine fuel tanks	42.005		0		Volatile Organic Compounds (VOC)	Tanks shall use a white shell. Tanks shall use submerged filling. Tanks shall use good maintenance practices as described in the permit.	0.0114 TONS		0.01
KY-0109	10/24/2016 &nbsp;ACT	Diesel Storage Tank (EU76)	42.005		2000 gallons		Volatile Organic Compounds (VOC)	The diesel storage tank (EU76) shall be equipped with a permanent submerged fill pipe.	0		
KY-0109	10/24/2016 &nbsp;ACT	Gasoline Storage Tank (EU75)	42.005		2000 Gallon (Capacity)		Volatile Organic Compounds (VOC)	The permittee shall not allow gasoline to be handled in a manner that would result in vapor releases to the atmosphere for extended periods of time. Measures to be taken include, but are not limited to, the following: i. Minimize gasoline spills; ii. Clean up spills as expeditiously as practicable; iii. Cover all open gasoline containers and all gasoline storage tank fill-pipes with a gasketed seal when not in use; iv. Minimize gasoline sent to open waste collection systems that collect and transport gasoline to reclamation and recycling devices, such as oil/water separators. The gasoline storage tank (EU75) shall be equipped with a permanent submerged fill pipe.	0		
KY-0110	07/23/2020 &nbsp;ACT	EP 15-02 - Gasoline Storage Tanks #1 & #2	42.005		2000 gal combined		Volatile Organic Compounds (VOC)	The gasoline storage tanks (EP 15-02) shall be equipped with a permanent submerged fill pipe.	0		

Std Units	Limit	tpy
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Appendix C, Page C2-200

**BACT Determinations for Fuel Tanks Greater than 10,000 Gallons - VOC**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit tpy
*LA-0376	07/17/2020 &nbsp;   ACT	Natural Gasoline Tank	42.006		0		Volatile Organic Compounds (VOC)	An EFR to comply with 40 CFR 63 Subpart CC	0		
NJ-0083	03/11/2014 &nbsp;   ACT	26 Internal floating roof storage tanks for materials with RVP &lt;= 15	42.006	Material with RVP <= 15	2072718	MGAL/YR	Volatile Organic Compounds (VOC)	Vapor combustion unit for cleaning & roof landings	0		
OK-0148	09/12/2012 &nbsp;   ACT	Condensate Tanks (Petroleum Storage-Fixed Roof Tanks)	42.005	N/A	1.46	MMBPY	Volatile Organic Compounds (VOC)	Flare.	0		
OK-0153	03/01/2013 &nbsp;   ACT	CONDENSATE TANKS	42.005	NA	9198000	GAL/YR	Volatile Organic Compounds (VOC)	FLARE	0.82	TPY	0.82
OK-0154	07/02/2013 &nbsp;   ACT	DIESEL TANK (2800 GALLON)	42.005	NA	2800	GALLONS	Volatile Organic Compounds (VOC)	FIXED-ROOF TANK	0		
OK-0175	06/29/2017 &nbsp;   ACT	250,000 BBL EFR TANKS	42.006	NA	10.5	MMBBL/YR/TANK	Volatile Organic Compounds (VOC)	Equipped with EFRs, primary mechanical shoe seals, secondary seals, and drain-dry design.	6.43	TONS/YR/TANK	6.43
OK-0175	06/29/2017 &nbsp;   ACT	350,000 BBL EFR TANKS	42.006	NA	14.7	MMBBL/YR/TANK	Volatile Organic Compounds (VOC)	Equipped with EFRs, primary mechanical shoe seals, and drain-dry design.	7.47	TON/YR/TANK	7.47
OK-0175	06/29/2017 &nbsp;   ACT	500,000 BBL EFR TANKS	42.006	NA	21	MMBBL/YR/TANK	Volatile Organic Compounds (VOC)	Equipped with EFR, primary mechanical shoe seals, secondary seals, and drain-dry design.	8.78	TON/YR/TANK	8.78
OK-0175	06/29/2017 &nbsp;   ACT	20,000 BBL EFR TANK	42.006	NA	840	MMBBL/YR	Volatile Organic Compounds (VOC)	Equipped with EFR, primary mechanical shoe seal, secondary seal, and drain-dry design.	2.16	TON/YR	2.16
OK-0176	07/19/2017 &nbsp;   ACT	250,000 BBL EFR TANKS	42.006	NA	54450000	BBL/TANK/YEAR	Volatile Organic Compounds (VOC)	Equipped with EFR, primary mechanical shoe seals, secondary seals, and drain-dry design.	217.24	TONS/YEAR/FACILITY	217.24
*OK-0180	08/27/2019 &nbsp;   ACT	Thirty (30) 270,000-bbl EFR Crude Oil Storage Tanks	42.006	NA	6445918	BBL/TANK/YR	Volatile Organic Compounds (VOC)	EFR tanks equipped with primary mechanical shoe seal and a secondary seal. Drain-dry design.	109.5	TPY	109.50
*OK-0180	08/27/2019 &nbsp;   ACT	Seventeen (17) 270,000-bbl EFR Crude Oil Storage Tanks	42.006	NA	6445918	BBL/TANK/YR	Volatile Organic Compounds (VOC)	EFR tanks equipped with primary mechanical seal and secondary seal. Drain-dry design.	64.2	TPY	64.20
*OK-0181	09/11/2019 &nbsp;   ACT	20000 bbl IFR TANK	42.006	NA	1000000	BBL PER YR	Volatile Organic Compounds (VOC)	Equipped with IFR, primary mechanical shoe seal, and drain-dry design. Normal operations limited to 2.16 tpy. Landings limited to 0.09 tons per event, 0.2 tpy, and 21.15 tpy facility-wide. Cleanings limited to 0.79 tons per event, 0.8 tpy, and 18.90 tpy facility-wide.	2.16	TPY	2.16
OR-0050	03/05/2014 &nbsp;   ACT	Storage tank	42.005	ULSD	0		Volatile Organic Compounds (VOC)	Submerged fill line; Vapor balancing during tank filling.	0		
*PA-0326	02/18/2021 &nbsp;   ACT	Diesel Fuel Storage Tanks 18,000 gal	42.005		0		Volatile Organic Compounds (VOC)	tank vents controlled by carbon canisters designed to reduce VOC emissions by a minimum 95%	0		
*SC-0193	04/15/2016 &nbsp;   ACT	Storage Tank	42.005	Gasoline	5000	gal	Volatile Organic Compounds (VOC)	Stage 1 Vapor Control	0		
TX-0637	10/15/2013 &nbsp;   ACT	Petroleum Liquid Storage in loating Roof Tanks	42.006	not applicable	1300000	bbl	Volatile Organic Compounds (VOC)	Welded decks, mechanical shoe primary and rim-mounted secondary seal for stock with VP>0.10 psia. Control is required during loading of marine vessels and during roof landings for VP>0.10 psia.	14.37	TPY	14.37
TX-0653	02/18/2014 &nbsp;   ACT	Petroleum Liquid Marketing; Petroleum Liquid Storage in Floating Roof Tanks	42.006	natural gas as pilot fuel for VCU	250	Mbbl	Volatile Organic Compounds (VOC)	For storage of VOC in floating roof tanks, the tanks will have welded decks, mechanical shoe primary and rim-mounted secondary seal for VOC with a vapor pressure >0.5 psia. Floating roof tank landings are limited in frequency and duration.	11.23	TPY	11.23
TX-0656	05/16/2014 &nbsp;   ACT	Fixed Roof Tanks (3)	42.005		800000	GAL/YR	Volatile Organic Compounds (VOC)	WATER SCRUBBER	1.65	T/YR	1.65
TX-0728	04/01/2015 &nbsp;   ACT	Diesel and lube oil tanks	42.005		10708	gallons/yr	Volatile Organic Compounds (VOC)	low vapor pressure fuel, submerged fill, white tank	0.02	LB/H	0.01
TX-0731	04/10/2015 &nbsp;   ACT	Petroleum Liquids Storage in Fixed Roof Tanks	42.005		3.4	MMBbl/yr/tank	Volatile Organic Compounds (VOC)	Temperature reduced to maintain volatile organic compound (VOC) vapor pressure < 0.5 pounds per square inch actual (psia) at all times.	15.78	TONS/YR/TANK	15.78

**BACT Determinations for Fuel Tanks Greater than 10,000 Gallons - VOC**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units
											Limit tpy
TX-0731	04/10/2015 &nbsp;ACT	Petroleum Liquids Storage in Floating Roof Tanks	42.006		8 MMBbl/yr/tank		Volatile Organic Compounds (VOC)	Required floating roof with welded deck seams if the tank will store products with VOC vapor pressure of 0.5 psia or greater. Proper fitting and seal integrity for the floating roof is ensured through visual inspections and any seal gap measurements specified in 40 CFR Â§ 60.113b.  The vapor space under the floating roof must be routed to a control device during standing idle periods until the vapor space VOC concentration is 10,000 ppmv or less. The tank roof must be landed on its lowest legs unless tank entry is planned. Refilling must also be controlled if the product stored has a VOC vapor pressure of 0.5 psia or greater.	5.09 TONS/YR/TANK		5.09
TX-0745	06/03/2015 &nbsp;ACT	Petroleum Liquids Storage in Floating Roof Tanks - 45 MMBbl	42.006		48 turnovers/yr/tank		Volatile Organic Compounds (VOC)	Required floating roof with welded deck seams if the tank will store products with VOC vapor pressure of 0.5 psia or greater. Proper fitting and seal integrity for the floating roof is ensured through visual inspections and any seal gap measurements specified in 40 CFR Â§ 60.113b.  The vapor space under the floating roof must be routed to a control device during standing idle periods until the vapor space VOC concentration is 10,000 ppmv or less. The tank roof must be landed on its lowest legs unless tank entry is planned. Refilling must also be controlled if the product stored has a VOC vapor pressure of 0.5 psia or greater.	2.06 TONS/YR/TANK		2.06
TX-0745	06/03/2015 &nbsp;ACT	Petroleum Liquids Storage in Floating Roof Tanks - 50 MMBbl	42.006		60 turnovers/yr/tank		Volatile Organic Compounds (VOC)	Required floating roof with welded deck seams if the tank will store products with VOC vapor pressure of 0.5 psia or greater. Proper fitting and seal integrity for the floating roof is ensured through visual inspections and any seal gap measurements specified in 40 CFR Â§ 60.113b.  The vapor space under the floating roof must be routed to a control device during standing idle periods until the vapor space VOC concentration is 10,000 ppmv or less. The tank roof must be landed on its lowest legs unless tank entry is planned. Refilling must also be controlled if the product stored has a VOC vapor pressure of 0.5 psia or greater.	4.18 TONS/YR/TANK		4.18



**BACT Determinations for Fuel Tanks Greater than 10,000 Gallons - VOC**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units
											Limit tpy
TX-0745	06/03/2015 &nbsp;ACT	Petroleum Liquids Storage in Floating Roof Tanks -115 MMBbl	42.006		60 turnovers/yr/tank		Volatile Organic Compounds (VOC)	Required floating roof with welded deck seams if the tank will store products with VOC vapor pressure of 0.5 psia or greater. Proper fitting and seal integrity for the floating roof is ensured through visual inspections and any seal gap measurements specified in 40 CFR Â§ 60.113b.  The vapor space under the floating roof must be routed to a control device during standing idle periods until the vapor space VOC concentration is 10,000 ppmv or less. The tank roof must be landed on its lowest legs unless tank entry is planned. Refilling must also be controlled if the product stored has a VOC vapor pressure of 0.5 psia or greater.	3.71 TONS/YR/TANK		3.71
TX-0745	06/03/2015 &nbsp;ACT	Petroleum Liquids Storage in Floating Roof Tanks - 285 MMBbl	42.006		36 turnovers/yr/tank		Volatile Organic Compounds (VOC)	Required floating roof with welded deck seams if the tank will store products with VOC vapor pressure of 0.5 psia or greater. Proper fitting and seal integrity for the floating roof is ensured through visual inspections and any seal gap measurements specified in 40 CFR Â§ 60.113b.  The vapor space under the floating roof must be routed to a control device during standing idle periods until the vapor space VOC concentration is 10,000 ppmv or less. The tank roof must be landed on its lowest legs unless tank entry is planned. Refilling must also be controlled if the product stored has a VOC vapor pressure of 0.5 psia or greater.	7.32 TONS/YR/TANK		7.32
TX-0752	06/22/2015 &nbsp;ACT	Storage Tanks	42.006		110 MMBL/YR		Volatile Organic Compounds (VOC)		81.57 T/YR		81.57
TX-0756	06/19/2015 &nbsp;ACT	Storage Tanks, TK-101, TK-102, TK-103, TK-104	42.006		383000000 gal/yr/tank		Volatile Organic Compounds (VOC)		6.44 LB/HR		2.62
TX-0756	06/19/2015 &nbsp;ACT	Storage Tanks, TK-105, TK-106	42.006		300000000 gal/yr/tank		Volatile Organic Compounds (VOC)		2.35 LB/R		3.95
TX-0756	06/19/2015 &nbsp;ACT	Storage Tanks 116, TK- 117, TK-118, and TK-119	42.006		744282000 gal/yr/tank		Volatile Organic Compounds (VOC)		6.38 LB/HR		3.48
TX-0756	06/19/2015 &nbsp;ACT	Storage Tanks, TK-107, TK-108, TK-109, 42.005	42.006		60300 gal/hr		Volatile Organic Compounds (VOC)		4.2 LB/HR		3.26
TX-0756	06/19/2015 &nbsp;ACT	Storage Tanks, TK-110, TK-111, TK-112	42.005		57960 gal/hr		Volatile Organic Compounds (VOC)		3.07 LB/HR		2.63
TX-0756	06/19/2015 &nbsp;ACT	Storage Tanks, TK-113, TK-114, and TK-115	42.005		47000000 gal/yr/tank		Volatile Organic Compounds (VOC)		0.85 LB/HR		1.15
TX-0756	06/19/2015 &nbsp;ACT	Storage Tanks, TK-120 and TK-121	42.006		1437817500 gal/yr/tank		Volatile Organic Compounds (VOC)		5.43 LB/HR		7.33
TX-0756	06/19/2015 &nbsp;ACT	Floating Roof Storage Tanks - Controlled Maintenance, Startup and Shutdown (MSS)	42.006		5000 scf/hr		Volatile Organic Compounds (VOC)		10000 PPMV		7.82
TX-0772	11/06/2015 &nbsp;ACT	Petroleum Liquids Storage in Floating Roof Tanks	42.006		276565714 BBL/YR		Volatile Organic Compounds (VOC)		289.13 T/YR		289.13
TX-0772	11/06/2015 &nbsp;ACT	Petroleum Liquids Storage in Fixed Roof Tanks	42.005		47.62 BBL/YR		Volatile Organic Compounds (VOC)		0.01 T/YR		0.01

**BACT Determinations for Fuel Tanks Greater than 10,000 Gallons - VOC**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit tpy
TX-0797	05/04/2016 &nbsp;ACT	Petroleum Liquid Storage in Floating Roof Tanks	42.006		146 MM BBL / YR		Volatile Organic Compounds (VOC)		24.37 T/YR		24.37
TX-0799	06/08/2016 &nbsp;ACT	Storage Tanks -IFR	42.006		0		Volatile Organic Compounds (VOC)		109.17 T/YR		109.17
TX-0799	06/08/2016 &nbsp;ACT	Storage Tanks - EFR	42.006		0		Volatile Organic Compounds (VOC)		384.37 T/YR		384.37
TX-0799	06/08/2016 &nbsp;ACT	Storage Tanks - fixed roof	42.005		0		Volatile Organic Compounds (VOC)		72.5 T/YR		72.50
TX-0799	06/08/2016 &nbsp;ACT	Storage Tanks Floating Roof MSS	42.006		0		Volatile Organic Compounds (VOC)		28.83 T/YR		28.83
TX-0800	06/22/2016 &nbsp;ACT	Storage Tanks	42.006		3655000 BBL/YR		Volatile Organic Compounds (VOC)		57.42 T/YR		57.42
TX-0800	06/22/2016 &nbsp;ACT	Floating Roof Storage Tanks - Controlled Maintenance, Startup and Shutdown (MSS)	42.006		0		Volatile Organic Compounds (VOC)		0.8 T/YR		0.80
TX-0808	09/02/2016 &nbsp;ACT	Storage Tank	42.005		0		Volatile Organic Compounds (VOC)		0.1 T/YR		0.10
TX-0808	09/02/2016 &nbsp;ACT	Storage Tanks	42.006		0		Volatile Organic Compounds (VOC)		6.43 T/YR		6.43
TX-0812	10/31/2016 &nbsp;ACT	Petroleum Liquid Storage in Floating Roof tanks	42.006		0		Volatile Organic Compounds (VOC)		3.04 T/YR		3.04
TX-0813	11/22/2016 &nbsp;ACT	Petroleum Liquid Storage in Fixed Roof tanks	42.005		0		Volatile Organic Compounds (VOC)		0.01 T/YR		0.01
TX-0818	04/26/2017 &nbsp;ACT	Storage Tanks	42.006		45000 BBL/H		Volatile Organic Compounds (VOC)		90.36 T/YR		90.36
TX-0818	04/26/2017 &nbsp;ACT	STORAGE TANKS MSS	42.006		0		Volatile Organic Compounds (VOC)		19.37 T/YR		19.37
TX-0825	07/14/2017 &nbsp;ACT	Internal floating roof storage tanks maintenance, startup, and shutdown	42.006		0		Volatile Organic Compounds (VOC)		26.28 T/YR		26.28
TX-0825	07/14/2017 &nbsp;ACT	Horizontal fixed roof storage tanks	42.005		0		Volatile Organic Compounds (VOC)		0.37 T/YR		0.37
TX-0825	07/14/2017 &nbsp;ACT	Horizontal fixed roof storage tanks maintenance, start up, and shutdown	42.005		0		Volatile Organic Compounds (VOC)		26.28 T/YR		26.28
TX-0835	04/13/2018 &nbsp;ACT	IFR STORAGE TANK	42.006		31830071 BBL/YR		Volatile Organic Compounds (VOC)		0		
TX-0836	05/11/2018 &nbsp;ACT	FIXED ROOF STORAGE TANKS	42.005	POLYALPHA OLEFINS	0		Volatile Organic Compounds (VOC)		0		
TX-0836	05/11/2018 &nbsp;ACT	IFR STORAGE TANKS	42.006		0		Volatile Organic Compounds (VOC)		0		
TX-0840	10/31/2018 &nbsp;ACT	Heavy oil storage	42.005		0		Volatile Organic Compounds (VOC)		0		
TX-0840	10/31/2018 &nbsp;ACT	TANK MSS	42.006		0		Volatile Organic Compounds (VOC)		0		
TX-0844	07/25/2018 &nbsp;ACT	STORAGE TANKS MSS	42.006		0		Volatile Organic Compounds (VOC)		0		
TX-0844	07/25/2018 &nbsp;ACT	STORAGE TANKS	42.006		0		Volatile Organic Compounds (VOC)		14 T/YR		14.00
TX-0847	09/16/2018 &nbsp;ACT	External Floating roof storage tanks	42.006		45000 BBL/HR		Volatile Organic Compounds (VOC)		0		
TX-0847	09/16/2018 &nbsp;ACT	Coker sludge feed tanks	42.005		12000 GAL/HR		Volatile Organic Compounds (VOC)		100 PPM		
TX-0850	07/15/2018 &nbsp;ACT	Heavy oil storage in fixed roof tank	42.005		0		Volatile Organic Compounds (VOC)		0		

Std Units  
Limit  
tpy

Appendix C, Page C2-205

**BACT Determinations for Fuel Tanks Greater than 10,000 Gallons - VOC**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit tpy
TX-0888	04/23/2020 &nbsp;ACT	FIXED ROOF STORAGE TANKS	42.005		0		Volatile Organic Compounds (VOC)		0		
TX-0888	04/23/2020 &nbsp;ACT	Internal Floating Roof Storage Tanks	42.006		0		Volatile Organic Compounds (VOC)		0		
TX-0891	07/13/2020 &nbsp;ACT	EFR Storage Tanks	42.006		572 GAL/DAY/TANK		Volatile Organic Compounds (VOC)		0		
TX-0891	07/13/2020 &nbsp;ACT	Uncontrolled Floating Roof Storage Tanks â€œ Standing Idle	42.006		0		Volatile Organic Compounds (VOC)		0		
TX-0891	07/13/2020 &nbsp;ACT	IFR Storage Tanks	42.006		312 GAL/DAY/TANK		Volatile Organic Compounds (VOC)		0		
TX-0891	07/13/2020 &nbsp;ACT	Controlled Floating Roof Degassing	42.006		0		Volatile Organic Compounds (VOC)		0		
*TX-0899	03/05/2021 &nbsp;ACT	STORAGE TANK MSS	42.006		0		Volatile Organic Compounds (VOC)		0		
*TX-0903	09/09/2020 &nbsp;ACT	External Floating roof storage tank (EPN 68-95- 91A)	42.006		0		Volatile Organic Compounds (VOC)		0		
*WI-0261	06/12/2014 &nbsp;ACT	Crude Oil Storage Tanks (T43 - T45)	42.006		0		Volatile Organic Compounds (VOC)		0.88 TONS VOC / MONTH		10.56
*WI-0279	10/02/2017 &nbsp;ACT	FT02 â€œ Diesel Fuel Tank Storage	42.005		0		Volatile Organic Compounds (VOC)		0		
*WI-0284	04/24/2018 &nbsp;ACT	T01, T02, & T03 Diesel Storage Tank	42.005		0		Volatile Organic Compounds (VOC)		0		
WY-0071	10/15/2012 &nbsp;ACT	Storage Tank	42.006		100 MMbbls		Volatile Organic Compounds (VOC)		0		

**BACT Determinations for Waste and Sewage Sludge Incinerators - CO**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit ppmvd
AK-0082	01/23/2015 &nbsp;ACT	Waste Incinerator	21.4	Gas, ULSD, or Trash	4.9 MMBTU/H		Carbon Monoxide		13 PPMV		13
AK-0082	01/23/2015 &nbsp;ACT	Remote Incinerator Generator Engine	21.4	Ultra Low Sulfur Diesel	102 hp		Carbon Monoxide		10 LB/TON		
AK-0084	06/30/2017 &nbsp;ACT	Incinerator (Camp Waste)	21.4		990 lb/hr		Carbon Monoxide	Good Combustion Practices	13 PPMVD AT 7% O2		13
AK-0084	06/30/2017 &nbsp;ACT	Incinerator (Sewage Sludge)	21.5		0.06 ton/day		Carbon Monoxide	Good Combustion Practices	52 PPMVD AT 7% O2		52
*PA-0280	08/24/2011 &nbsp;ACT	SEWAGE SLUDGE INCINERATOR 1 & 2	21.5	sewage sludge	0		Carbon Monoxide		11.81 LB/H		
PR-0009	04/10/2014 &nbsp;ACT	Two Identical Municipal Solid Waste Combustors Units	21.4	municipal solid waste	2106 tons per day		Carbon Monoxide	Oxidation Catalyst. The Regenerative Selective Catalytic Reduction System has two modules: an Selective Catalytic Reduction System module, for NOx emissions control; and an Oxidation Catalyst module, for CO and VOC emissions control.	75 PPMVD@7%O2		75

**BACT Determinations for Waste and Sewage Sludge Incinerators - NO<sub>x</sub>**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit ppmvd
AK-0082	01/23/2015 &nbsp;ACT	Waste Incinerator	21.4	Gas, ULSD, or Trash	4.9 MMBTU/H		Nitrogen Oxides (NO <sub>x</sub> )		170 PPMV		170
AK-0082	01/23/2015 &nbsp;ACT	Remote Incinerator Generator Engine	21.4	Ultra Low Sulfur Diesel	102 hp		Nitrogen Oxides (NO <sub>x</sub> )		3 LB/TON		
AK-0084	06/30/2017 &nbsp;ACT	Incinerator (Camp Waste)	21.4		990 lb/hr		Nitrogen Oxides (NO <sub>x</sub> )	Good Combustion Practices	170 PPMVD AT 7% O <sub>2</sub>		170
AK-0084	06/30/2017 &nbsp;ACT	Incinerator (Sewage Sludge)	21.5		0.06 ton/day		Nitrogen Oxides (NO <sub>x</sub> )	Good Combustion Practices	210 PPMVD AT 7% O <sub>2</sub>		210
*PA-0280	08/24/2011 &nbsp;ACT	SEWAGE SLUDGE INCINERATOR 1 & 2	21.5	sewage sludge	0		Nitrogen Oxides (NO <sub>x</sub> )		17.63 LB/H		
PR-0009	04/10/2014 &nbsp;ACT	Two Identical Municipal Solid Waste Combustors Units	21.4	municipal solid waste	2106 tons per day		Nitrogen Oxides (NO <sub>x</sub> )	Regenerative Selective Catalytic Reduction System	45 PPMVD@7%O <sub>2</sub>		45
VA-0329	02/08/2019 &nbsp;ACT	three (3) municipal waste combustors	21.4		121.8 MMBtu		Nitrogen Oxides (NO <sub>x</sub> )	Emissions will be controlled by furnace design, proper operation, good combustion practices, ammonia injection (selective non- catalytic reduction (SNCR), and the Covanta proprietary low NOX combustion system (LNTM).	110 PPMVD @ 7% O <sub>2</sub>		110
VA-0330	02/08/2019 &nbsp;ACT	Four (4) municipal waste combustors	21.4		750 T		Nitrogen Oxides (NO <sub>x</sub> )	Controlled by furnace design, proper operation, ammonia injection (selective non- catalytic reduction (SNCR)), and the Covanta proprietary low NOX combustion system (LNTM).	110 PPMVD @ 7% O <sub>2</sub>		110

**BACT Determinations for Waste and Sewage Sludge Incinerators - Particulates**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit mg/dscm
AK-0082	01/23/2015 &nbsp;ACT	Waste Incinerator	21.4	Gas, ULSD, or Trash	4.9 MMBTU/H		Particulate matter, filterable &lt; 10 Åµ (FPM10)		270 MG/DSCM		270
AK-0082	01/23/2015 &nbsp;ACT	Remote Incinerator Generator Engine	21.4	Ultra Low Sulfur Diesel	102 hp		Particulate matter, filterable &lt; 10 Åµ (FPM10)		7 LB/TON		
AK-0084	06/30/2017 &nbsp;ACT	Incinerator (Camp Waste)	21.4		990 lb/hr		Particulate matter, total (TPM)	Good Combustion Practices	270 MG/DSCM AT 7% O2		270
AK-0084	06/30/2017 &nbsp;ACT	Incinerator (Sewage Sludge)	21.5		0.06 ton/day		Particulate matter, total (TPM)	Good Combustion Practices	60 MG/DSCM AT 7% O2		60
*PA-0280	08/24/2011 &nbsp;ACT	SEWAGE SLUDGE INCINERATOR 1 & 2	21.5	sewage sludge	0		Total Suspended Particulates	VENTURI & IMPINGEMENT TRAY SCRUBBER	0.1 GR/DRY FT3		
PR-0009	04/10/2014 &nbsp;ACT	Two Identical Municipal Solid Waste Combustors Units	21.4	municipal solid waste	2106 tons per day		Particulate matter, total &lt; 10 Åµ (TPM10)	Fabric Filters	24 MG/DSCM@7%O2		24

**BACT Determinations for Waste and Sewage Sludge Incinerators - GHG**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	PRIMARY_FUEL	THROUGHPUT	THROUGHPUT_UNIT	POLLUTANT	CONTROL_METHOD_DESCRIPTION	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	Std Units Limit ppmvd
AK-0082	01/23/2015 &nbsp;ACT	Waste Incinerator	21.4	Gas, ULSD, or Trash	4.9 MMBTU/H		Carbon Dioxide Equivalent (CO2e)		981 TONS/YEAR		981
AK-0082	01/23/2015 &nbsp;ACT	Remote Incinerator Generator Engine	21.4	Ultra Low Sulfur Diesel	102 hp		Carbon Dioxide Equivalent (CO2e)		892 TONS/YEAR		892
AK-0084	06/30/2017 &nbsp;ACT	Incinerator (Camp Waste)	21.4		990 lb/hr		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices	3934 TPY		3934
AK-0084	06/30/2017 &nbsp;ACT	Incinerator (Sewage Sludge)	21.5		0.06 ton/day		Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices	3934 TPY		3934
PR-0009	04/10/2014 &nbsp;ACT	Two Identical Municipal Solid Waste Combustors Units	21.4	municipal solid waste	2106 tons per day		Carbon Dioxide Equivalent (CO2e)	Thermal efficiency of 13.25 MMBTU/MWh based on 30-day rolling average	0.29 LB CO2E/ LB OF STEAM		



### BACT Determinations for Fugitive Dust from Unpaved Roads - Particulates

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	POLLUTANT	CONTROL_METHOD_DESCRIPTION	PERCENT_EFFICIENCY
AK-0084	06/30/2017 &nbsp;ACT	Fugitive Dust from Unpaved Roads	99.15	Particulate matter, total (TPM)	Water and Chemical Suppressant Spray	90
AR-0124	08/03/2015 &nbsp;ACT	HAUL ROADS SN-09	99.15	Particulate matter, total (TPM)	ROAD WATERING PLAN + 0% OFF-SITE OPACITY	90
*AR-0172	09/01/2021 &nbsp;ACT	SN-121 SN-211 Unpaved Roads	99.15	Particulate matter, total &lt; 10 Åµ (TPM10)	Water Sprays, low silt surface	85
CO-0074	07/09/2012 &nbsp;ACT	Haul roads	99.15	Particulate matter, filterable &lt; 10 Åµ (FPM10)	Plant roads â€” since almost all plant roads are already paved and are actively swept, BACT was determined to be paved and swept roads. Emissions from unpaved roads shall be controlled by applying water as needed.  Quarry roads â€” The combination of inherent moisture content supplemented by water application as needed was determined to be BACT for the quarry roads.	
*FL-0368	02/14/2019 &nbsp;ACT	Roads	99.15	Particulate matter, fugitive	Fugitive Dust Control Plan	
*KS-0034	05/27/2014 &nbsp;ACT	Biomass Laydown Roads (Unpaved)	99.15	Particulate matter, total (TPM)	Truck traffic fugitive control strategy and monitoring plan, including sweeping and speed limits	
KY-0110	07/23/2020 &nbsp;ACT	EP 14-02 - Unpaved Roadways	99.15	Particulate matter, fugitive	use of dust suppressants	
KY-0115	04/19/2021 &nbsp;ACT	Unpaved Roads (EP 04-02)	99.15	Particulate matter, total &lt; 10 Åµ (TPM10)	Wetting/Dust suppressants	70
OH-0344	01/27/2011 &nbsp;ACT	Paver and unpaved roadways and parking areas	99.15	Particulate matter, fugitive	Employ best available control measures: watering, sweeping, chemical stabilization, or suppressants applied at sufficient frequencies.	

**BACT Determinations for Fugitive Dust from Unpaved Roads - Particulates**

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	POLLUTANT	CONTROL_METHOD_DESCRIPTION	PERCENT_EFFICIENCY
OH-0379	02/06/2019 &nbsp;  ACT	Plant Roadways (F001)	99.15	Particulate matter, total &lt; 10 Åµ (TPM10)	Use of wet suppression and commercial dust suppressants.  Develop and implement a site-specific work practice plan designed as described to minimize or eliminate fugitive dust emissions.	
OK-0173	01/19/2016 &nbsp;  ACT	Unpaved Roads	99.15	Particulate matter, total &lt; 10 Åµ (TPM10)	BACT for PM emissions from roads is selected as work-practice standards of paving roads, sweeping them when needed, and setting of speed limits to minimize fugitive dust emissions. Since the PM emissions are fugitive, no numerical limitation is practical.	

# **BACT Determinations for Fugitive Dust from Material Loading and Unloading - Particulates**

<b>RBLCID</b>	<b>PERMIT_ISSUANCE_DATE</b>	<b>PROCESS_NAME</b>	<b>PROCESS_TYPE</b>	<b>POLLUTANT</b>	<b>CONTROL_METHOD_DESCRIPTION</b>	<b>PERCENT_EFFICIENCY</b>
AK-0084	06/30/2017 &nbsp;  ACT	Material Loading and Unloading	99.19	Particulate matter, total (TPM)	Best Practical Methods/Fugitive Dust Control Plan (includes water spray)	90
IN-0166	06/27/2012 &nbsp;  ACT	TWO (2) STORAGE PILES	99.19	Particulate matter, total &lt; 10 Åµ (TPM10)	WET SUPPRESSION WITH PILE COMPACTION	90
IN-0167	04/16/2013 &nbsp;  ACT	RECYCLED DUST STORAGE AREA	99.19	Particulate matter, total &lt; 10 Åµ (TPM10)	BAGHOUSE CE024	99
IN-0185	04/24/2014 &nbsp;  ACT	RECYCLED DUST STORAGE AREA	99.19	Particulate matter, filterable &lt; 2.5 Åµ (FPM2.5)	BAGHOUSE	
KY-0110	07/23/2020 &nbsp;  ACT	EP 12-02 - Slag Processing Piles	99.19	Particulate matter, fugitive	Use of dust suppressants	
LA-0248	01/27/2011 &nbsp;  ACT	DRI-118 - DRI Barge Loading Dock	99.19	Particulate matter, filterable &lt; 10 Åµ (FPM10)	High-energy wet scrubber. Additionally, hooded conveyors and enclosed transfer stations will be installed to limit emissions from material handling.	99
LA-0305	06/30/2016 &nbsp;  ACT	Coke Handling	99.19	Particulate matter, total &lt; 10 Åµ (TPM10)	baghouses	
*LA-0356	09/27/2019 &nbsp;  ACT	Coke Handling	99.19	Particulate matter, total &lt; 10 Åµ (TPM10)	Enclosure and maintaining a minimum moisture content of 8%	
MI-0401	12/21/2011 &nbsp;  ACT	Biomass feedstock handling	99.19	Particulate matter, total &lt; 10 Åµ (TPM10)	Enclosed systems plus fabric filter dust collectors for each of three buildings. Fugitive dust control plan and dust suppression as needed for outdoor emissions.	
OH-0350	07/18/2012 &nbsp;  ACT	Flux and Carbon storage material handling	99.19	Particulate matter, total &lt; 10 Åµ (TPM10)	Enclosures and baghouse	
SC-0183	05/04/2018 &nbsp;  ACT	Raw Material Handling and Processing (carbon dump fugitives)	99.19	Particulate matter, filterable (FPM)	Good Work Practice Standards and Proper Operation and Maintenance.	
SC-0183	05/04/2018 &nbsp;  ACT	Raw Material Handling and Processing (lime dump fugitives)	99.19	Particulate matter, filterable (FPM)	Good Work Practice Standards and Proper Operation and Maintenance	

## BACT Determinations for Fugitive Dust from Material Loading and Unloading - Particulates

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	POLLUTANT	CONTROL_METHOD_DESCRIPTION	PERCENT_EFFICIENCY
SC-0183	05/04/2018 &nbsp;  ACT	Raw Material Handling and Processing (alloy grizzly fugitives)	99.19	Particulate matter, filterable (FPM)	Good Work Practice Standards and Proper Operation and Maintenance.	
SC-0196	04/29/2019 &nbsp;  ACT	Raw Material Handling and Maintenance Activities	99.19	Particulate matter, filterable (FPM)	Good work practices and follow dust minimization plan.	
SC-0196	09/09/2019 &nbsp;  ACT	PRODUCT HANDLING	99.19	Particulate matter, filterable &lt; 10 Åµ (FPM10)	BAGHOUSE	

## BACT Determinations for Fugitive Dust from Wind Erosion - Particulates

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	POLLUTANT	CONTROL_METHOD_DESCRIPTION	PERCENT_EFFICIENCY
AK-0084	06/30/2017 &nbsp;ACT	Fugitive Dust from Wind Erosion	99.19	Particulate matter, total (TPM)	Best Practical Methods / Fugitive Dust Control Plan (includes applying water)	90
CO-0074	07/09/2012 &nbsp;ACT	Storage Piles	99.19	Particulate matter, filterable &lt; 10 Âµ (FPM10)	<p>Plant storage â€” BACT is determined to be use of enclosure (covering the storage pile with tarps)</p> <p>Quarry storage â€” BACT is determined to be use of the inherent moisture content supplemented with water application as needed.</p>	

## BACT Determinations for Drilling and Blasting - All BACT Pollutants

RBLCID	PERMIT_ISSUANCE_DATE	PROCESS_NAME	PROCESS_TYPE	POLLUTANT	CONTROL_METHOD_DESCRIPTION	PERCENT_EFFICIENCY
AK-0082	01/23/2015 &nbsp;  ACT	Drilling, HP, and LP Flares	19.31	Volatile Organic Compounds (VOC)		0
AK-0082	01/23/2015 &nbsp;  ACT	Drilling, HP, and LP Flares	19.31	Carbon Monoxide		0
AK-0082	01/23/2015 &nbsp;  ACT	Drilling, HP, and LP Flares	19.31	Carbon Dioxide		0
AK-0082	01/23/2015 &nbsp;  ACT	Drilling, HP, and LP Flares	19.31	Nitrogen Oxides (NOx)		0
AK-0082	01/23/2015 &nbsp;  ACT	Drilling, HP, and LP Flares	19.31	Particulate matter, filterable &lt; 10 Åµ (FPM10)		0
AK-0084	06/30/2017 &nbsp;  ACT	Drilling and Blasting	99.19	Particulate matter, total (TPM)	Best Practical Methods	0
AK-0084	06/30/2017 &nbsp;  ACT	Drilling and Blasting	99.19	Carbon Dioxide Equivalent (CO2e)	Good Combustion Practices	0
AK-0084	06/30/2017 &nbsp;  ACT	Drilling and Blasting	99.19	Carbon Monoxide	Good Combustion Practices	0
AK-0084	06/30/2017 &nbsp;  ACT	Drilling and Blasting	99.19	Nitrogen Oxides (NOx)	Good Combustion Practices	0

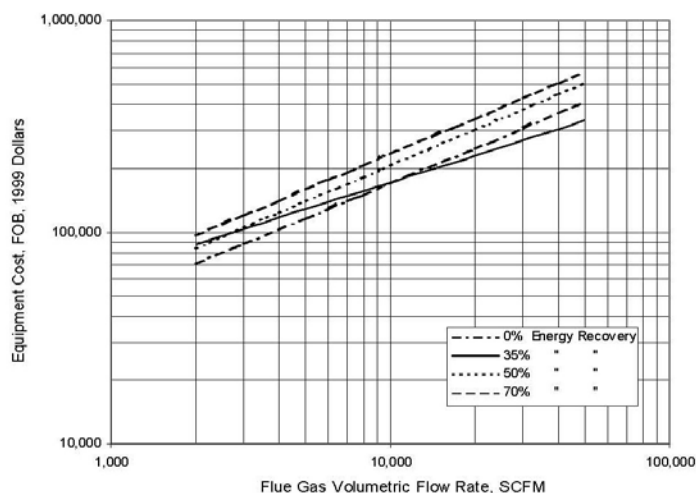
## **Attachment C3 - BACT Cost Calculations**

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<b>Air Sciences Inc.</b>  <b>CALCULATIONS</b>	PROJECT TITLE: Donlin		BY: K. LEWIS		
	PROJECT NO: 281-1-2		PAGE: 2	OF: 2	SHEET: Boil-Ox
	SUBJECT: Boilers/Heater - Ox. Cat.		DATE: October 13, 2021		



**Figure 2.6:** Equipment Cost of Catalytic Incinerators, Fixed-Bed

EPA. 2002. *Air Pollution Control Cost Manual, Sixth Edition*. EPA/454/B-02-001. January 2002. Sec. 3.2, Ch. 2, p. 2-39

	1.59(EC)	1.18(EC)	0.3(PEC)		0.3(PEC)	1.9(EC)	0.182(TCI)	0.04(TCI)	Annual Costs			
	1999	2021	EC	PEC	DIC	Total DC	Total IC	TCI	DAC+OH	IDAC	Cap. Recov.	TAC
5,000	\$160,000	\$254,400	\$300,192	\$90,058	\$390,250	\$93,060	\$483,309	\$88,181	\$19,332	\$44,784	\$152,297	
3,500	\$131,000	\$208,290	\$245,782	\$73,735	\$319,517	\$76,192	\$395,709	\$72,198	\$15,828	\$36,667	\$124,693	
2,000	\$96,000	\$152,640	\$180,115	\$54,035	\$234,150	\$55,836	\$289,985	\$52,908	\$11,599	\$26,870	\$91,378	
850	\$60,000	\$95,400	\$112,572	\$33,772	\$146,344	\$34,897	\$181,241	\$33,068	\$7,250	\$16,794	\$57,111	

$$CRF = \frac{i}{(1 - (1 + i)^{-n})} = 0.0944 \quad i = 7\% \quad n = 20$$

EPA. 2002. *Air Pollution Control Cost Manual, Sixth Edition*. EPA/454/B-02-001. January 2002.

Sec. 3.2, CH. 2, Table 2.9, p. 2-44

TCI \$889,000

Sec. 3.2, CH. 2, Table 2.10, p. 2-45

DAC+OH

\$162,200 per year

0.182 (TCI)

IDAC

0.04 (TCI)

Capital Recovery

CRF\*[TCI-1.08(cat. Cost)]

Catalyst Cost

\$15,100

0.017 (TCI)

#### Process Heater

	CO	Ox. Cat	Cost Eff.
Unit	ton/yr	\$/yr	\$/ton
A	10.57	\$152,297	\$14,415
B	10.57	\$152,297	\$14,415
C	7.45	\$124,693	\$16,730
D	5.95	\$91,378	\$15,353
E	5.77	\$91,378	\$15,833
F	1.80	\$57,111	\$31,667

CPI Inflation Calculator 1/1999 to 1/2021:

1.59 <https://data.bls.gov/cgi-bin/cpicalc.pl>

Air Sciences Inc.  CALCULATIONS	PROJECT TITLE: Donlin		BY: K. LEWIS		
	PROJECT NO: 281-1-2		PAGE: 1	OF: 4	SHEET: Boil-SCR
	SUBJECT: POX Boiler - SCR		DATE: October 13, 2021		

**I. NOx Emission**

Boiler/Heater  
POX Boiler No. 1 - 17-BLR-301

Make and Model                      Clayton Industries, E704

Rating                                      29.29 MMBtu/hr                      Man. Spec. Sheet

	lb/MMBtu	lb/hr	ton/yr	
NO <sub>x</sub>	0.098	2.870	12.57	Based in primary fuel; NG

EPA Method 19

F = 10,610 wscf/MMBtu

B = 0.027 default value

O<sub>2</sub>%wet = 3 %

H = 29.29 MMBtu/hr

standard exhaust flow = 374,670 SCF/hr (wet)

6,245 SCFM (wet)

T = 400 °F

P = 1 atm

actual exhaust flow = 10,171 ACFM (wet)

Air Sciences Inc.	PROJECT TITLE:		Donlin		BY:		K. LEWIS	
	PROJECT NO:		281-1-2		PAGE:	2	OF:	4
	SUBJECT:		POX Boiler - SCR		DATE:		October 13, 2021	
	CALCULATIONS							

II. SCR Control Cost

Calculation Assumptions

Maximum Heat Input ( $Q_B$ )29.3 MMBtu/hr, HHV

Exhaust Flow Rate ( $q_{flue\ gas}$ )10,171 acfm

Number of SCR Operating Hours8,760 hr/yr

Uncontrolled  $NO_x$  Emissions0.0980 lb/MMBtu, HHV

Ammonia Slip2 ppm

Fuel Sulfur Content0.0007%

ASR1.05

NSR for ammonia1.05

$NH_3$  sol'n concentration29%

No. of Days of Storage for Ammonia14 days

Pressure Drop for Ductwork3 inches w.g.

Pressure Drop for each Catalyst Layer1 inch w.g.

Temperature at SCR inlet650 F

Equipment Life20 years

Annual Interest Rate7%

Catalyst Cost, Initial240 \$/ft<sup>3</sup>

Catalyst Cost, Replacement290 \$/ft<sup>3</sup>

Electrical Power Cost0.05 \$/kWh

29% Ammonia Solution Cost0.101 \$/lb

Operating Life of Catalyst24,000 hr

Catalyst Layers3

Reference

Man. Spec. Sheet

EPA Method 19 for natural gas

Page 1

Manual, Sec. 4.2, Ch. 2, p. 2-50

Estimate

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 1, Eq. 1.12

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

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Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

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Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

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Manual, Sec. 4.2, Ch. 2, p. 2-50

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Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

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Manual, Sec. 4.2, Ch. 2, p. 2-50

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Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual, Sec. 4.2, Ch. 2, p. 2-50

Manual

Air Sciences Inc.  CALCULATIONS	PROJECT TITLE:		Donlin		BY: K. LEWIS		
	PROJECT NO:		281-1-2		PAGE: 3	OF: 4	SHEET: Boil-SCR
	SUBJECT:		POX Boiler - SCR		DATE: October 13, 2021		

Direct Capital Costs

DC = Q<sub>B</sub> [\$3,380 + f(h<sub>SCR</sub>) + f(NH3rate) + f(new) + f(bypass)]\*(3500/Q<sub>B</sub>)<sup>0.35</sup> + f(Vol<sub>catalyst</sub>)

Manual, Sec. 4.2, Ch. 2, Eq. 2.36

f(h<sub>SCR</sub>) = (6.12 x 55.0) - 187.9 = \$148.9

Manual, Sec. 4.2, Ch. 2, Eq. 2.37

f(NH3rate) = (411 x 0.95) / 29.3 - 47.3 = -\$34.0

Manual, Sec. 4.2, Ch. 2, Eq. 2.38

f(new) = -\$728

Manual, Sec. 4.2, Ch. 2, Eq. 2.40

f(bypass) = 0

Manual, Sec. 4.2, Ch. 2, Eq. 2.41

f(Vol<sub>catalyst</sub>) = 112 x 240 = \$26,761

Manual, Sec. 4.2, Ch. 2, Eq. 2.43

Scaling Factor = (3500 / 29.3)<sup>0.35</sup> = 5.33

Manual, Sec. 4.2, Ch. 2, Eq. 2.36

DC (A) = \$459,067

Manual, Sec. 4.2, Ch. 2, Eq. 2.36

Indirect Capital Costs

Indirect Installation Costs

Manual, Sec. 4.2, Ch. 2, Table 2.5

General Facilities0.05 x A

Engineering and Home Office0.10 x A

Process Contingency0.05 x A

Total Indirect Installation Costs (B)B = A x (0.05 + 0.1 + 0.05) = \$91,813

Project ContingencyC = (A + B) x 0.15 = \$82,632

Total Plant CostD = (A + B + C) = \$633,512

Preproduction CostG = D x 0.02 = \$12,670

Inventory Capital3.3 lb/hr x 0.101 \$/lb x 14 days = \$111

Total Capital Investment (TCI)

\$646,293 per unit, 1998 dollars

CPI Inflation Calculator 1/1998 to 1/2021:

\$1,046,995 per unit, 2021 dollars

1.62 <https://data.bls.gov/cgi-bin/cpicalc.pl>

Air Sciences Inc.	PROJECT TITLE:		BY:		
	Donlin		K. LEWIS		
	PROJECT NO:		PAGE:	OF:	SHEET:
CALCULATIONS	281-1-2		4	4	Boil-SCR
	SUBJECT:		DATE:		
	POX Boiler - SCR		October 13, 2021		
Direct Annual Costs					
DAC = (Annual Maintenance Cost) + (Annual Reagent Cost) + (Annual Electric Cost) + (Annual Catalyst Cost)					
Annual Maintenance Cost	0.015 x TCI	=	\$15,705 Manual, Sec. 4.2, Ch. 2, Eq. 2.46		
Annual Reagent Cost	28,644 lb/yr sol      0.101 \$/lb	=	\$2,893 See reagent use calc. below		
$m_{sol-annual}$	$= \frac{3.27 \text{ lb NH}_3}{\text{hr}} \bigg  \frac{8,760 \text{ hr}}{\text{yr}}$	=	28,644 lb/yr NH <sub>3</sub> sol		
Power Requirements	= 0.105 Q <sub>B</sub> [NO <sub>x<sub>in</sub></sub> h <sub>NOx</sub> + 0.5 (P <sub>duct</sub> + n <sub>total</sub> x P <sub>catalyst</sub> )		Manual, Sec. 4.2, Ch. 2, Eq. 2.48		
ammonia vap.	= 0.105 Q <sub>B</sub> (NO <sub>x<sub>in</sub></sub> h <sub>NOx</sub> ) x t <sub>op</sub>		Manual, Sec. 4.2, Ch. 2, Eq. 2.48 & 2.49		
	= 0.105 x 29.3 x 0.098 x 0.85 x 8,760	=	2,244 kWh/yr		
pressure drop	= 0.105 Q <sub>B</sub> (0.5 (P <sub>duct</sub> + n <sub>total</sub> x P <sub>catalyst</sub> ) x t <sub>op</sub>		Manual, Sec. 4.2, Ch. 2, Eq. 2.48 & 2.49		
	= 0.105 x 29.3 x 0.5 x (3 + 4 x 1) x 8,760	=	94,295 kWh/yr		
	Total Power Loss	=	96,540 kWh/yr		
Annual Electrical Cost	96,540 kWh/yr x 0.05 \$/kWh	=	\$4,827		
Catalyst Replacement Cost	112 ft <sup>3</sup> x 290 \$/ft <sup>3</sup> / 3 layers	=	\$10,779		
			Manual, Sec. 4.2, Ch. 2, Eq. 2.50		
FWF	= i [ 1/((1 + i) <sup>Y</sup> - 1) ] = 0.311		Manual, Sec. 4.2, Ch. 2, Eq. 2.52		
Y	= $\frac{24000}{8,760}$ = 2.7 = 3 years		Manual, Sec. 4.2, Ch. 2, Eq. 2.53		
Annual Catalyst Replacement Cost	\$10,779 x 0.311	=	\$3,353 Manual, Sec. 4.2, Ch. 2, Eq. 2.51		
Total Direct Annual Cost			\$26,778 per unit		
Indirect Annual Costs					
CRF	= $\frac{i}{(1 - (1 + i)^{-n})}$ = 0.0944		Manual, Sec. 4.2, Ch. 2, Eq. 2.55		
Annual Capital Recovery Cost	\$1,046,995 x 0.0944	=	\$98,829 Manual, Sec. 4.2, Ch. 2, Eq. 2.54		
Total Indirect Cost			\$98,829		
Total Annual Cost			\$125,607		
Cost Effectiveness	\$125,607 / 10.7 tons	=	\$11,753		
			Manual, Sec. 4.2, Ch. 2, Eq. 2.58		

<b>Air Sciences Inc.</b>  <b>CALCULATIONS</b>	<b>PROJECT TITLE:</b> Donlin		<b>BY:</b> K. LEWIS	
	<b>PROJECT NO:</b> 281-1-2		<b>PAGE:</b> 1	<b>OF:</b> 4
	<b>SUBJECT:</b> Elution Heater - SCR		<b>DATE:</b> October 13, 2021	

**I. NO<sub>x</sub> Emission**

Boiler/Heater  
 Carbon Elution Heater - 56-BLR-200  
 Make and Model                      Sigma Thermal, HC2-10.0-H-SF  
 Rating                                      16.00 MMBtu/hr                      Man. Spec. Sheet

	lb/MMBtu	lb/hr	ton/yr	
NO <sub>x</sub>	0.098	1.568	6.87	Based in primary fuel; NG

EPA Method 19

F =  wscf/MMBtu  
 B =  default value  
 O<sub>2</sub>%wet =  %  
 H =  MMBtu/hr  
 standard exhaust flow =    204,663 SCF/hr (wet)  
    3,411 SCFM (wet)  
 T =  °F  
 P =  atm  
 actual exhaust flow =       5,646.3 ACFM (wet)

Air Sciences Inc.  CALCULATIONS	PROJECT TITLE: Donlin		K. LEWIS		
	PROJECT NO: 281-1-2		PAGE: 2	OF: 4	SHEET: Heat-SCR
	SUBJECT: Elution Heater - SCR		DATE: October 13, 2021		

II. SCR Control Cost

Calculation Assumptions		Reference
Maximum Heat Input ( $Q_B$ )	16.0 MMBtu/hr, HHV	Man. Spec. Sheet
Exhaust Flow Rate ( $q_{flue\ gas}$ )	5,646 acfm	EPA Method 19 for natural gas
Number of SCR Operating Hours	8,760 hr/yr	
Uncontrolled $NO_x$ Emissions	0.0980 lb/MMBtu, HHV	Page 1
Ammonia Slip	2 ppm	Manual, Sec. 4.2, Ch. 2, p. 2-50
Fuel Sulfur Content	0.0007%	Estimate
ASR	1.05	Manual, Sec. 4.2, Ch. 2, p. 2-50
NSR for ammonia	1.05	Manual, Sec. 4.2, Ch. 1, Eq. 1.12
$NH_3$ sol'n concentration	29%	Manual, Sec. 4.2, Ch. 2, p. 2-50
No. of Days of Storage for Ammonia	14 days	Manual, Sec. 4.2, Ch. 2, p. 2-50
Pressure Drop for Ductwork	3 inches w.g.	Manual, Sec. 4.2, Ch. 2, p. 2-50
Pressure Drop for each Catalyst Layer	1 inch w.g.	Manual, Sec. 4.2, Ch. 2, p. 2-50
Temperature at SCR inlet	414 F	Manual, Sec. 4.2, Ch. 2, p. 2-50
Equipment Life	20 years	Manual, Sec. 4.2, Ch. 2, p. 2-50
Annual Interest Rate	7%	Manual, Sec. 4.2, Ch. 2, p. 2-50
Catalyst Cost, Initial	240 $\$/ft^3$	Manual, Sec. 4.2, Ch. 2, p. 2-50
Catalyst Cost, Replacement	290 $\$/ft^3$	Manual, Sec. 4.2, Ch. 2, p. 2-50
Electrical Power Cost	0.05 $\$/kWh$	Manual, Sec. 4.2, Ch. 2, p. 2-50
29% Ammonia Solution Cost	0.101 $\$/lb$	Manual, Sec. 4.2, Ch. 2, p. 2-50
Operating Life of Catalyst	24,000 hr	Manual, Sec. 4.2, Ch. 2, p. 2-50
Catalyst Layers	10	Calculated

Calculations

$h_{NO_x}$	=	85%	Manual, Sec. 4.2, Ch. 2, p. 2-52
$Vol_{catalyst}$	=	$2.81 \times 16.0$	Manual, Sec. 4.2, Ch. 2, Eq. 2.19
$h_{adj}$	x	$[0.2869 + (1.058 \times 0.85)]$	Manual, Sec. 4.2, Ch. 2, Eq. 2.20
$NO_{X\ adj}$	x	$[0.8524 + (0.3208 \times 0.098)]$	Manual, Sec. 4.2, Ch. 2, Eq. 2.21
Slip <sub>adj</sub>	x	$[1.2835 - (0.0567 \times 2)]$	Manual, Sec. 4.2, Ch. 2, Eq. 2.22
$S_{adj}$	x	$[0.9636 + (0.0455 \times 7.E-04)]$	Manual, Sec. 4.2, Ch. 2, Eq. 2.23
$T_{adj}$	x	$[15.16 - (0.03937 \times 414) + (2.74E-05 \times 414^2)]$	Manual, Sec. 4.2, Ch. 2, Eq. 2.24
	=	189 $ft^3$	
$A_{catalyst}$	=	$\frac{5,646}{16 \times 60}$	= 5.9 $ft^2$ Manual, Sec. 4.2, Ch. 2, Eq. 2.25
$n_{layer}$	=	$\frac{189}{3.1 \times 5.9}$	= 10.37 = 10 layer Manual, Sec. 4.2, Ch. 2, Eq. 2.28
$h_{layer}$	=	$\frac{189}{10 \times 5.9} + 1$	= 4.2 ft Manual, Sec. 4.2, Ch. 2, Eq. 2.29
$h_{SCR}$	=	$11 \times (7 + 4.2) + 9$	= 132.4 ft Manual, Sec. 4.2, Ch. 2, Eq. 2.31
$m_{reagent}$	=	$\frac{0.0980\ lb\ NO_x}{MMBtu} \times \frac{16.0\ MMBtu}{hr} \times 1.05 \times 85\% \times \frac{17.03\ MW\ NH_3}{46.01\ MW\ NO_x}$	
	=	0.52 lb/hr $NH_3$	Manual, Sec. 4.2, Ch. 2, Eq. 2.32
$m_{sol}$	=	$\frac{0.52\ lb-NH_3}{hr} \times \frac{1\ NH_3\ sol'n}{29\%\ NH_3}$	= 1.79 lb/hr $NH_3$ sol Manual, Sec. 4.2, Ch. 2, Eq. 2.33

Air Sciences Inc.	PROJECT TITLE:		BY:		
	Donlin		K. LEWIS		
	PROJECT NO:		PAGE:	OF:	SHEET:
CALCULATIONS	281-1-2		3	4	Heat-SCR
	SUBJECT:		DATE:		
	Elution Heater - SCR		October 13, 2021		

Direct Capital Costs

DC = Q<sub>B</sub> [\$3,380 + f(h<sub>SCR</sub>) + f(NH<sub>3</sub>rate) + f(new) + f(bypass)]\*(3500/Q<sub>B</sub>)<sup>0.35</sup> + f(Vol<sub>catalyst</sub>)

Manual, Sec. 4.2, Ch. 2, Eq. 2.36

f(h<sub>SCR</sub>) = (6.12 x 132.4) - 187.9 = \$622.1

Manual, Sec. 4.2, Ch. 2, Eq. 2.37

f(NH<sub>3</sub>rate) = (411 x 0.52) - 47.3 = -\$34.0

Manual, Sec. 4.2, Ch. 2, Eq. 2.38

f(new) = -\$728

Manual, Sec. 4.2, Ch. 2, Eq. 2.40

f(bypass) = 0

Manual, Sec. 4.2, Ch. 2, Eq. 2.41

f(Vol<sub>catalyst</sub>) = 189 x 240 = \$45,373

Manual, Sec. 4.2, Ch. 2, Eq. 2.43

Scaling Factor = (3500 / 16.0)<sup>0.35</sup> = 6.59

Manual, Sec. 4.2, Ch. 2, Eq. 2.36

DC (A) = \$387,089

Manual, Sec. 4.2, Ch. 2, Eq. 2.36

Indirect Capital Costs

Indirect Installation Costs

Manual, Sec. 4.2, Ch. 2, Table 2.5

General Facilities0.05 x A

Engineering and Home Office0.10 x A

Process Contingency0.05 x A

Total Indirect Installation Costs (B)B = A x (0.05 + 0.1 + 0.05) = \$77,418

Project ContingencyC = (A + B) x 0.15 = \$69,676

Total Plant CostD = (A + B + C) = \$534,183

Preproduction CostG = D x 0.02 = \$10,684

Inventory Capital1.8 lb/hr x 0.101 \$/lb x 14 days = \$61

Total Capital Investment (TCI)

\$544,928 per unit, 1998 dollars

CPI Inflation Calculator 1/1998 to 1/2021:

\$882,783 per unit, 2021 dollars

1.62 <https://data.bls.gov/cgi-bin/cpicalc.pl>





<b>Air Sciences Inc.</b>  <b>CALCULATIONS</b>	<b>PROJECT TITLE:</b> Donlin		<b>BY:</b> K. LEWIS	
	<b>PROJECT NO:</b> 281-1-2		<b>PAGE:</b> 1	<b>OF:</b> 4
	<b>SUBJECT:</b> Air Handlers - SCR		<b>DATE:</b> October 13, 2021	

**I. NO<sub>x</sub> Emission**

Boiler/Heater  
 Air Handlers  
 Make and Model                      Bousquet, HDG(H)-400  
 Rating                                      5.00 MMBtu/hr                      Man. Spec. Sheet

	lb/MMBtu	lb/hr	ton/yr	
NO <sub>x</sub>	0.098	0.490	2.15	Based in primary fuel; NG

EPA Method 19

F =  wscf/MMBtu

B =  default value

O<sub>2</sub>%wet =  %

H =  MMBtu/hr

standard exhaust flow =  SCF/hr (wet)

1,066 SCFM (wet)

T =  °F

P =  atm

actual exhaust flow =  ACFM (wet)

Air Sciences Inc.  CALCULATIONS	PROJECT TITLE:		K. LEWIS		
	PROJECT NO:		PAGE:	OF:	SHEET:
	281-1-2		2	4	Heat-SCR 2
	SUBJECT:		DATE:		
	Air Handlers - SCR		October 13, 2021		

II. SCR Control Cost

Calculation Assumptions		Reference
Maximum Heat Input ( $Q_B$ )	5.0 MMBtu/hr, HHV	Man. Spec. Sheet
Exhaust Flow Rate ( $q_{flue\ gas}$ )	1,764 acfm	EPA Method 19 for natural gas
Number of SCR Operating Hours	8,760 hr/yr	
Uncontrolled $NO_x$ Emissions	0.0980 lb/MMBtu, HHV	Page 1
Ammonia Slip	2 ppm	Manual, Sec. 4.2, Ch. 2, p. 2-50
Fuel Sulfur Content	0.0007%	Estimate
ASR	1.05	Manual, Sec. 4.2, Ch. 2, p. 2-50
NSR for ammonia	1.05	Manual, Sec. 4.2, Ch. 1, Eq. 1.12
$NH_3$ sol'n concentration	29%	Manual, Sec. 4.2, Ch. 2, p. 2-50
No. of Days of Storage for Ammonia	14 days	Manual, Sec. 4.2, Ch. 2, p. 2-50
Pressure Drop for Ductwork	3 inches w.g.	Manual, Sec. 4.2, Ch. 2, p. 2-50
Pressure Drop for each Catalyst Layer	1 inch w.g.	Manual, Sec. 4.2, Ch. 2, p. 2-50
Temperature at SCR inlet	414 F	Manual, Sec. 4.2, Ch. 2, p. 2-50
Equipment Life	20 years	Manual, Sec. 4.2, Ch. 2, p. 2-50
Annual Interest Rate	7%	Manual, Sec. 4.2, Ch. 2, p. 2-50
Catalyst Cost, Initial	240 \$/ft <sup>3</sup>	Manual, Sec. 4.2, Ch. 2, p. 2-50
Catalyst Cost, Replacement	290 \$/ft <sup>3</sup>	Manual, Sec. 4.2, Ch. 2, p. 2-50
Electrical Power Cost	0.05 \$/kWh	Manual, Sec. 4.2, Ch. 2, p. 2-50
29% Ammonia Solution Cost	0.101 \$/lb	Manual, Sec. 4.2, Ch. 2, p. 2-50
Operating Life of Catalyst	24,000 hr	Manual, Sec. 4.2, Ch. 2, p. 2-50
Catalyst Layers	10	Calculated

Calculations

$h_{NO_x}$	=	85%	Manual, Sec. 4.2, Ch. 2, p. 2-52
$Vol_{catalyst}$	=	$2.81 \times 5.0$	Manual, Sec. 4.2, Ch. 2, Eq. 2.19
$h_{adj}$	x	$[0.2869 + (1.058 \times 0.85)]$	Manual, Sec. 4.2, Ch. 2, Eq. 2.20
$NO_{X\ adj}$	x	$[0.8524 + (0.3208 \times 0.098)]$	Manual, Sec. 4.2, Ch. 2, Eq. 2.21
Slip <sub>adj</sub>	x	$[1.2835 - (0.0567 \times 2)]$	Manual, Sec. 4.2, Ch. 2, Eq. 2.22
$S_{adj}$	x	$[0.9636 + (0.0455 \times 7.E-04)]$	Manual, Sec. 4.2, Ch. 2, Eq. 2.23
$T_{adj}$	x	$[15.16 - (0.03937 \times 414) + (2.74E-05 \times 414^2)]$	Manual, Sec. 4.2, Ch. 2, Eq. 2.24
	=	59 ft <sup>3</sup>	
$A_{catalyst}$	=	$\frac{1,764}{16 \times 60} = 1.8\ ft^2$	Manual, Sec. 4.2, Ch. 2, Eq. 2.25
$n_{layer}$	=	$\frac{59}{3.1 \times 1.8} = 10.37 = 10\ layer$	Manual, Sec. 4.2, Ch. 2, Eq. 2.28
$h_{layer}$	=	$\frac{59}{10 \times 1.8} + 1 = 4.2\ ft$	Manual, Sec. 4.2, Ch. 2, Eq. 2.29
$h_{SCR}$	=	$11 \times (7 + 4.2) + 9 = 132.4\ ft$	Manual, Sec. 4.2, Ch. 2, Eq. 2.31
$m_{reagent}$	=	$\frac{0.0980\ lb\ NO_x}{MMBtu} \times \frac{5.0\ MMBtu}{hr} \times 1.05 \times 85\% \times \frac{17.03\ MW\ NH_3}{46.01\ MW\ NO_x}$	
	=	0.16 lb/hr $NH_3$	Manual, Sec. 4.2, Ch. 2, Eq. 2.32
$m_{sol}$	=	$\frac{0.16\ lb-NH_3}{hr} \times \frac{1\ NH_3\ sol'n}{29\%\ NH_3} = 0.56\ lb/hr\ NH_3\ sol$	Manual, Sec. 4.2, Ch. 2, Eq. 2.33

Air Sciences Inc.	PROJECT TITLE:		Donlin		BY:		K. LEWIS			
	PROJECT NO:		281-1-2		PAGE:	3	OF:	4	SHEET:	Heat-SCR 2
	SUBJECT:		Air Handlers - SCR		DATE:		October 13, 2021			
CALCULATIONS										
Direct Capital Costs										
$DC = Q_B [\$3,380 + f(h_{SCR}) + f(NH3rate) + f(new) + f(bypass)]*(3500/Q_B)^{0.35} + f(Vol_{catalyst})$										
Manual, Sec. 4.2, Ch. 2, Eq. 2.36										
$f(h_{SCR}) = (6.12 \times 132.4) - 187.9 = \$622.1$										
Manual, Sec. 4.2, Ch. 2, Eq. 2.37										
$f(NH3rate) = \frac{(411 \times 0.16)}{5.0} - 47.3 = -\$34.0$										
Manual, Sec. 4.2, Ch. 2, Eq. 2.38										
$f(new) = -\$728$										
Manual, Sec. 4.2, Ch. 2, Eq. 2.40										
$f(bypass) = 0$										
Manual, Sec. 4.2, Ch. 2, Eq. 2.41										
$f(Vol_{catalyst}) = 59 \times 240 = \$14,179$										
Manual, Sec. 4.2, Ch. 2, Eq. 2.43										
$Scaling\ Factor = (3500 / 5.0)^{0.35} = 9.90$										
Manual, Sec. 4.2, Ch. 2, Eq. 2.36										
$DC\ (A) = \$174,621$										
Manual, Sec. 4.2, Ch. 2, Eq. 2.36										
Indirect Capital Costs										
Indirect Installation Costs										
Manual, Sec. 4.2, Ch. 2, Table 2.5										
General Facilities 0.05 x A										
Engineering and Home Office 0.10 x A										
Process Contingency 0.05 x A										
Total Indirect Installation Costs (B) B = A x (0.05 + 0.1 + 0.05) = \$34,924										
Project Contingency C = (A + B) x 0.15 = \$31,432										
Total Plant Cost D = (A + B + C) = \$240,977										
Preproduction Cost G = D x 0.02 = \$4,820										
Inventory Capital 0.6 lb/hr x 0.101 \$/lb x 14 days = \$19										
Total Capital Investment (TCI)										
\$245,816 per unit, 1998 dollars										
CPI Inflation Calculator 1/1998 to 1/2021:										
\$398,222 per unit, 2021 dollars										
1.62 <a href="https://data.bls.gov/cgi-bin/cpicalc.pl">https://data.bls.gov/cgi-bin/cpicalc.pl</a>										



## Appendix D - Air Quality Analysis

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AIR SCIENCES INC.

DENVER • PORTLAND

## **Air Quality Analysis Report**

### **Donlin Gold Project, Alaska**

PREPARED FOR:  
DONLIN GOLD LLC

PROJECT NO. 281-21B-1  
OCTOBER 27, 2021

# TABLE OF CONTENTS

---

List of Abbreviations.....	6
Executive Summary.....	10
1.0 Introduction .....	11
2.0 Project Description.....	12
2.1 Site Characteristics .....	12
2.2 Pollutants and Emissions.....	14
2.2.1 Operation Emissions.....	14
2.2.2 Construction Emissions.....	14
2.3 Regulatory Basis.....	15
2.3.1 PSD Applicability.....	15
2.3.2 Attainment Status and National Parks.....	16
2.3.3 PSD Increments and AAQS.....	16
2.3.4 Preconstruction Ambient Air Quality .....	17
2.3.5 O <sub>3</sub> Review .....	17
2.4 Baseline Conditions.....	18
2.4.1 Baseline Meteorology .....	19
2.4.2 Baseline Air Quality.....	19
2.4.2.1 CO Background .....	20
2.4.2.2 NO <sub>2</sub> Background.....	20
2.4.2.3 PM <sub>2.5</sub> Background .....	21
2.4.2.4 PM <sub>10</sub> Background.....	21
2.4.2.5 O <sub>3</sub> Background.....	22
3.0 Air Quality Analysis.....	23
3.1 Model Selection .....	23
3.2 Pollutants and Averaging Periods.....	23
3.3 Building Downwash .....	23
3.4 Modeling Domain .....	24
3.4.1 Ambient Air Boundary.....	24
3.4.2 Receptors .....	25
3.5 Meteorological Data .....	27
3.5.1 Surface Characteristics for AERMET Processing.....	28
3.5.1.1 Bowen Ratio and Albedo .....	31



3.5.1.2 Surface Roughness Length.....	34
3.6 Background Concentrations.....	36
3.7 Source Emissions and Characterization .....	36
3.7.1 Emission Calculations.....	36
3.7.2 Long- and Short-Term Emissions Approach.....	41
3.7.3 Source Characterization .....	42
3.7.4 Plume Merging for Power Plant Engines.....	47
3.7.5 Model Input Emissions.....	47
3.8 Coordinate System.....	48
3.9 NO <sub>2</sub> Modeling.....	48
3.10 Treatment of Intermittent Sources for NO <sub>2</sub> 1-Hour Analysis .....	53
3.11 Particulate Modeling.....	53
3.12 Nearby Sources.....	58
3.13 Results and Compliance Demonstration.....	58
3.13.1 PSD Increments and AAQS.....	58
3.13.2 Secondary PM <sub>2.5</sub> Formation.....	62
3.13.3 O <sub>3</sub> Assessment.....	64
3.13.4 Additional Impact Analyses.....	65
3.13.4.1 Visibility .....	65
3.13.4.2 Soil and Vegetation.....	66
3.13.4.3 Commercial, Residential, and Other Growth.....	67
4.0 References.....	68

## Tables

Table 2-1. Donlin Project Maximum Potential Emissions Summary (ton/yr).....	14
Table 2-2. Donlin Project Construction Emissions Summary (tons).....	15
Table 2-3. Donlin Project Potential Emissions and PSD Thresholds (ton/yr).....	15
Table 2-4. Class II PSD Increments and AAQS .....	16
Table 2-5. Donlin Project Ambient Design Concentrations and AAQS .....	17
Table 2-6. Donlin Project Ambient Monitoring Summary .....	19
Table 2-7. CO Background Concentration Summary .....	20
Table 2-8. NO <sub>2</sub> Background Concentration Summary.....	21
Table 2-9. PM <sub>2.5</sub> Background Concentration Summary .....	21
Table 2-10. PM <sub>10</sub> Background Concentration Summary.....	22

Table 2-11. O <sub>3</sub> Background Concentration Summary .....	22
Table 3-1. Pollutants and Averaging Periods .....	23
Table 3-2. Site-Specific Meteorological Parameters for AERMET Processing.....	27
Table 3-3. Sleetmute, Aniak, and McGrath Station Information.....	28
Table 3-4. Monthly Season and Moisture Classification and Calculated r and B <sub>0</sub> .....	31
Table 3-5. Calculated Seasonal Surface Roughness Length Values (m) .....	34
Table 3-6. Design Background Concentrations .....	36
Table 3-7. Emission Factor References – Mill and Process Sources .....	37
Table 3-8. Emission Factor References – Mining Sources.....	38
Table 3-9. Emission Factor References – Stationary Combustion Sources .....	40
Table 3-10. Maximum Potential Emissions Summary by Source Category (ton/yr) .....	40
Table 3-11. Project Emissions (ton/yr) for LOM Years 16 and 20.....	41
Table 3-12. Fugitive Activity Locations Modeled .....	43
Table 3-13. Model Input Parameters for Fugitive Activity Locations .....	44
Table 3-14. Maximum Potential Model Input Emission Rates (g/s) .....	47
Table 3-15. Monthly-Hour-of-Day O <sub>3</sub> Profile .....	50
Table 3-16. NO <sub>2</sub> /NO <sub>x</sub> Ratios .....	51
Table 3-17. Monthly-Hour-of-Day NO <sub>2</sub> Profile .....	52
Table 3-18. References Used to Develop Deposition Parameters .....	54
Table 3-19. Deposition Parameters for Model ID INPIT.....	55
Table 3-20. Deposition Parameters by Source Category.....	57
Table 3-21. Modeling Results and PSD Increment Compliance Demonstration .....	58
Table 3-22. Modeling Results and AAQS Compliance Demonstration.....	60
Table 3-23. Project and Anchorage Area O <sub>3</sub> Comparison.....	65

## Figures

Figure 2-1. Donlin Project Location.....	13
Figure 3-1. Modeled Receptor Grid.....	26
Figure 3-2. Location of Meteorological Stations.....	29
Figure 3-3. Wind Frequency Distribution for Camp Data (August 2020 to July 2021) .....	30
Figure 3-4. 10-km by 10-km Aerial Photograph – Camp Station.....	32
Figure 3-5. 10-km by 10-km Land Cover Classification Map – Camp Station.....	33
Figure 3-6. 1-km Radius Land Cover Classification and Sectors – Camp Station .....	35
Figure 3-7. Source Layout for Model Input .....	46

Figure 3-8. Location of Highest PSD Increment Impacts ( $\mu\text{g}/\text{m}^3$ ).....	59
Figure 3-9. Location of Highest Total Ambient Impacts ( $\mu\text{g}/\text{m}^3$ ).....	61

## **Attachments**

Attachment D 1 – Electronic Files

# LIST OF ABBREVIATIONS

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°	Degree
µg/m <sup>3</sup>	Micrograms per Cubic Meter
µg/Nm <sup>3</sup>	Micrograms per Normalized (Standard) Cubic Meter
µm	Micrometer
AAC	Alaska Administrative Code
AAQS	Ambient Air Quality Standards
ADEC	Alaska Department of Environmental Conservation
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
Air Permit	Air Quality Control Construction Permit No. AQ0934CPT01 issued June 30, 2017
ANFO	Ammonium Nitrate and Fuel Oil
Avg	Average
BACT	Best Available Control Technology
B <sub>o</sub>	Bowen Ratio
BPIP	Building Profile Input Program
Btu	British Thermal Unit
CFR	Code of Federal Regulations
CMAQ	Community Multi-scale Air Quality
CO	Carbon Monoxide
COA	Core Operating Area
DNP	Denali National Park
EDMS	Emissions Data Management System
EPA	United States Environmental Protection Agency
F	Fahrenheit
g/cm <sup>3</sup>	Grams per Cubic Centimeter
g/hr	Grams per Hour
g/kWhe	Grams per Kilowatt-Hour Electric

g/s	Grams per Second
gr/ft <sup>3</sup>	Grains per Cubic Foot
HAP	Hazardous Air Pollutant
hp-hr	Horsepower-Hour
hr	Hour
km	Kilometer
kW	Kilowatt
kWhe	Kilowatt-Hour Electric
lb	Pound
lb/gal	Pounds per Gallon
lb/ton	Pounds per Short Ton
lb/VMT	Pounds per Vehicle Miles Traveled
LOM	Life of Mine
m	Meter
M	Moisture
m/s	Meters per Second
MACT	Maximum Achievable Control Technology
NAAQS	National Ambient Air Quality Standards
NAD83	North American Datum of 1983
NED	National Elevation Dataset
NEPA	National Environmental Policy Act
NG	Natural Gas
NH <sub>3</sub>	Ammonia
NLCD	National Land Cover Data
NO	Nitrogen Oxides
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Oxides of Nitrogen
NSPS	New Source Performance Standards
NTE	Not-to-Exceed

NWS	National Weather Service
O <sub>3</sub>	Ozone
OLM	Ozone Limiting Method
P	Percentile
PAG	Potentially Acid-Generating
Pb	Lead
PM	Particulate Matter
PM <sub>2.5</sub>	Particulate Matter less than 2.5 Micrometers in Aerodynamic Diameter
PM <sub>10</sub>	Particulate Matter less than 10 Micrometers in Aerodynamic Diameter
ppb	Parts per Billion
ppm	Parts per Million
ppmvd	Parts per Million, Volumetric Dry
PRIME	Plume Rise Model Enhancement
PSD	Prevention of Significant Deterioration
r	Albedo
S	Sulfur
SER	Significant Emission Rate
SO <sub>2</sub>	Sulfur Dioxide
SODAR	Sonic Detection and Ranging
ton	Short Ton (2,000 pounds)
ton/day	Tons per Day
ton/yr	Tons per Year
TRS	Total Reduced Sulfur
ULSD	Ultra-Low-Sulfur Diesel
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
VOC	Volatile Organic Compound
WBAN	Weather Bureau Air Force Navy
WDEQ	Wyoming Department of Environmental Quality

WRAP	Western Regional Air Partnership
yr	Year
$z_0$	Surface Roughness Length

## EXECUTIVE SUMMARY

---

Donlin Gold LLC is proposing to construct and operate the Donlin Gold project in southwest Alaska, approximately 280 miles west of Anchorage. The Donlin Gold project will consist of conventional open-pit mining operations and onsite ore preparation and gold extraction processes, along with site infrastructure that includes an airstrip, an employee accommodation complex, and a power plant.

The Donlin Gold project is a major stationary source subject to the Prevention of Significant Deterioration (PSD) regulations. In accordance with these regulations, Donlin Gold LLC has conducted a PSD air quality analysis. This analysis was based on one year of onsite meteorological data, onsite ambient air quality data, and the latest version of the AERMOD modeling system.

The results of this analysis demonstrate that the Donlin Gold project air emissions will not violate the applicable PSD increments or Ambient Air Quality Standards beyond the ambient air boundary. Additional assessments are provided to show that the Donlin Gold project air emissions will not adversely affect regional ozone formation, visibility, or soil and vegetation.



## 1.0 INTRODUCTION

---

Donlin Gold LLC (Donlin Gold) is proposing to construct and operate the Donlin Gold mine: a hard rock, open-pit, gold mine (Project). The Project is located in southwest Alaska, approximately 280 miles west of Anchorage. Donlin Gold is an Alaskan operated company that is owned by Barrick Gold U.S. Inc., a subsidiary of Barrick Gold Corporation, and NovaGold Resources Alaska Inc., a subsidiary of NovaGold Resources, Inc.

With regards to air pollutant emissions, the Project is a major stationary source subject to the Prevention of Significant Deterioration (PSD) regulations of 40 Code of Federal Regulations (CFR) 52.21, adopted by reference in 18 Alaska Administrative Code (AAC) 50.040(h). In accordance with the PSD regulations under 40 CFR 51.21(m), Donlin Gold has conducted a PSD air quality analysis to quantify and evaluate the impacts on ambient air quality resulting from the Project's air emissions.

The Alaska Department of Environmental Conservation (ADEC) issued Air Quality Control Construction Permit No. AQ0934CPT01 for the Project on June 30, 2017 (Air Permit). The following PSD air quality analysis validates and remains consistent with the emission limits currently established in the Air Permit.

## 2.0 PROJECT DESCRIPTION

---

The Project is located on the western slopes of the Kuskokwim Mountains in the Yukon-Kuskokwim region of southwest Alaska, a remote area with no existing road or rail access or other public infrastructure. Beyond the open-pit and processing facilities, the Project will require the construction of additional onsite infrastructure including waste storage facilities, power generation facilities, worker accommodations; and offsite infrastructure including a natural gas (NG) pipeline from Cook Inlet, an access road to a new port on the Kuskokwim River, an airstrip, and river transportation system with a new port at Bethel. The Project location is presented in Figure 2-1.

The Project will have an operating mine life of 27 years. Conventional open-pit development methods will be used to extract ore and waste rock, including drilling, blasting, excavating, and hauling. Hydraulic shovels and front-end loaders will be used to load ore and waste material into haul trucks. Waste rock will be hauled to the waste rock facility (some waste rock will be backfilled to the pit later in the mine life). Ore will be hauled and fed to the primary crusher or stockpiled; or it will be hauled to a long-term ore stockpile for later transfer to the primary crusher. The gold will be extracted through conventional ore crushing and milling, followed by flotation, pressure oxidation, and carbon-in-leach circuits. The process plant will be rated at a nominal production rate of 59,000 short tons (ton) of ore per day.

A detailed process and source description, including process flow diagrams, is provided in the accompanying PSD Construction Permit Application Report.

### 2.1 Site Characteristics

The Project is approximately 280 miles west of Anchorage and 155 miles northeast of Bethel, up the Kuskokwim River. The closest village is the community of Crooked Creek, approximately 10 miles to the south, on the Kuskokwim River. Bethel, 56 miles upriver from the mouth of the Kuskokwim on the Bering Sea, is the regional center for the Yukon-Kuskokwim region of Alaska. The town of Aniak, also on the Kuskokwim River, approximately 50 air miles southwest of the Project site, is the regional center for the Upper Kuskokwim Valley. There is no river, road, or rail access to the site; therefore, all personnel and supplies are currently transported by air. At present, the Project is isolated from public power utilities and all other public infrastructure.

The Project area is one of low topographic relief on the western flank of the Kuskokwim Mountains. Elevations range from 500 to 2,100 feet. Ridges are well rounded and easily accessible by all-terrain vehicle.

Figure 2-1. Donlin Project Location



Hillsides are forested with black spruce, tamarack, alder, birch, and larch. Soft muskeg and discontinuous permafrost are common in poorly drained areas at lower elevations and along north-facing slopes.

The area has a relatively dry interior continental climate with typically about 20 inches of total annual precipitation. Summer temperatures are relatively warm and may exceed 83 degrees Fahrenheit (°F). Minimum temperatures may fall to well below negative 45°F during the cold winter months.

## 2.2 Pollutants and Emissions

The Project will operate on a continuous, 24-hour-per-day, 7-day-per-week basis. This section describes the Project's maximum potential emissions from the operation and construction phases of the Project.

### 2.2.1 Operation Emissions

In addition to dust emissions (particulate matter [PM], particulate matter less than 2.5 micrometers [ $\mu\text{m}$ ] in aerodynamic diameter [ $\text{PM}_{2.5}$ ] and less than 10  $\mu\text{m}$  in aerodynamic diameter [ $\text{PM}_{10}$ ]) from mining activities (drilling, blasting, material handling, and hauling) and ore preparation activities (crushing, milling, and conveyance), the Project will also generate combustion emissions ( $\text{PM}_{2.5}$ ,  $\text{PM}_{10}$ , carbon monoxide [CO], oxides of nitrogen [ $\text{NO}_x$ ],  $\text{SO}_2$ , and VOC) from blasting, primary and backup power generation, process and ancillary equipment, and mobile machinery tailpipes. The maximum potential Project total annual emissions in tons per year (ton/yr) are provided in Table 2-1.

**Table 2-1. Donlin Project Maximum Potential Emissions Summary (ton/yr)**

Source Category	CO	$\text{NO}_x$	$\text{PM}_{2.5}$	$\text{PM}_{10}$	PM	$\text{SO}_2$	VOC
Point Sources	1,256	1,225	639	656	688	23.2	1,167.6
Fugitive Sources	1,925	54	169	1,350	4,775	0.2	0.2
Mobile Machinery	2,046	1,979	23	22	22	3.9	111.1
Project Total	5,227	3,258	831	2,028	5,485	27.3	1,278.8
LOM Year	19	19	16	20	20	19	19

The emissions provided in Table 2-1 represent the maximum potential annual emissions for each pollutant. As shown in Table 2-1, the total maximum emissions occur during life of mine (LOM) year 19 for CO,  $\text{NO}_x$ ,  $\text{SO}_2$ , and VOC; LOM year 16 for  $\text{PM}_{2.5}$ ; and LOM year 20 for  $\text{PM}_{10}$  and PM. A detailed description of emission calculations and mining activity rates that result in the maximum emission years is provided in Section 3.7.

### 2.2.2 Construction Emissions

Construction of the Project is expected to occur over a three-to-four-year period. The total construction emissions during this period are summarized in Table 2-2.

**Table 2-2. Donlin Project Construction Emissions Summary (tons)**

Source Category	CO	NO <sub>x</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM	SO <sub>2</sub>	VOC
Fugitive Sources	152	4	105	748	3,011	0.01	0
Mobile Machinery	2,055	861	16	16	16	3.78	152
Project Total	2,207	865	121	764	3,027	3.80	152

As shown in Table 2-2, the total construction emissions are significantly less than the annual emissions during operation shown in Table 2-1.

## 2.3 Regulatory Basis

This section describes the regulatory basis for the PSD air quality analysis.

### 2.3.1 PSD Applicability

A comparison of the Project's stationary source emissions with the applicable PSD major source thresholds and Significant Emission Rates (SERs) is provided in Table 2-3 (fugitive and mobile machinery emissions are not included for a PSD major source determination per 40 CFR 52.21(b)(1)(iii) and (b)(4)).

**Table 2-3. Donlin Project Potential Emissions and PSD Thresholds (ton/yr)**

Parameter	CO	NO <sub>x</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM	SO <sub>2</sub>	VOC
Process Source Emissions	1,256	1,225	639	656	688	23	1,168
PSD Major Source Threshold	250	250	250	250	250	250	250
SER	100	40	10	15	15	40	40
PSD Review Triggered	Yes	Yes	Yes	Yes	Yes	No	Yes

This table shows that the Project has the potential to emit 250 ton/yr or more of a regulated New Source Review pollutant; therefore, it is subject to PSD permitting requirements pursuant to 18 AAC 50.302(a)(1), 50.306 and 40 CFR 52.21(a)(2)(iii), which require a PSD air quality analysis.

As shown in Table 2-3, the Project's potential emissions are expected to be greater than the SERs for all the pollutants shown except for SO<sub>2</sub>. Therefore, and as confirmed by ADEC, SO<sub>2</sub> emissions are not included in the PSD air quality analysis provided in this report. Because the Project is major for both NO<sub>x</sub> and VOC, it is also considered major for ozone (O<sub>3</sub>) per 40 CFR 52.21(b)(1)(ii), and O<sub>3</sub> review is addressed in Section 2.3.5.

In addition to the pollutants listed in Table 2-3, lead (Pb) is also a criteria pollutant for which Ambient Air Quality Standards (AAQS) and SER have been established. However, the estimated Pb emissions (less than 0.1 ton/yr) from point sources at the Project are less than the applicable SER of 0.6 ton/yr; therefore, Pb emissions are not subject to PSD review. Also, there is an Alaska-only AAQS and a PSD SER for total reduced sulfur (TRS) compounds. The

estimated TRS compounds emissions (less than 3 ton/yr) from the Project's sources are less than the applicable SER of 10 ton/yr and are therefore not subject to PSD review.

### 2.3.2 Attainment Status and National Parks

The Project is in the South Central Alaska Interstate Air Quality Control Region No. 010, which is in attainment for all criteria pollutants and designated as a Class II area. The closest Class I area is the Denali National Park (DNP), located more than 300 kilometers (km) to the northeast (Figure 2-1) of the Project. The National Park Service has confirmed that no analysis is required for this Class I area (Notar 2013).

### 2.3.3 PSD Increments and AAQS

The PSD air quality analysis provided in this report includes dispersion modeling to demonstrate compliance with the applicable Class II Alaska (18 AAC 50.010) and national (40 CFR 50) AAQS and PSD increments (40 CFR 52.21(c)) provided in Table 2-4, in units of micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) and/or parts per million (ppm).

**Table 2-4. Class II PSD Increments and AAQS**

Pollutant	Averaging Period	PSD Increment	AAQS		AAQS Form
		( $\mu\text{g}/\text{m}^3$ )	(ppm)	( $\mu\text{g}/\text{m}^3$ )	
CO	8-Hour	--	9	10,000	Not to be exceeded more than once per year
	1-Hour	--	35	40,000	
NO <sub>2</sub>	Annual	25	0.053	100	Annual mean
	1-Hour	--	0.1	188	98 <sup>th</sup> percentile, averaged over 3 years
PM <sub>2.5</sub>	Annual <sup>(1)</sup>	4	--	12	Annual mean, averaged over 3 years
	24-Hour	9	--	35	98 <sup>th</sup> percentile, averaged over 3 years/second-high <sup>(2)</sup>
PM <sub>10</sub>	Annual	17	--	--	Annual mean
	24-Hour	30	--	150	Not to be exceeded more than once per year on average over 3 years

<sup>(1)</sup> Alaska AAQS is 15  $\mu\text{g}/\text{m}^3$ .

<sup>(2)</sup> 98<sup>th</sup> percentile for AAQS and second-high for increment compliance.

The PSD increments are concentration levels that represent the maximum level of pollution or maximum permissible level of air quality deterioration allowed to occur in clean areas for a given project in conjunction with impacts from other nearby competing sources. The PSD increments were established by the United States Environmental Protection Agency (EPA) to be stringent air quality standards that are a small fraction of their corresponding AAQS (generally 25 percent of the AAQS). Significant deterioration is considered to occur when the amount of new pollution exceeds the applicable PSD increments.

The AAQS represent concentration levels of pollutants in ambient air that are considered protective of the public health, including protecting the health of "sensitive" populations such

as asthmatics, children, and the elderly. The AAQS also provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. These standards are established by the EPA and are adopted by state regulatory authorities. The AAQS are used in an air impact modeling analysis to demonstrate that the predicted concentrations resulting from a project's air emission sources combined with the existing air pollution (from both regional competing emission sources and from existing monitored baseline concentration levels) will not result in ambient concentrations beyond the AAQS—the upper concentration threshold that protects public health and welfare.

### 2.3.4 Preconstruction Ambient Air Quality

Donlin Gold initiated an onsite monitoring program in 2006 to evaluate the ambient air quality in the Project area (addressed in detail in Section 2.4.2). The monitored design concentrations for the applicable pollutants and their comparison to the AAQS are provided in Table 2-5.

**Table 2-5. Donlin Project Ambient Design Concentrations and AAQS**

Pollutant	Averaging Period	Monitored Ambient Design Concentration	AAQS
CO	8-Hour (2 <sup>nd</sup> high) Maximum	457.9	10,000
	1-Hour (2 <sup>nd</sup> high) Maximum	686.9	40,000
NO <sub>2</sub>	Annual Average	1.4	100
	1-Hour (98 <sup>th</sup> percentile) Average	20.7	188
PM <sub>2.5</sub>	Annual Average	2.3	12
	24-Hour (98 <sup>th</sup> percentile) Average	6.8	35
PM <sub>10</sub>	24-Hour (2 <sup>nd</sup> high) Maximum	14.1	150

Table 2-5 shows that the monitored design concentrations are significantly less than the corresponding AAQS for all pollutants and averaging periods. This demonstrates that the existing air quality in the Project area complies with the applicable AAQS for the triggered pollutants.

### 2.3.5 O<sub>3</sub> Review

In addition to Table 2-4, there is an Alaska AAQS and a national 8-hour AAQS for O<sub>3</sub>, and as discussed earlier, the Project's emissions are subject to PSD review for O<sub>3</sub>.

On January 17, 2017, the EPA promulgated an update to its Guideline on Air Quality Models (GAQM) (EPA 2017b) in 40 CFR 51, Appendix W, to incorporate a tiered demonstration approach to address the secondary chemical formation of O<sub>3</sub> and PM<sub>2.5</sub> associated with precursor emissions from single sources.

The 2017 GAQM outlines a two-tiered approach for addressing single-source O<sub>3</sub> and secondary PM<sub>2.5</sub> impacts:

1. **Tier 1:** The first tier of assessment involves those situations where existing technical information is available (e.g., results from existing photochemical grid modeling [PGM], published empirical estimates of source-specific impacts, or reduced-form models) in combination with other supportive information and analyses for the purposes of estimating secondary impacts from a particular source. According to the EPA, the existing technical information should provide a credible and representative estimate of the secondary impacts from the Project source.
2. **Tier 2:** If the first-tier analysis is not suitable, then a second-tier analysis would be conducted involving the application of more sophisticated, case-specific air quality modeling analyses using chemical transport models.

The most recent update (draft) of the EPA's guidance (EPA n.d.) on this subject suggests using qualitative methods to assess secondary impacts for parts of Alaska (like the Project) where photochemistry is not possible for portions of a year.

Alternatively, there is a simple screening lookup table method (Scheffe tables) that is widely used to predict O<sub>3</sub> ambient concentrations. However, this method is applicable to VOC-dominated sources with a VOC-to-NO<sub>x</sub> emission ratio of greater than 1, which is not applicable to a source like the Project where VOC emissions are less than NO<sub>x</sub> emissions, as shown in Table 2-1. Therefore, in the absence of a reasonable method for estimating ambient O<sub>3</sub> concentrations and per EPA's draft guidance, the potential O<sub>3</sub> formation resulting from the Project's emissions is addressed qualitatively (Section 3.13.3). The qualitative approach presented in Section 3.13.3 has been accepted by several agencies for PSD permitting purposes, including EPA Region 10,<sup>1</sup> ADEC,<sup>2</sup> and the Wyoming Department of Environmental Quality (WDEQ).<sup>3</sup>

## 2.4 Baseline Conditions

Donlin Gold has collected ambient air quality and meteorological and air quality starting in July 2004 at various locations in the Project proximity to establish baseline conditions for the PSD air quality analysis. A summary of Donlin Gold's ambient monitoring activity considered for this analysis is provided in Table 2-6.

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<sup>1</sup> EPA Region 10. 2011. "Supplemental Statement of Basis for Proposed Outer Continental Shelf Prevention of Significant Deterioration Permits Nobel Discoverer Drillship." July 6, 2011. (See page 57.) Accessed July 10, 2014. [http://www.epa.gov/region10/pdf/permits/shell/discoverer\\_supplemental\\_statement\\_of\\_basis\\_chukchi\\_and\\_beaufort\\_air\\_permits\\_070111.pdf](http://www.epa.gov/region10/pdf/permits/shell/discoverer_supplemental_statement_of_basis_chukchi_and_beaufort_air_permits_070111.pdf).

<sup>2</sup> ADEC. 2013. "Technical Analysis Report for Air Quality Control Construction Permit AQ1201CPT02." ExxonMobil Corporation Point Thomson Production Facility. June 12, 2013. (See page 21.) Accessed July 10, 2014. <http://dec.alaska.gov/Applications/Air/airtoolsweb/AirPermitsApprovalsAndPublicNotices>. For Permit/Approval Type, select Major - Title I Construction (CPT), click Search, and then in the ExxonMobil Production Company row, click the Final TAR link.

<sup>3</sup> WDEQ. 2013. Air Quality Division, Permit Application Analysis AP-13083, Solvay Chemicals Inc. October 10, 2013.



**Table 2-6. Donlin Project Ambient Monitoring Summary**

Monitored Parameters	Station	Monitoring Period
Surface Meteorology	American Ridge	July 2004 - June 2013
	Camp	October 2005 - April 2012
		August 2020 - July 2021
	Hill 1918	April 2009 - March 2011
	Birch Tree Crossing	April 2010 - March 2011
	Jungjuk	October 2010 - September 2012
Upper Air	SODAR <sup>(1)</sup>	November 2008 - October 2009
Air Quality	New Air Station	July 2006 - April 2013

<sup>(1)</sup> Sonic Detection and Ranging

The data listed in Table 2-6 have been reviewed by:

- ADEC (2007a) (2012a) (2012b) (2015d) (2021)
- Air Sciences (2021)
- Enviroplan (2009) (2010a) (2010b) (2010c) (2010d) (2012a) (2012b) (2012c) (2014)
- ERG (Eastern Research Group, Inc.) (2013a) (2013b)
- MACTEC (2007) (2008a) (2008b) (2009a) (2009b) (2009c) (2010) (2011)
- WESTON (2008) (2009a) (2009b) (2009c)

### **2.4.1 Baseline Meteorology**

As shown in Table 2-6, Donlin Gold has collected surface and upper-air meteorological data at six different locations for varying periods. The most recent meteorological data was collected at the Camp station from August 1, 2020, to July 31, 2021, and was approved by ADEC for this air quality analysis (ADEC 2021). Section 3.5 provides a discussion of the 2020-2021 Camp station data used in this analysis.

### **2.4.2 Baseline Air Quality**

Donlin Gold collected ambient air quality data at the Project site for the period of July 2006 to April 2013 to establish pre-construction baseline pollutant concentrations. These monitoring data have been submitted to ADEC for review and have been approved for use as background concentrations for the PSD air quality analysis (Enviroplan 2009) (Enviroplan 2012b) (Enviroplan 2014) (MACTEC 2009a) (MACTEC 2009b) (MACTEC 2009c) (WESTON 2008). Pollutant-specific ambient air monitoring details are provided in the following sections.

### 2.4.2.1 CO Background

Ambient background levels of CO were collected at the onsite ambient monitoring station using a Teledyne 300E CO Analyzer, which is designated as EPA Automated Reference Method RFCA-1093-093. CO measurement was conducted for the following periods:

1. November 18, 2006, to November 17, 2007
2. January 1, 2008, to December 31, 2008

A summary of the monitored CO concentrations, in units of  $\mu\text{g}/\text{m}^3$  and parts per billion (ppb), is provided in Table 2-7.

**Table 2-7. CO Background Concentration Summary**

Pollutant	Averaging Period	Monitoring Period	Background Concentration	
			( $\mu\text{g}/\text{m}^3$ )	(ppb)
CO	8-Hour (2 <sup>nd</sup> high)	11/18/2006 - 11/17/2007	457.9	400
		01/01/2008 - 12/31/2008	343.5	300
	8-Hour (2 <sup>nd</sup> high) Maximum		457.9	400
	1-Hour (2 <sup>nd</sup> high)	11/18/2006 - 11/17/2007	686.9	600
		01/01/2008 - 12/31/2008	457.9	400
	1-Hour (2 <sup>nd</sup> high) Maximum		686.9	600

### 2.4.2.2 NO<sub>2</sub> Background

Ambient hourly NO<sub>2</sub> levels were measured at the onsite ambient monitoring station with a Teledyne 200E NO<sub>x</sub> Analyzer, which measures the concentration of nitrogen oxides (NO) and total NO<sub>x</sub> and calculates NO<sub>2</sub> concentrations. This instrument is designated as EPA Automated Reference Method RFNA-1194-099. The hourly NO<sub>2</sub> data were collected for the following periods:

1. November 18, 2006, to November 17, 2007
2. January 9, 2008, to December 31, 2008
3. December 1, 2010, to November 22, 2011
4. April 17, 2012, to April 16, 2013

A summary of the monitored NO<sub>2</sub> concentrations is provided in Table 2-8.

**Table 2-8. NO<sub>2</sub> Background Concentration Summary**

Pollutant	Averaging Period	Monitoring Period	Background Concentration	
			(µg/m <sup>3</sup> )	(ppb)
NO <sub>2</sub>	Annual	11/18/2006 - 11/17/2007	1.5	0.8
		01/09/2008 - 12/31/2008	2.1	1.1
		12/01/2010 - 11/22/2011	0.5	0.3
		04/17/2012 - 04/16/2013	1.4	0.7
	Annual Average		1.4	0.7
	1-Hour (98 <sup>th</sup> percentile)	11/18/2006 - 11/17/2007	28.2	15.0
		01/09/2008 - 12/31/2008	20.7	11.0
		12/01/2010 - 11/22/2011	13.2	7.0
		04/17/2012 - 04/16/2013	17.3	9.2
	1-Hour (98 <sup>th</sup> percentile) Average		20.7	10.6

**2.4.2.3 PM<sub>2.5</sub> Background**

The hourly background PM<sub>2.5</sub> data were collected at the onsite ambient monitoring station using BGI PQ200 Samplers associated with Federal Reference Method RFPS-0498-116. The PM<sub>2.5</sub> data were collected from January 1, 2008, to December 29, 2008.

A summary of the monitored PM<sub>2.5</sub> concentrations is provided in Table 2-9.

**Table 2-9. PM<sub>2.5</sub> Background Concentration Summary**

Pollutant	Averaging Period	Monitoring Period	Background Concentration
			(µg/m <sup>3</sup> )
PM <sub>2.5</sub>	Annual	01/01/2008 - 12/29/2008	2.3
	24-Hour (98 <sup>th</sup> percentile)	01/01/2008 - 12/29/2008	6.8

**2.4.2.4 PM<sub>10</sub> Background**

The hourly PM<sub>10</sub> data were collected at the onsite ambient monitoring station with high volume samplers. These samplers have an EPA Federal Reference Method designation of RFPS-0202-141. The PM<sub>10</sub> data were collected from July 1, 2006, to June 30, 2008.

A summary of the monitored PM<sub>10</sub> concentrations is provided in Table 2-10.

**Table 2-10. PM<sub>10</sub> Background Concentration Summary**

Pollutant	Averaging Period	Monitoring Period	Background Concentration
			(µg/m <sup>3</sup> )
PM <sub>10</sub>	24-Hour (2 <sup>nd</sup> high)	07/01/2006 - 06/30/2007	14.1
		07/01/2007 - 06/30/2008	13.5
	24-Hour (2 <sup>nd</sup> high) Maximum		14.1

### 2.4.2.5 O<sub>3</sub> Background

Ambient hourly O<sub>3</sub> concentrations at the onsite ambient monitoring station were measured with a Teledyne 400E O<sub>3</sub> Analyzer, which is designated as EPA Automated Equivalent Method EQOA-0992-087. The hourly O<sub>3</sub> data were collected for the following periods:

1. December 1, 2010, to November 22, 2011
2. April 17, 2012, to April 16, 2013

A summary of monitored O<sub>3</sub> concentrations is provided in Table 2-11.

**Table 2-11. O<sub>3</sub> Background Concentration Summary**

Pollutant	Averaging Period	Monitoring Period	Background Concentration	
			(µg/m <sup>3</sup> )	(ppb)
O <sub>3</sub>	8-Hour (4 <sup>th</sup> high)	12/01/2010 - 11/22/2011	99.6	50.8
		04/17/2012 - 4/16/2013	101.8	51.9
	8-Hour (4th high daily maximum) Average		100.7	51.3

The monitored O<sub>3</sub> data were used as an input for NO<sub>2</sub> modeling (Section 3.9).

## 3.0 AIR QUALITY ANALYSIS

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This section describes the modeling methods, procedures, and datasets used for the Project PSD air quality analysis. The modeling methodology was reviewed and approved by ADEC on September 28, 2015, (ADEC 2015b), and October 1, 2015, (ADEC 2015f). The results of this analysis are presented at the end of this section (Section 3.13).

### 3.1 Model Selection

Version 21112 of the AERMOD (American Meteorological Society/Environmental Protection Agency Regulatory Model) modeling system was used for this air quality analysis. AERMOD is an enhanced steady-state, Gaussian plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain (EPA 2004a). The AERMOD modeling system is listed as the recommended model for short-range analysis (up to 50 km) in 40 CFR 51, Appendix W.

### 3.2 Pollutants and Averaging Periods

The Project air quality analysis includes dispersion modeling for the pollutants and averaging periods presented in Table 3-1. This table also shows the short-term (up to 24-hour) modeled design values used for compliance demonstration.

**Table 3-1. Pollutants and Averaging Periods**

Pollutant	Averaging Period	Compliance Design Value
CO	8-Hour	Second-High
	1-Hour	Second-High
NO <sub>2</sub>	Annual	
	1-Hour	Eighth-High
PM <sub>2.5</sub>	Annual	
	24-Hour	Second-High and Eighth-High <sup>(1)</sup>
PM <sub>10</sub>	Annual	
	24-Hour	Second-High

<sup>(1)</sup> Second-high for increment and eighth-high for AAQS compliance

### 3.3 Building Downwash

The effects of the building-induced downwash were incorporated into this analysis. The building downwash parameters were calculated using the most recent version of the Building Profile Input Program (BPIP) with the Plume Rise Model Enhancement (PRIME) algorithm (BPIP-PRIME version 04274).

## 3.4 Modeling Domain

For this air quality analysis, pollutant impacts were assessed at and beyond the Project ambient air boundary.

### 3.4.1 Ambient Air Boundary

The Project will be an active industrial site where hazardous activities will occur, such as explosives handling, blasting, drilling, and heavy equipment operation. To mitigate hazards from these activities, most areas at the mine will require strict safety protocols and controlled access. Donlin Gold has established a Core Operating Area (COA) boundary to identify the area where public access will be excluded. Donlin Gold has legal authority under its lease agreements with The Kuskokwim Corporation, Calista Corporation, and Lyman Resources to restrict the public from access within the COA on lands owned by these entities. This COA boundary, shown in Figures 3-1, 3-2, and 3-7, is used to define the ambient air boundary for modeling purposes.

Donlin Gold has developed a Public Access Control Plan (Donlin Gold 2017) that describes the measures that will be employed to exclude public access to the COA. These measures include the following:

- Public Easements – There are currently 15 publicly recognized access easements and/or rights-of-way (public easements) that intersect the COA. Donlin Gold has submitted a Public Easement Plan to reroute these public easements around the COA.
- Fencing – For locations where fencing will be used, the fence will extend along the COA boundary for a minimum of 100 feet in each direction from the edge of a roadway, trail, or former public easement that crosses the COA boundary.
- Signage – Warning signs will be posted on the fenced controlled boundaries of all roadways, trails, easements, and other identified access points to the COA.
- Natural Barriers – Streams and creeks, wetlands, steep slopes, and areas of thick vegetation and undergrowth around the proposed COA will, in certain instances, serve as natural barriers or impediments to access. Creeks within the COA are not navigable waters (BLM 2005); consequently, these are not considered public access routes.
- Surveillance – Mine security will routinely patrol the mine facilities and roadways for unauthorized individual(s). In addition, all onsite personnel will be briefed on the necessity of restricting public access to areas within the COA. Any suspected trespass by unauthorized individual(s) will be immediately reported to security.

- Access roads - The mine access roads are not open to public use, and access will be controlled by signage and patrols. A gate will be installed at the point the port access road crosses the COA boundary.

### **3.4.2 Receptors**

The air quality analysis was conducted using the following receptor spacing and extents:

- 50-meter-spaced receptors placed along the ambient air boundary
- 100-meter-spaced receptors extending 500 meters beyond the ambient air boundary
- 500-meter-spaced receptors extending 1 km beyond the 100-meter-spaced receptors

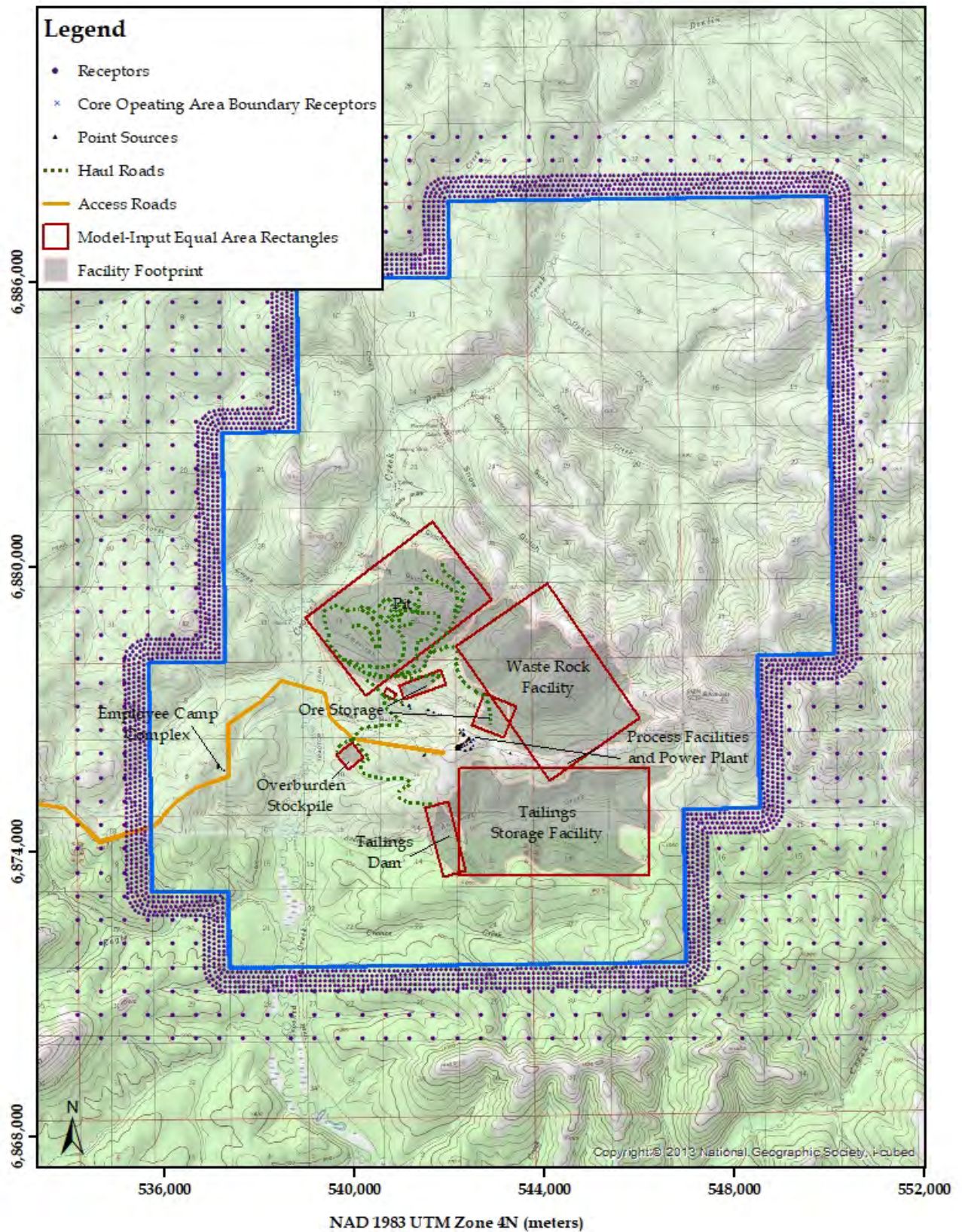
In addition, each highest modeled impact was further evaluated by performing a hot-spot analysis using a finer 25-meter-spacing receptor grid. The modeled receptor grid is shown in Figure 3-1.

The most recent version of the AERMOD terrain preprocessor, AERMAP (version 18081), was used to develop receptor elevations and hill heights. AERMAP uses United States Geological Survey (USGS) 1-degree and 7.5-minute Digital Elevation Model or National Elevation Dataset (NED) files for this purpose. USGS 1-arc-second (30-meter) resolution NED files were used to process receptors for this analysis.

A permanent employee camp complex will be constructed within the Project COA boundary to provide onsite worker housing. This employee camp complex will meet the Alaska policy requirements (ADEC 2004) for exclusion from the model receptor domain. The Donlin Gold housing policy limits the use of the camp area to employees, contractors, or visitors present for work or official business. Casual or family visits are not permitted, and any persons staying at the living quarters will be on 24-hour call.



Figure 3-1. Modeled Receptor Grid





### 3.5 Meteorological Data

AERMOD requires an input of hourly meteorological data to estimate pollutant concentrations in ambient air resulting from modeled source emissions. The EPA's Guideline on Air Quality Models states, "5 years of NWS meteorological data or at least 1 year of site specific data is required" for an air quality modeling analysis (40 CFR 51, Appendix W, 8.3.1.2 b.).

For this analysis, Donlin Gold has used ADEC-approved one year (August 1, 2020, to July 31, 2021) of site-specific hourly surface meteorological data collected at the Donlin Camp station. The site-specific surface meteorological parameters collected and their usability for AERMET processing are summarized in Table 3-2.

**Table 3-2. Site-Specific Meteorological Parameters for AERMET Processing**

Monitored Parameter	AERMET Card	AERMET Input
Wind speed at 10 meters	WS02	Yes
Wind direction at 10 meters	WD02	Yes
Standard deviation of the horizontal wind direction at 10 meters (sigma theta)	SA02	No <sup>(1)</sup>
Temperature at 10 meters	TT02	Yes
Temperature at 2 meters	TT01	Yes
Vertical temperature difference (10 meters minus 2 meters temperature)	DT01	Yes
Relative humidity at 2 meters	RH01	Yes
Incoming solar radiation (insolation)	INSO	Yes
Station pressure	PRES	Yes
Precipitation amount	PAMT	No <sup>(2)</sup>

<sup>(1)</sup> Excluded per ADEC request; not required for modeling

<sup>(2)</sup> Excluded due to insufficient capture; not required modeling

The site-specific surface data were supplemented with the following concurrent National Weather Station (NWS) datasets:

- Twice-daily upper-air data (all levels) from the McGrath NWS station.
- Cloud-cover data from the Sleetmute NWS station. Cloud-cover data from the Aniak NWS station were used to supplement the Sleetmute data, as approved by ADEC (ADEC 2015b) (ADEC 2021).

Per ADEC request, the AERMET keyword SUBNWS was not used for NWS surface data substitution. Sleetmute, Aniak, and McGrath station information is provided in Table 3-3.

**Table 3-3. Sleetmute, Aniak, and McGrath Station Information**

Station Name	WBAN <sup>(1)</sup> ID	Latitude	Longitude	Distance from Donlin Project
Sleetmute	26553	61.70°N	157.17°W	35 miles southeast
Aniak	26516	61.58°N	159.53°W	45 miles southwest
McGrath	26510	62.96°N	155.61°W	97 miles northeast

<sup>(1)</sup> WBAN - Weather Bureau Air Force Navy

The locations of the Camp, Sleetmute, Aniak, and McGrath stations in relation to the Project are provided in Figure 3-2, and a wind frequency distribution for the Camp 2020–2021 data is presented in Figure 3-3.

Donlin Gold has used the adjusted surface friction velocity default model option (ADJ\_U\*) for this modeling analysis in accordance with ADEC approval granted on September 15, 2015, (ADEC 2015e). Per this approval, the low-wind non-default model option (LOWWIND3) and the sigma-theta and sigma-w meteorological parameters were not used for this modeling analysis.

### **3.5.1 Surface Characteristics for AERMET Processing**

AERMET requires the input of three surface boundary layer parameters: midday Bowen ratio ( $B_o$ ), midday albedo ( $r$ ), and surface roughness length ( $z_o$ ). These parameters are dependent on the land use and vegetative cover of the area being evaluated. Per discussions with ADEC, terrain elevation features were not considered in calculating  $z_o$ . The 2016 National Land Cover Data (NLCD) was processed with AERSURFACE to develop these surface characteristic parameters for the Camp station.

Figure 3-2. Location of Meteorological Stations

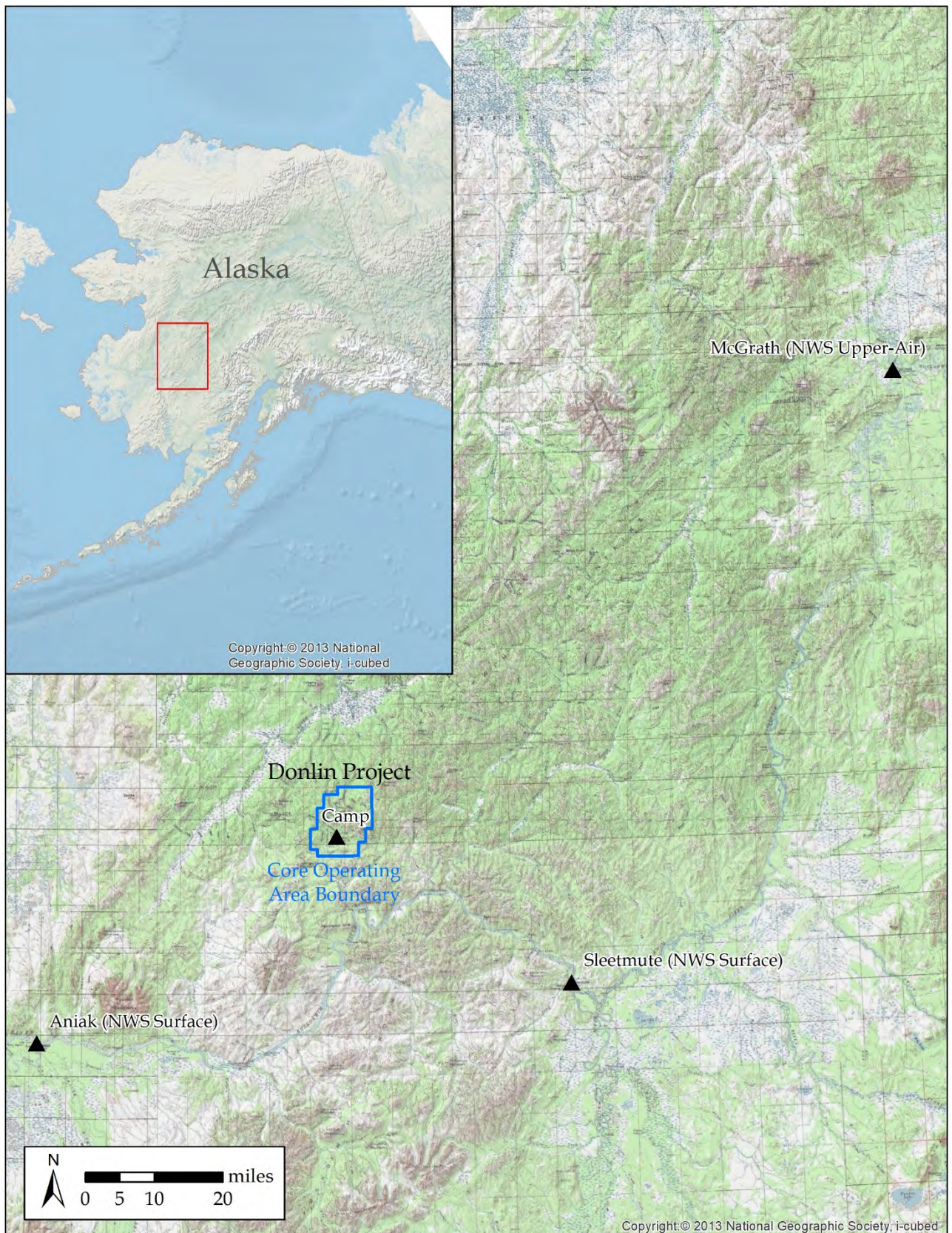
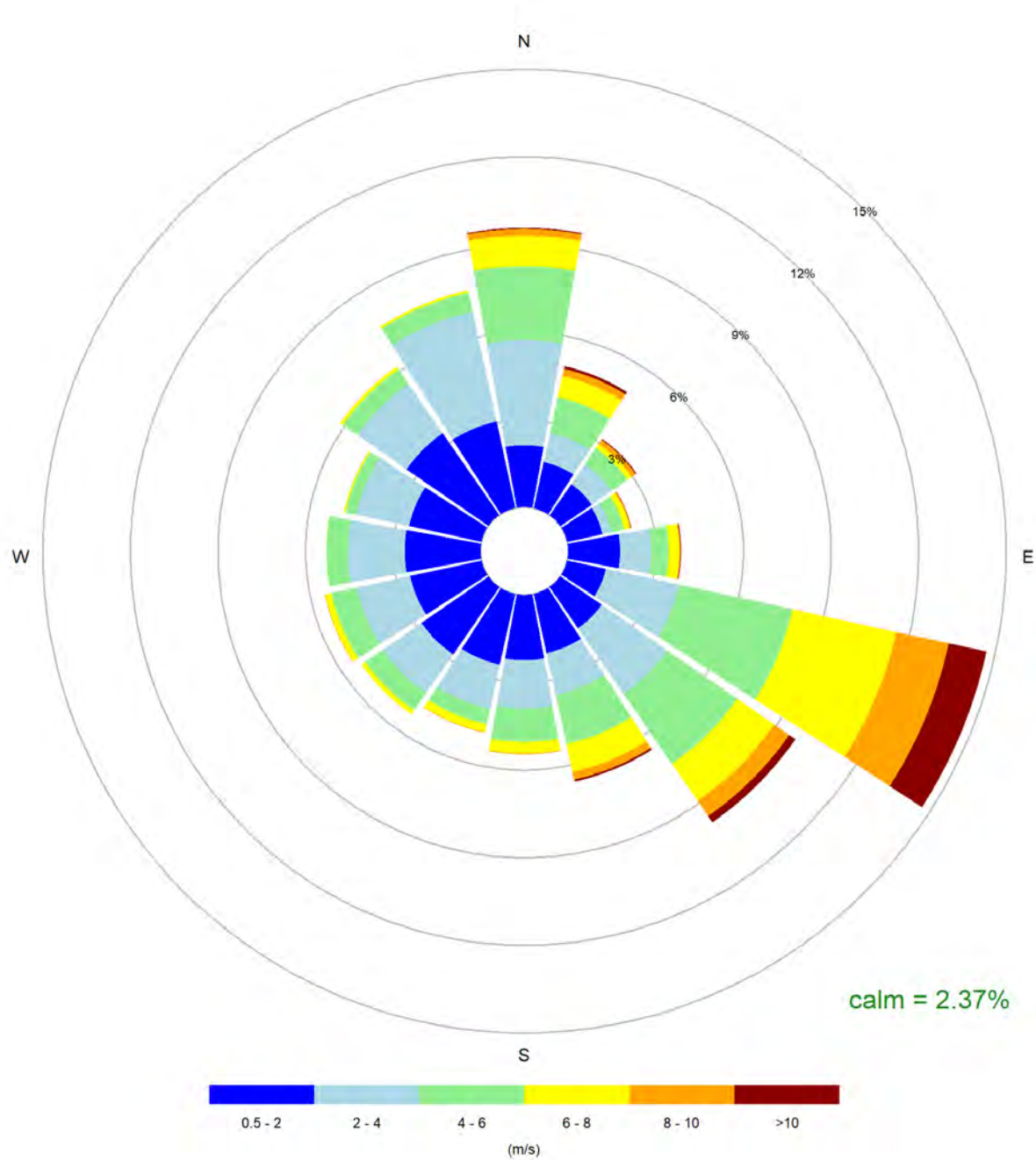




Figure 3-3. Wind Frequency Distribution for Camp Data (August 2020 to July 2021)



### 3.5.1.1 Bowen Ratio and Albedo

The  $B_o$  and  $r$  were produced by AERSURFACE with the 2016 NLCD, using a 10-km by 10-km area around the Camp station. A high-resolution aerial photograph showing the 10-km by 10-km area around the Camp station is provided in Figure 3-4. A 10-km by 10-km land cover classification map for the Camp station area is provided in Figure 3-5.

The determination of  $B_o$  is dependent on ambient moisture conditions (i.e., wet, average, or dry). For this purpose, historic 30-year (1991–2020) precipitation data from the McGrath station (closest station for which this type of data is available) were used. The data capture rate for this dataset is good, with no data missing for any given month in the data period.

The 70<sup>th</sup> and 30<sup>th</sup> percentile (P) values estimated from the 30-year precipitation data were used to assign a moisture class to each calendar month per the following scheme: monthly precipitation greater than 70<sup>th</sup> P as wet, between 70<sup>th</sup> and 30<sup>th</sup> P as average (Avg), and less than 30<sup>th</sup> P as dry. While data capture was good throughout the historical period, three months in 2021 (April, June, and July 2021) have low capture rates, with four or more days of measurement missing. For those months, the Avg moisture class was assumed.

The monthly season and moisture (M) classification and estimated  $r$  and  $B_o$  for the 2020-2021 Camp data are presented in Table 3-4.

**Table 3-4. Monthly Season and Moisture Classification and Calculated  $r$  and  $B_o$**

Month	Season	$r$	2020-2021	
			M	$B_o$
August	Summer	0.14	Dry	0.94
September	Autumn	0.14	Avg	0.98
October	Winter (No Snow)	0.14	Avg	0.98
November	Winter (Snow)	0.40	Avg	0.50
December	Winter (Snow)	0.40	Dry	0.50
January	Winter (Snow)	0.40	Dry	0.50
February	Winter (Snow)	0.40	Avg	0.50
March	Winter (Snow)	0.40	Wet	0.50
April	Winter (Snow)	0.40	Avg	0.50
May	Spring	0.14	Dry	1.74
June	Summer	0.14	Avg	0.44
July	Summer	0.14	Avg	0.44

Figure 3-4. 10-km by 10-km Aerial Photograph - Camp Station

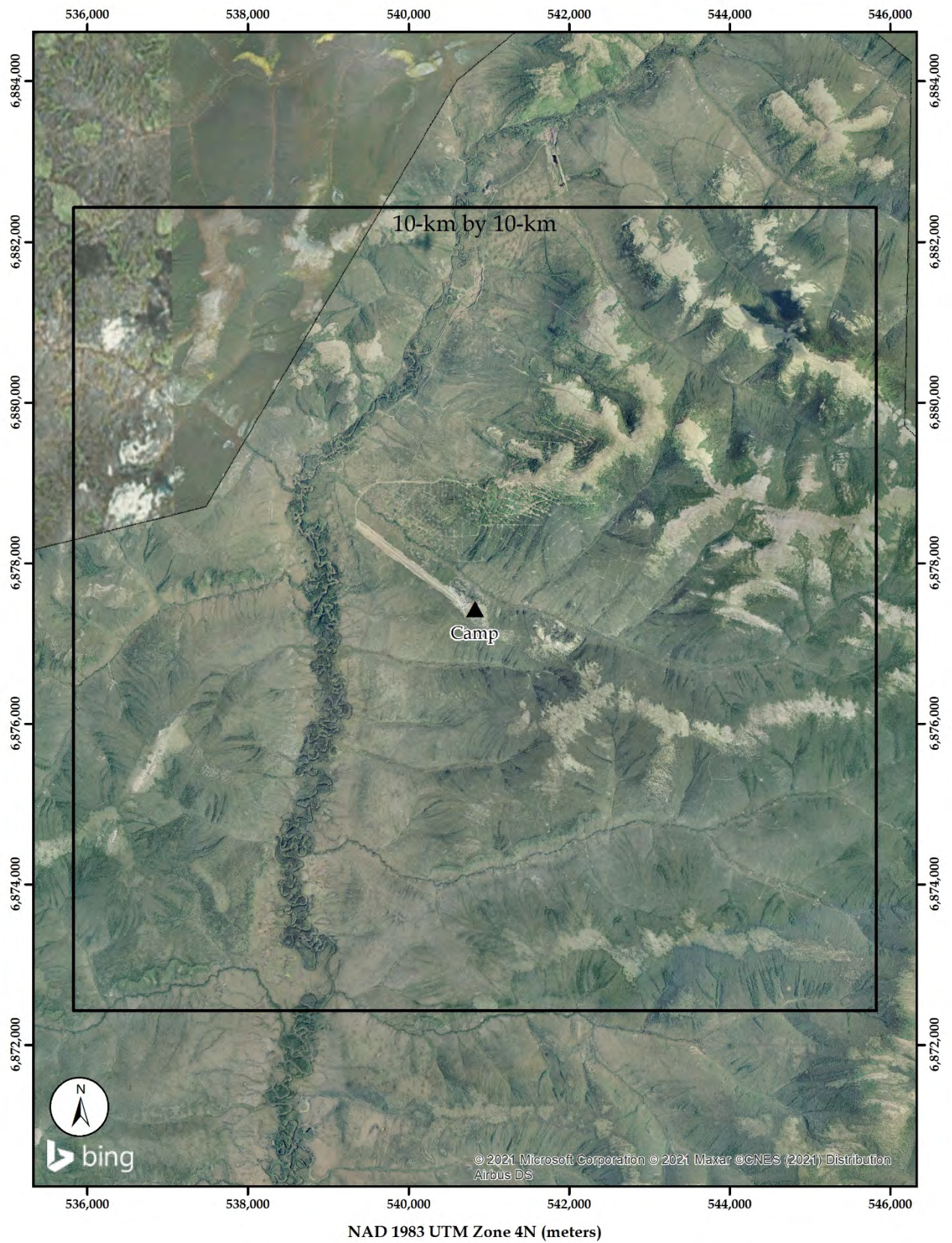
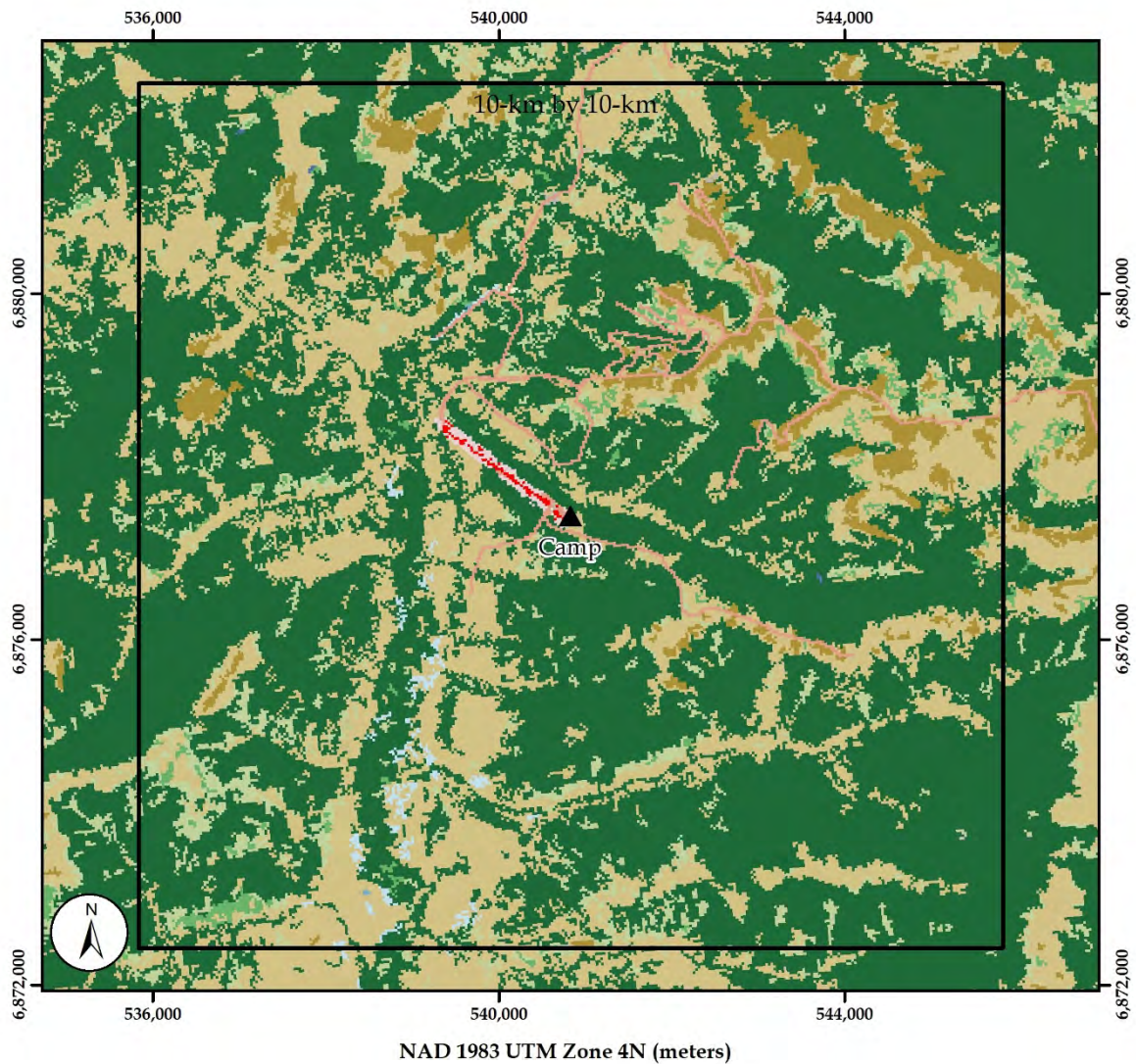




Figure 3-5. 10-km by 10-km Land Cover Classification Map - Camp Station



#### Land Cover Legend

Open Water (11)	Dwarf Scrub(AK only) (51)
Perennial Ice/Snow/ (12)	Shrub/Scrub (52)
Developed, Open Space (21)	Grasslands/Herbaceous (71)
Developed, Low Intensity (22)	Sedge/Herbaceous(AK only) (72)
Developed, Medium Intensity (23)	Lichens (AK only) (73)
Developed, High Intensity (24)	Moss (AK only) (74)
Barren Land (Rock/Sand/Clay) (31)	Pasture/Hay (81)
Unconsolidated Shore (32)	Cultivated Crops (82)
Deciduous Forest (41)	Woody Wetlands (90)
Evergreen Forest (42)	Emergent Herbaceous Wetlands (95)
Mixed Forest (43)	

### 3.5.1.2 Surface Roughness Length

The seasonal  $z_o$  values for each 30-degree sector of the 1-km radius for the Camp station are provided in Table 3-5. (Sector 1 is 0 to 30 degrees clockwise from the north, Sector 2 is 30 to 60 degrees clockwise from the north, etc.)

**Table 3-5. Calculated Seasonal Surface Roughness Length Values (m)**

Sector	Summer	Autumn	Winter (No Snow)	Winter (Snow)	Spring
1	0.717	0.713	0.695	0.544	0.709
2	0.924	0.924	0.895	0.755	0.913
3	0.546	0.546	0.546	0.371	0.546
4	0.985	0.982	0.974	0.875	0.981
5	0.671	0.665	0.648	0.510	0.663
6	0.672	0.657	0.626	0.503	0.653
7	0.798	0.777	0.731	0.642	0.770
8	0.526	0.513	0.473	0.349	0.503
9	0.386	0.364	0.324	0.243	0.361
10	0.367	0.348	0.303	0.222	0.343
11	0.343	0.321	0.287	0.211	0.321
12	0.753	0.748	0.730	0.591	0.745

Summer = June, July, August

Autumn = September

Winter (No Snow) = October

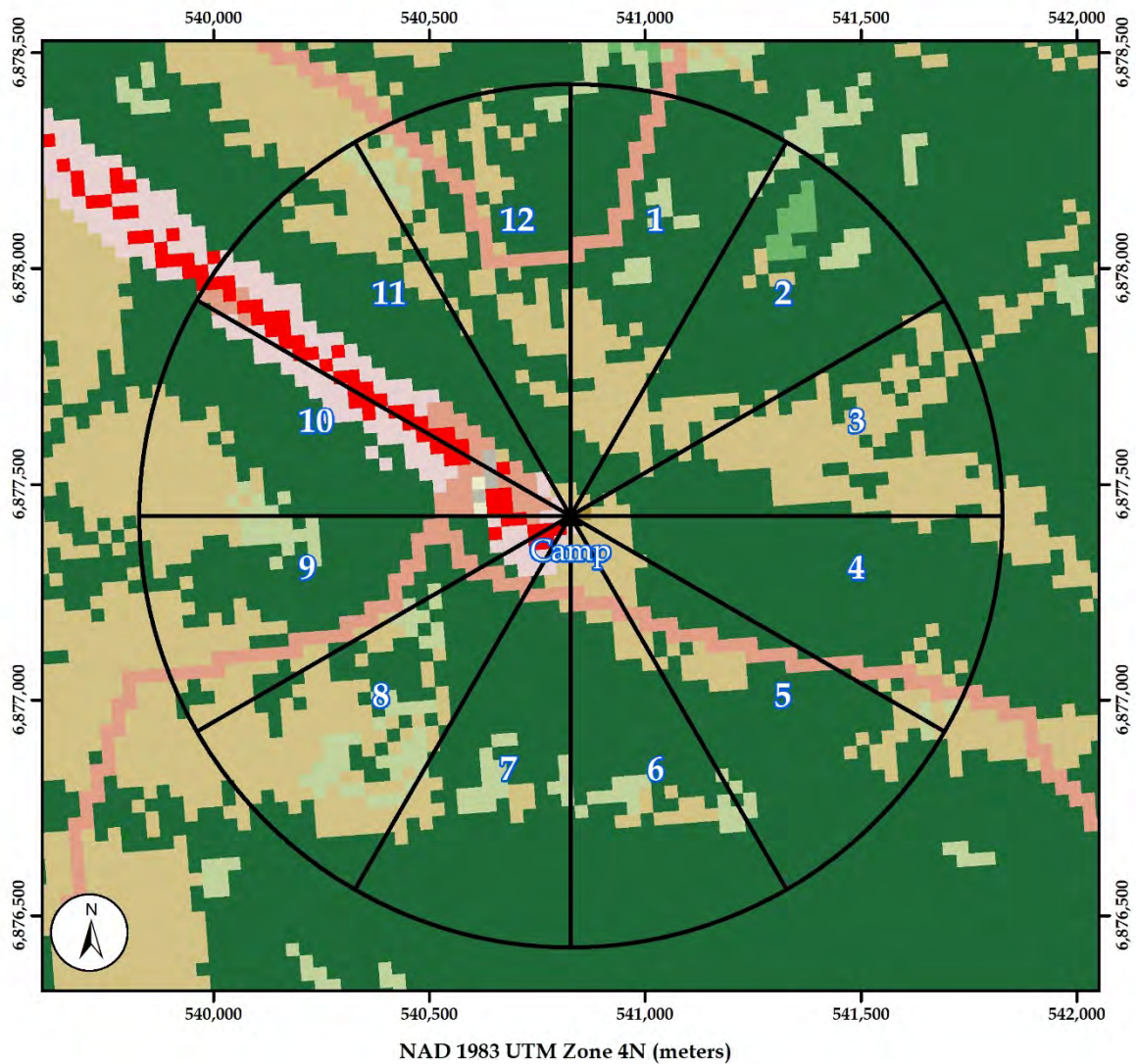
Winter (Snow) = January, February, March, April, November, December

Spring = May

A map showing the sectors and the land cover classification for a 1-km radius area around the Camp station is provided in Figure 3-6.



Figure 3-6. 1-km Radius Land Cover Classification and Sectors - Camp Station



#### Land Cover Legend

- |                                   |                                   |
|-----------------------------------|-----------------------------------|
| Open Water (11)                   | Dwarf Scrub(AK only) (51)         |
| Perennial Ice/Snow/ (12)          | Shrub/Scrub (52)                  |
| Developed, Open Space (21)        | Grasslands/Herbaceous (71)        |
| Developed, Low Intensity (22)     | Sedge/Herbaceous(AK only) (72)    |
| Developed, Medium Intensity (23)  | Lichens (AK only) (73)            |
| Developed, High Intensity (24)    | Moss (AK only) (74)               |
| Barren Land (Rock/Sand/Clay) (31) | Pasture/Hay (81)                  |
| Unconsolidated Shore (32)         | Cultivated Crops (82)             |
| Deciduous Forest (41)             | Woody Wetlands (90)               |
| Evergreen Forest (42)             | Emergent Herbaceous Wetlands (95) |
| Mixed Forest (43)                 |                                   |

### 3.6 Background Concentrations

The monitored pollutant concentrations (Section 2.4.2), also known as baseline or ambient background concentrations, are considered to be representative of the prevailing air pollution from existing sources in the region. These background concentrations are added to the modeled concentrations from Project's emissions (to account for the sources not modeled exclusively) to estimate the total ambient concentrations in the area. These total ambient concentrations are compared to the AAQS to determine compliance.

Donlin Gold has used the pollutant and averaging-period-specific measured concentrations provided in Section 2.4.2 to develop the design background values for this analysis, summarized in Table 3-6. These design background concentrations were estimated from the measured data in accordance with 40 CFR 51, Appendix W, Section 8.2 provisions without any processing. For NO<sub>2</sub> modeling, temporally varying background profiles for NO<sub>2</sub> and O<sub>3</sub> developed from the monitoring data were used. These profiles are provided in Section 3.9 and show the varying background concentration for each hour of the day for each month of the year.

**Table 3-6. Design Background Concentrations**

Pollutant	Averaging Period	Background Concentration	
		(µg/m <sup>3</sup> )	(ppb)
CO	8-Hour (2 <sup>nd</sup> high) Maximum	457.9	400
	1-Hour (2 <sup>nd</sup> high) Maximum	686.9	600
NO <sub>2</sub>	Annual Average	1.4	0.7
	1-Hour (98 <sup>th</sup> percentile) Average	20.7	10.6
PM <sub>2.5</sub>	Annual Average	2.3	N/A
	24-Hour (98 <sup>th</sup> percentile) Average	6.8	N/A
PM <sub>10</sub>	24-Hour (2 <sup>nd</sup> high) Maximum	14.1	N/A
O <sub>3</sub>	8-Hour (4 <sup>th</sup> high daily maximum) Average	100.7	51.3

### 3.7 Source Emissions and Characterization

This section discusses emission factors and methods used to develop the Project's emissions inventory. It also addresses emissions and source characterization for model input.

#### 3.7.1 Emission Calculations

An emissions inventory for the Project was developed and is provided in Appendix B. A variety of sources, including AP-42 emission factors, performance data from similar sources, manufacturer specifications, New Source Performance Standards (NSPS), and technical literature, were used to develop the Project emissions inventory. A summary of emission factor

references used to develop the Project emissions inventory is provided in Tables 3-7 through 3-9.

**Table 3-7. Emission Factor References – Mill and Process Sources**

Source Category	Pollutant	Emission Factor	Reference	Remarks
Ore Transfer	PM <sub>2.5</sub>	0.00003 lb/ton	AP-42, Sec. 13.2.4, Eq. 1, 11/06	Based on moisture content of 1.8% and average wind speed of 1.3 mph (to account for enclosure). (Donlin Gold 2015b)
	PM <sub>10</sub>	0.00023 lb/ton		
Baghouses/Dust Collectors	PM <sub>2.5</sub> , PM <sub>10</sub>	0.01 gr/ft <sup>3</sup>	Vendor performance guarantee	Donlin Gold will require vendor performance guarantees of less than or equal to the stated emission levels. (Donlin Gold 2015b)
	PM <sub>2.5</sub> , PM <sub>10</sub>	0.02 gr/ft <sup>3</sup>		
Autoclaves	PM <sub>2.5</sub> , PM <sub>10</sub>	100 g/hr	Donlin Gold and Hatch Engineering conservative estimates	(Donlin Gold 2015b)
	SO <sub>2</sub>	507 g/hr		
	H <sub>2</sub> S	144 g/hr		
	VOC	19 g/hr		
	CO	2,600 ppm		
Hot Cure	PM <sub>2.5</sub> , PM <sub>10</sub>	181 g/hr		
Carbon Kiln	PM <sub>2.5</sub> , PM <sub>10</sub>	50,000 µg/Nm <sup>3</sup>	Similar source test data	The test data are from similar sources at Barrick Goldstrike facility in Nevada. (Donlin Gold 2015b)
	CO	100,000 µg/Nm <sup>3</sup>		
	NO <sub>x</sub>	2,000 µg/Nm <sup>3</sup>		
	VOC	50,000 µg/Nm <sup>3</sup>		
Electrowinning Cells	PM <sub>2.5</sub> , PM <sub>10</sub>	12,000 µg/Nm <sup>3</sup>		
Retort	PM <sub>2.5</sub> , PM <sub>10</sub>	40,000 µg/Nm <sup>3</sup>		
Induction Furnace	PM <sub>2.5</sub> , PM <sub>10</sub>	11,500 µg/Nm <sup>3</sup>		

µg/Nm<sup>3</sup> - micrograms per normalized cubic meter

g/hr - grams per hour

gr/ft<sup>3</sup> - grains per cubic foot

lb/ton - pounds per ton

**Table 3-8. Emission Factor References – Mining Sources**

Source Category	Pollutant	Emission Factor	Reference	Remarks
Drilling	PM <sub>2.5</sub>	0.039 lb/hole	AP-42, Tab. 11.9-4, 7/98 (overburden)	Scaling for drilling not available, blasting scaling factors (AP-42, Tab. 11.9-1) used
	PM <sub>10</sub>	0.676 lb/hole		
Blasting <sup>(1)</sup>	PM <sub>2.5</sub>	17.5 / 12.8 lb/blast	AP-42, Tab. 11.9-1, 7/98 (overburden)	Based on 27 tests conducted by Australian coal mining industry ULSD with 15 ppm S content
	PM <sub>10</sub>	302.6 / 221.3 lb/blast		
	CO	67.0 lb/ton-Emulsion	AP-42, Tab. 13.3-1, 2/80 (ANFO)	
	NO <sub>x</sub>	1.8 lb/ton-Emulsion	CSIRO, 2008	
	SO <sub>2</sub>	0.006 lb/ton-Emulsion	Mass balance	
Material Handling	PM <sub>2.5</sub>	0.0002 lb/ton	AP-42, Sec. 13.2.4, Eq. 1, 11/06	Based on moisture content of 2.5% and average wind speed of 7.95 mph
	PM <sub>10</sub>	0.0015 lb/ton		
Hauling <sup>(2)</sup>	PM <sub>2.5</sub>	0.328 / 0.329 lb/VMT	AP-42, Sec. 13.2.2, Eqs. 1a and 2, 11/06	Based on silt content of 3.8%, mean vehicle weight of 449.4 tons, 129 days per year with precipitation ≥ 0.01 inch, and 90% control
	PM <sub>10</sub>	3.28 / 3.29 lb/VMT		
Dozing	PM <sub>2.5</sub>	0.90 lb/hr	AP-42, Tab. 11.9-1, 07/98, (overburden)	
	PM <sub>10</sub>	1.54 lb/hr		
Grading	PM <sub>2.5</sub>	0.02 lb/VMT	AP-42, Tab. 11.9-1, 07/98	Based on mean vehicle speed of 3 mph, and 129 days per year with precipitation ≥ 0.01 inch
	PM <sub>10</sub>	0.28 lb/VMT		
Water Trucking	PM <sub>2.5</sub>	0.22 lb/VMT	AP-42, Sec. 13.2.2, Eqs. 1a and 2, 11/06	Based on silt content of 3.8%, mean vehicle weight of 182.6 tons, 129 days per year with precipitation ≥ 0.01 inch, and 90% control
	PM <sub>10</sub>	2.19 lb/VMT		
Wind Erosion of Roads	PM <sub>2.5</sub>	12.52 lb/acre-yr	AP-42, Sec. 13.2.5, 11/06	Fastest-mile based hourly emissions summed over a year, and 90% control
	PM <sub>10</sub>	83.43 lb/acre-yr		
Wind Erosion of Stockpiles, Waste and Tailings Facilities	PM <sub>2.5</sub> , PM <sub>10</sub>	Variable	AP-42, Sec. 13.2.5, 11/06	Fastest-mile based hourly emissions, varied based on frequency of threshold wind events
Machinery Tailpipes	All	Variable	40 CFR 1039	Engine size-specific Tier 4 emission factors and a load factor of 7,000 Btu/hp-hr
Personnel and Cargo Transportation Tailpipes	All	Variable	EPA MOVES	

<sup>(1)</sup> PM<sub>10</sub>/PM<sub>2.5</sub> emission factors are a function of the blast area, which varies by LOM year. The emission factors shown are for LOM years 16 and 20, respectively.

<sup>(2)</sup> PM<sub>10</sub>/PM<sub>2.5</sub> emission factors are a function of the truck fleet, which varies by LOM year. The emission factors shown are for LOM years 16 and 20, respectively.

Btu - British thermal unit

hp-hr - horsepower-hour

lb/VMT - pounds per vehicle miles travelled

ULSD – ultra-low-sulfur diesel

Wind erosion emissions from exposed surfaces of material stockpiles (ore stockpiles and waste dumps) and flat surfaces (tailings dry beach and road surfaces) were estimated using the fastest-mile method specified in AP-42, Section 13.2.5. An ADEC-approved factor of 1.24<sup>4</sup> was used to convert the hourly wind speeds to fastest-mile wind speeds. Sample wind erosion emission calculations are provided in Appendix B.

Donlin Gold will control dust emissions from unpaved roads through a combination of controls including water and chemical dust suppressant application according to its fugitive dust control plan. The fugitive dust control plan includes visual observations of dust emissions from unpaved roads to assess dust control effectiveness. As discussed below, this will provide 90 percent, or greater, dust control.

The EPA source documents for control efficiency referenced in AP-42, Section 13.2.2, Unpaved Roads, as well as additional applicable studies, were reviewed by Air Sciences. This review (described in Air Sciences' memorandum (Air Sciences 2015b)) indicated that the studies showed that chemical suppressants alone could achieve 90 percent, or more, control efficiency. The Air Sciences memorandum also provides examples of other agencies that have adopted a 90-percent-control-efficiency level with chemical dust suppressants application on unpaved roads as part of their air quality program.

The Air Sciences memorandum was reviewed by Greg Muleski of SACI, LLC. SACI provides consulting services on the characterization and control of air pollution sources, and Mr. Muleski had previously been a co-author of several EPA studies that are supporting documents for AP-42. The conclusion of the review was that chemical unpaved road dust suppressants can reasonably achieve over 90 percent average control efficiency (SACI 2015).

As discussed in Section 2.3.1, the Project is subject to PSD review for PM. Therefore, it must employ the Best Available Control Technology (BACT) to control PM (dust) emissions from unpaved roads. The EPA RACT/BACT/LAER Clearinghouse (EPA 2015) was queried for the last 10 years of determinations for the process code 99.150, Unpaved Roads. This search showed that for the determinations where a control efficiency level was provided, the majority of these determinations listed a control efficiency of 90 percent or greater. The control technologies listed for these determinations were chemical application, water application, and/or speed reduction.

Based on the BACT determinations, and the Air Sciences and SACI reviews, a 90 percent control level for unpaved road dust is considered technologically feasible. Therefore, Donlin Gold has proposed control measures for achieving 90 percent dust control in its PSD application to meet the PSD BACT requirement.

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<sup>4</sup> Telephone communication from A. Schuler (ADEC), per M. Rieser's (Donlin Gold) email dated April 15, 2015.

**Table 3-9. Emission Factor References – Stationary Combustion Sources**

Source Category	Pollutant	Emission Factor	Reference	Remarks
Wärtsilä Engines	PM <sub>2.5</sub> , PM <sub>10</sub>	0.29 g/kWhe	Manufacturer guarantee	Worst-case ULSD combustion
	CO	0.18 g/kWhe		
	NO <sub>x</sub>	0.53 g/kWhe		
	VOC	0.58 g/kWhe		
	SO <sub>2</sub>	0.006 g/kWhe	Mass balance	ULSD with 15 ppm S content and 6.74 lb/gal density
Other Primary/Emergency Diesel Generators and Fire Pumps	PM <sub>2.5</sub> , PM <sub>10</sub> , CO, NO <sub>x</sub> , VOC	Variable	40 CFR 60, Subpart IIII, 40 CFR 1039	Engine size-specific Tier 4 emission factors multiplied by an NTE factor of 1.25
	SO <sub>2</sub>	Variable	Mass balance	ULSD with 15 ppm S content and 6.74 lb/gal density
Diesel Boilers/Heaters	PM <sub>2.5</sub> , PM <sub>10</sub> , CO, NO <sub>x</sub> , VOC	Variable	AP-42, Ch. 1.3	Rating-specific applicable emission factors
	SO <sub>2</sub>	Variable	Mass balance	ULSD with 15 ppm S content and 6.74 lb/gal density
Natural Gas Boilers/Heaters	All	Variable	AP-42, Ch. 1.4	Rating-specific applicable emission factors
Waste/Sludge Incinerators	All	Variable	Vendor performance guarantee	Donlin Gold will require vendor performance guarantees meet applicable NSPS

g/kWhe – grams per kilowatt-hour electric

lb/gal – pounds per gallon

ppmvd – parts per million, volumetric dry

S – sulfur

NTE – not to exceed

A summary of the maximum potential Project emissions for model input, by broad source category, is provided in Table 3-10.

**Table 3-10. Maximum Potential Emissions Summary by Source Category (ton/yr)**

Source/ Activity	CO	NO <sub>x</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>
Fugitive Sources	1,925.4	53.9	169.5	1,350.3
Mobile Machinery	2,045.8	1,978.9	22.9	22.0
Power Generation	367.0	1,032.8	564.2	564.2
Emergency Equipment	18.7	33.3	1.1	1.1
Processing Operations	774.9	0.1	64.5	80.6
Boilers/Heaters and Incinerators	95.3	159.0	9.2	9.8
Project Total	5,227.2	3,257.9	831.3	2,028.0
LOM Year	19	19	16	20

The emissions provided in Table 3-10 are based on the maximum design rates for the process and ancillary sources (ore processing, power generation, and ancillary equipment), including emissions based on all 12 Wärtsilä engines operating continuously on ULSD, which results in

higher emissions for all pollutants than from NG combustion. In the case of dual-fuel boilers, the higher emissions for each pollutant associated with either fuel are provided in this table. The mining activity (fugitive sources) and mobile machinery total emissions represent the maximum annual emissions over the Project's life. As shown in Table 3-10, the modeled emissions were from LOM year 19 for CO and NO<sub>x</sub>; LOM year 16 for PM<sub>2.5</sub>; and LOM year 20 for PM<sub>10</sub>.

Potential emissions among different LOM years differ due to varying mining activity rates, specifically for: ore production, waste movement, mobile equipment fuel consumption, and material hauling. Although these activities are maximized and optimized each year per the Project Mining Operation Plan, they are capped by inherent limitations in mining capacity, such as the number of haul trucks. For example, peak ore production does not occur in the same LOM year as peak waste movement. Because emissions are based on these mining activity rates, the peak emissions for each pollutant can occur in different LOM years, as shown in Table 3-11.

**Table 3-11. Project Emissions (ton/yr) for LOM Years 16 and 20**

Pollutant	LOM Year 16	LOM Year 19	LOM Year 20
CO	5,224	<b>5,227</b>	5,147
NO <sub>x</sub>	3,257	<b>3,258</b>	3,177
PM <sub>2.5</sub>	<b>831</b>	821	827
PM <sub>10</sub>	2,020	1,936	<b>2,028</b>

**Bold** values represent the maximum activity rates and emissions.

### 3.7.2 Long- and Short-Term Emissions Approach

The annual hourly average emissions were modeled for the applicable annual AAQS. The methodology for determining the model input emission rates for the short-term averaging periods (up to 24-hour) was developed with ADEC's consultation and approval (June 26, 2015, teleconference). A summary of the short-term model input emissions approach for the process sources, blasting, and fugitive and mobile equipment emissions from mining activities is as follows:

- **Process Sources:** Short-term model input emission rates for the process sources, including ore processing, refining, power generation, and other support activities, were based on the equipment/process-specific maximum hourly design throughput rates.
- **Blasting:** Short-term model input emission rates for blasting were determined by spreading the emissions from the maximum anticipated blasting requirement (up to a maximum of five blasts per day<sup>5</sup>) over each short-term averaging period. For example:

<sup>5</sup> The actual annual average number of blasts per day will be less than two.

- For 1-hour AAQS, blasting emissions were based on five blasts occurring during every 1-hour period.
- For 3-hour AAQS, blasting emissions were based on five blasts occurring during every 3-hour period (one-third of emissions modeled for 1-hour AAQS).
- For 8-hour AAQS, blasting emissions were based on five blasts occurring during every 8-hour period (one-eighth of emissions modeled for 1-hour AAQS).
- For 24-hour AAQS, blasting emissions were based on five blasts occurring during every 24-hour period (one-twenty-fourth of emissions modeled for 1-hour AAQS).
- Fugitive and Mobile Equipment Emissions from Mining Activities: As shown in Table 3-10, the maximum emissions from mining activities occur during different LOM years: CO and NO<sub>x</sub> in LOM year 19, PM<sub>2.5</sub> in LOM year 16, and PM<sub>10</sub> in LOM year 20. Therefore, to conservatively evaluate the emissions from mining activities, the annual hourly average emissions from these LOM years were modeled: CO and NO<sub>x</sub> for LOM year 19, PM<sub>2.5</sub> for LOM year 16, and PM<sub>10</sub> for LOM year 20. For each of these years, short-term model input fugitive emission rates were augmented by basing the ore loading and unloading emissions on the gyratory crusher design throughput rate of 122,400 tons per day. This daily maximum design rate is approximately three times higher than the annual average daily ore production rates for LOM years 16, 19, or 20.

### 3.7.3 Source Characterization

The Wärtsilä engines at the power plant were characterized as POINT sources for model input. The remaining sources with exhaust stacks, such as generators, boilers, autoclaves, the retort, the smelting furnace, and dust-collector-equipped sources (crusher, silos, apron feeder, etc.), were modeled as POINTCAP sources. The fugitive process sources, such as truck dump and uncontrolled ore transfers, were characterized as VOLUME sources in the model.

Unlike process sources, emissions from fugitive sources (e.g., drilling; blasting; material loading, unloading, and hauling; and wind erosion of exposed surfaces) and mobile machinery tailpipes were not modeled exclusively; rather, they were represented by appropriate activity locations. Except for haul roads (fugitive dust and tailpipe emissions from material hauling) and access roads (fugitive dust and tailpipe emissions from personnel and cargo transportation), all fugitive emissions were aggregated and assigned to appropriate modeled activity locations presented in Table 3-12. This table also shows the source type and associated dimensions for each of the modeled fugitive activity locations.



**Table 3-12. Fugitive Activity Locations Modeled**

Model ID	Activity Location	Type	Lateral Dimensions (m)		Emission Sources
BLAST1-BLAST5 <sup>(1)</sup>	In-pit Blasting (5 locations)	VOLUME	90	× 90	Blasting
INPIT	Pit	OPENPIT	3,345	× 2,068	Drilling, material extraction, loading, and unloading, dozing, machinery
WASTE	Waste Rock Facility	VOLUME	2,330	× 3,460	Waste unloading, hauling, wind erosion, dozing, grading, machinery
STPILE	Short-term Ore Storage Site	VOLUME	235	× 130	Ore unloading and reloading, wind erosion, dozing, machinery
LTPILEW	Long-term Ore Storage Site (West)	VOLUME	950	× 323	Ore (and PAG rock) unloading and reloading, wind erosion, dozing, machinery
LTPILEE	Long-term Ore Storage Site (East)	VOLUME	740	× 707	Ore unloading and reloading, wind erosion, dozing, machinery
TAILS	Tailings Storage Facility	AREA	4,000	× 2,260	Wind erosion
TAILSDAM	Tailings Dam	VOLUME	500	× 1,495	Waste unloading, dozing, machinery
OVBSTKS	Overburden Stockpile (South)	VOLUME	410	× 402	Overburden unloading and reloading, wind erosion, dozing, machinery

<sup>(1)</sup> Each blasting shot was characterized by an individual VOLUME source located inside the pit.  
PAG = Potentially Acid-Generating

The VOLUME source dimensions for blasting were adopted from the study conducted by the Australian coal mining association (CSIRO 2008). For the remaining OPENPIT, VOLUME, and AREA sources listed in Table 3-12, the dimensions were developed by best-fitting an equal area rectangle within the actual footprint of each fugitive activity location (Figure 3-7).

The model input physical parameters for the fugitive activity locations are provided in Table 3-13.

**Table 3-13. Model Input Parameters for Fugitive Activity Locations**

Model ID	Base Elevation (m)	Release Height (m)	Initial Lateral Dispersion (m)	Initial Vertical Dispersion (m)	Volume (million m <sup>3</sup> )
BLAST1	-159	75.00	20.93	69.77	N/A
BLAST2	-168	75.00	20.93	69.77	N/A
BLAST3	2	75.00	20.93	69.77	N/A
BLAST4	113	75.00	20.93	69.77	N/A
BLAST5	346	75.00	20.93	69.77	N/A
INPIT <sup>(1)</sup>	207	4.99	N/A	N/A	943
WASTE <sup>(2)</sup>	472	6.93	660.31	6.45	N/A
STPILE <sup>(2)</sup>	220	6.93	40.65	6.45	N/A
LTPILEW <sup>(2)</sup>	220	6.93	128.87	6.45	N/A
LTPILEE <sup>(2)</sup>	304	6.93	168.18	6.45	N/A
TAILS	237	0.00	N/A	0.00	N/A
TAILSDAM <sup>(2)</sup>	241	6.93	201.04	6.45	N/A
OVBSTKS <sup>(2)</sup>	142	6.93	94.43	6.45	N/A

<sup>(1)</sup> In-pit activity release heights are weighted by associated particulate emissions, which vary by LOM year. The parameters shown are for LOM year 16.

<sup>(2)</sup> Release height and initial vertical dispersion are function of truck fleet, which varies by LOM year. The parameters shown are for LOM year 16.

The blasting physical parameters were based on dimensions provided in CSIRO 2008. The release height for the open-pit (INPIT) is a weighted release height of various activities occurring within the pit (drilling, truck loading/unloading, equipment tailpipes, and dozing) and associated PM<sub>10</sub> emissions, and was calculated using the recommendations provided in the Haul Road Workgroup Report (EPA 2012). The INPIT base elevation and volume are the averages for LOM year 16 and 20. A significant fraction of emissions occurring at the waste rock facility (WASTE) and the remaining fugitive activity locations with material stockpiles (STPILE, LTPILEW, LTPILEE, TAILSDAM, and OVBSTKS) is associated with truck loading/unloading. Therefore, the release heights for these sources were developed using weighted haul truck heights and recommendations provided in the Haul Road Workgroup Report (EPA 2012). The initial lateral dispersion for each VOLUME source was calculated using the respective equal area square dimension.

A representative haul road network for hauling material from inside the pit (or origin) to various destinations was developed. This network includes the following routes:

1. Inside pit
2. Pit exit to crusher and short-term ore stockpile
3. Pit exit to long-term ore stockpiles (east and west)

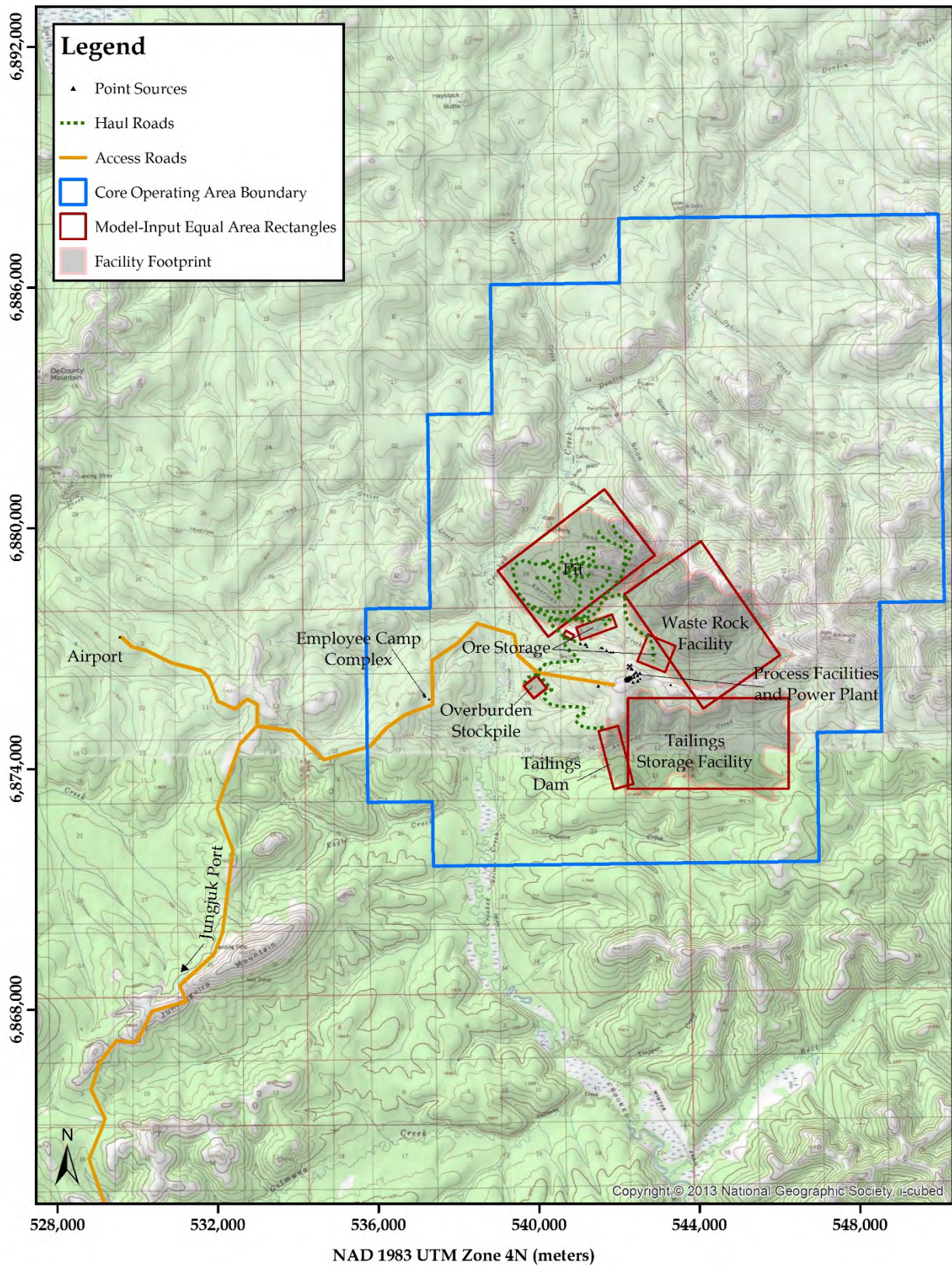
4. Long-term ore stockpiles (east and west) to crusher
5. Pit exit to waste rock facility
6. Pit exit to tailings dam
7. Pit exit to overburden stockpiles (south)
8. Overburden stockpiles (south) to waste rock facility

Each of these hauling routes was divided into a number of segments with lengths approximately equal to twice the adjusted haul road width of 35 meters (29 meters road width plus 6 meters per (EPA 2012)), and each of the segments was characterized as an individual VOLUME source in the model with a release height of 7 meters (weighted truck height times 1.7, divided by 2 (EPA 2012)), an initial lateral dispersion of 16.3 meters (adjusted road width divided by 2.15 (EPA 2012)), and an initial vertical dispersion of 6 meters (weighted top of plume height divided by 2.15 (EPA 2012)). Material hauling and tailpipe emissions associated with each of these routes were distributed based on traffic density along the segments for that route.

The access roads, including Jungjuk port to mine site, and airport to employee complex and onward to mine site, were characterized by a series of elongated AREA sources laid along the actual routes. These sources were assigned a release height of 3 meters and an initial vertical dispersion of 2.8 meters. These release parameters are based on an assumed 3.5-meter vehicle height that is representative of an overall approximation of anticipated vehicle heights (grader – 3.7 meters, cargo truck – 3.6 meters, water truck – 3.6 meters, commuter bus – 3.2 meters, and pickup truck – 3.2 meters) and the AREA source parameterization recommendations provided in (EPA 2012).

The source layout for model input is presented in Figure 3-7.

Figure 3-7. Source Layout for Model Input



### 3.7.4 Plume Merging for Power Plant Engines

The Project power plant will consist of 12 identical Wärtsilä engines housed in two identical engine halls, each containing six engines. Each engine hall will consist of six stacks (one per engine) with identical release characteristics, clustered together in a configuration of two banks of three stacks each. The six stacks in each cluster will be arranged tightly together, approximately one diameter apart.

When multiple plumes from closely knit stacks enter the atmosphere, they merge, and plume rise is enhanced due to the increased buoyancy flux of the combined flues. To account for this plume enhancement, each cluster of six identical Wärtsilä engine stacks was modeled as a single merged stack (2 merged stacks representing the 12 Wärtsilä engines at the power plant) in AERMOD modeling. Consistent with the guidance on characterizing a merged stack for model input, each merged stack was represented by actual release height, exhaust temperature, and velocity of a single stack, with a diameter adjusted so that the combined (six stacks) exhaust flow rate is preserved. This method is detailed in a technical memorandum entitled “Merged-Stack Modeling for Donlin Gold” (Air Sciences 2015a) and was approved by ADEC (ADEC 2015b).

### 3.7.5 Model Input Emissions

The maximum potential model input emission rates in grams per second (g/s) derived from the Project’s emissions (Table 3-10) for each pollutant and averaging period are presented in Table 3-14.

**Table 3-14. Maximum Potential Model Input Emission Rates (g/s)**

Pollutant	Averaging Period	Emissions	LOM Year
CO	8-Hour	4,504.69	19
	1-Hour	4,504.69	19
NO <sub>2</sub>	Annual	93.72	19
	1-Hour	210.47	19
PM <sub>2.5</sub>	Annual	23.91	16
	24-Hour	24.83	16
PM <sub>10</sub>	Annual	58.34	20
	24-Hour	65.12	20

The model input emission rates provided in Table 3-14 are the maximum rates that would be modeled for a specific one-hour period, except for PM<sub>10</sub> and PM<sub>2.5</sub>. For these pollutants, the maximum modeled emissions varied on an hourly basis as the modeling utilized variable hourly emission rates for select activities (material transfers) that are affected by hourly wind speed. The PM<sub>10</sub> and PM<sub>2.5</sub> emission rates presented in Table 3-14 are based on the average wind speed.



The two sources/locations most affected by hourly wind speed are the pit (INPIT) and waste rock facility (WASTE). A refined method of hourly varying emissions due to wind speed fluctuations was used for these two locations. The hourly varying particulate emissions were fed into the model via an external file by specifying the HOUREMIS keyword in the input file.

### 3.8 Coordinate System

The Universal Transverse Mercator (UTM) coordinate system projected in North American Datum of 1983 (NAD83), Zone 4 North was used in the analysis to define all locations in the modeling domain (sources, buildings, and receptors).

### 3.9 NO<sub>2</sub> Modeling

The NO<sub>x</sub> emissions from the combustion sources are principally composed of NO and NO<sub>2</sub>. Once in the atmosphere, the NO can convert to NO<sub>2</sub> through chemical reactions with ambient ozone (O<sub>3</sub>). To address this atmospheric conversion process, the Guideline on Air Quality Models (40 CFR 51, Appendix W) recommends the following three-tiered screening approach for evaluating the NO<sub>2</sub> impacts:

- Tier 1: Assume total conversion of NO to NO<sub>2</sub>.
- Tier 2: Assume representative equilibrium NO<sub>2</sub>/NO<sub>x</sub> ratio (0.75 for annual and 0.80 for 1-hour).
- Tier 3: Use a detailed screening method on a case-by-case basis.

The non-default option of the Ozone Limiting Method (OLM), a Tier 3 method from 40 CFR 51, Appendix W, was used to estimate the NO<sub>2</sub> 1-hour and annual impacts for this analysis, as approved by ADEC and EPA (ADEC 2015b). The OLM determines the limiting factor for NO<sub>2</sub> formation by comparing the estimated maximum NO<sub>x</sub> concentration and the ambient O<sub>3</sub> concentration. The model assumes a total NO to NO<sub>2</sub> conversion when the ambient O<sub>3</sub> concentration is greater than the estimated maximum NO<sub>x</sub> concentration; otherwise, it is limited by the ambient O<sub>3</sub> concentration (Cole and Summerhays 1979).

The combined plume option (keywords OLMGROUP ALL) of the OLM was used for this analysis. The use of OLM requires the following additional input parameters:

- Background O<sub>3</sub> Concentrations – The use of the OLM option in AERMOD requires the input of hourly O<sub>3</sub> concentrations. The O<sub>3</sub> concentration values may be input as a single value, as hourly values to correspond with the meteorological data, or as temporally varying profiles. This analysis used a monthly-hour-of-day O<sub>3</sub> concentration profile developed from the onsite monitored hourly O<sub>3</sub> data (Section 2.4.2.5), presented in Table 3-15. This profile consists of the multi-year average of the highest values for each

monthly-hour-of-day. This profile was implemented in AERMOD using the MHRDOW keyword.

- Ambient Equilibrium  $\text{NO}_2/\text{NO}_x$  Ratio – The AERMOD default  $\text{NO}_2/\text{NO}_x$  ambient equilibrium ratio of 0.90 was used for this analysis.
- In-Stack  $\text{NO}_2/\text{NO}_x$  Ratio – A literature review was conducted to identify reasonable  $\text{NO}_2/\text{NO}_x$  ratios for different combustion source categories. Based on this research, the  $\text{NO}_2/\text{NO}_x$  ratios for this analysis are presented in Table 3-16.

**Table 3-15. Monthly-Hour-of-Day O<sub>3</sub> Profile**

Month	Hours	Hourly Concentration (ppb)							
January	1 - 8	44.9	45.3	45.6	45.6	45.7	45.8	45.7	45.1
	9 - 16	45.8	46.0	45.8	45.7	45.2	45.3	45.5	45.6
	17 - 24	45.5	45.2	45.4	45.3	45.4	45.4	45.3	45.0
February	1 - 8	44.3	45.1	44.9	44.6	44.8	44.4	45.4	45.2
	9 - 16	45.2	44.8	44.5	46.4	46.6	46.8	47.4	47.5
	17 - 24	45.7	44.7	45.9	43.5	43.7	43.7	43.4	43.6
March	1 - 8	51.2	50.3	50.2	50.9	51.7	51.3	50.9	50.8
	9 - 16	50.0	49.8	49.6	50.3	49.7	49.6	50.3	50.0
	17 - 24	49.6	49.5	49.3	51.7	51.3	51.3	51.3	52.3
April	1 - 8	51.5	51.5	51.7	52.0	51.3	50.6	49.5	49.8
	9 - 16	49.3	49.7	50.0	50.4	50.7	51.3	51.5	51.6
	17 - 24	51.4	51.9	52.0	53.2	53.7	52.8	52.2	51.9
May	1 - 8	45.9	46.6	46.6	46.9	47.0	46.2	45.6	45.4
	9 - 16	46.2	46.8	47.2	48.7	49.6	51.3	52.0	51.9
	17 - 24	51.6	51.8	51.9	51.2	49.6	48.2	47.9	45.9
June	1 - 8	41.8	42.0	42.1	41.7	39.7	39.9	41.2	42.3
	9 - 16	43.8	43.8	44.1	43.7	42.2	40.9	40.8	41.6
	17 - 24	42.8	43.7	40.0	41.1	41.1	42.4	43.9	42.3
July	1 - 8	28.2	28.6	30.1	29.0	27.0	27.1	27.0	26.8
	9 - 16	28.4	28.9	29.8	29.9	31.6	31.9	32.6	34.0
	17 - 24	32.2	32.6	33.4	32.2	31.2	30.9	30.8	28.9
August	1 - 8	31.2	31.3	31.4	32.8	32.5	30.7	28.8	26.9
	9 - 16	27.0	28.1	28.6	29.2	31.6	31.4	31.6	31.4
	17 - 24	30.4	30.5	30.6	34.7	32.3	30.0	31.4	31.7
September	1 - 8	31.8	32.8	35.1	34.9	33.8	33.1	32.2	31.9
	9 - 16	32.3	32.8	32.0	33.1	35.9	46.0	38.9	34.6
	17 - 24	35.3	36.0	33.5	32.5	32.0	32.5	32.0	31.6
October	1 - 8	36.3	36.1	36.4	36.7	37.1	36.5	36.5	35.5
	9 - 16	35.4	35.3	35.4	36.4	37.0	37.6	38.0	39.0
	17 - 24	39.2	38.9	37.8	39.0	38.7	35.7	36.3	36.6
November	1 - 8	38.5	38.5	38.3	38.3	38.3	38.5	38.5	38.6
	9 - 16	39.4	39.8	39.8	39.8	39.5	39.3	43.2	39.5
	17 - 24	39.3	39.1	39.0	39.8	39.1	38.7	38.6	38.6
December	1 - 8	40.7	40.0	40.5	40.9	41.2	40.9	41.6	41.6
	9 - 16	41.9	42.3	41.6	42.0	41.6	41.1	40.5	40.9
	17 - 24	41.1	41.2	41.2	41.2	42.0	41.9	41.3	41.8



**Table 3-16. NO<sub>2</sub>/NO<sub>x</sub> Ratios**

Source Category	NO <sub>2</sub> /NO <sub>x</sub> Ratio	Reference
Blasting	0.036	(CSIRO 2008)
Diesel Engines	0.11	(ADEC 2013b)
Diesel Engines with Catalyzed Particulate Filter	0.22	(ADEC 2015a)
Diesel Boilers	0.05	AP-42, Tab. 1.3-1, 05/10, footnote d
Natural Gas Boilers	0.10	(CAPCOA 2011)
Diesel Machinery	0.11	(ADEC 2013b)

Temporally varying NO<sub>2</sub> background concentrations for NO<sub>2</sub> annual and 1-hour modeling were integrated into AERMOD using the BACKGRND keyword. For this purpose, a monthly-hour-of-day NO<sub>2</sub> concentration profile developed from the onsite monitored hourly NO<sub>2</sub> data (Section 2.4.2.2) was used. The NO<sub>2</sub> background profile is provided in Table 3-17. This profile consists of the multi-year average of the highest values for each monthly-hour-of-day.

**Table 3-17. Monthly-Hour-of-Day NO<sub>2</sub> Profile**

Month	Hours	Hourly Concentration (ppb)							
January	1 - 8	5.3	4.8	6.0	5.3	3.3	5.3	4.5	6.6
	9 - 16	6.4	7.9	6.6	5.2	2.3	4.7	6.8	2.7
	17 - 24	3.7	5.9	5.1	5.2	6.9	5.7	5.4	4.3
February	1 - 8	5.8	5.0	6.4	7.6	4.3	5.1	5.8	5.2
	9 - 16	10.2	7.3	6.7	5.9	5.3	5.8	5.0	6.1
	17 - 24	7.3	9.0	9.4	7.0	6.0	5.8	6.1	5.7
March	1 - 8	5.8	5.7	6.9	7.2	6.9	8.5	8.6	10.2
	9 - 16	7.2	7.0	5.8	4.2	4.7	4.6	4.5	4.3
	17 - 24	5.2	6.2	5.8	7.4	7.2	7.0	9.4	7.1
April	1 - 8	5.0	3.7	3.2	5.0	3.9	2.6	4.6	5.8
	9 - 16	5.5	2.3	2.4	1.5	2.0	1.8	1.5	2.1
	17 - 24	1.9	1.6	2.4	2.8	5.9	4.0	4.2	4.3
May	1 - 8	3.1	2.8	3.8	5.4	5.2	4.4	3.5	3.7
	9 - 16	2.7	1.3	1.4	1.0	1.0	1.4	1.7	1.2
	17 - 24	2.2	1.6	2.4	1.4	1.8	2.9	3.9	3.6
June	1 - 8	2.3	1.9	2.1	2.4	2.8	3.2	2.9	2.7
	9 - 16	4.6	2.8	1.5	1.3	1.4	1.4	2.1	1.7
	17 - 24	1.3	1.2	1.1	3.3	1.7	2.2	2.0	2.2
July	1 - 8	2.0	1.7	2.1	2.1	2.1	2.2	2.7	2.0
	9 - 16	1.3	1.6	0.9	0.7	1.6	1.0	0.8	0.8
	17 - 24	0.6	1.0	0.9	1.2	1.7	1.8	2.5	1.7
August	1 - 8	2.6	2.3	3.2	3.1	3.4	3.8	3.4	3.0
	9 - 16	2.0	2.7	1.6	1.4	5.5	1.7	1.2	4.2
	17 - 24	2.8	1.7	1.4	2.3	2.3	3.0	1.7	2.1
September	1 - 8	1.8	2.3	3.2	2.8	3.3	2.5	2.4	2.7
	9 - 16	3.5	2.3	2.2	1.0	1.3	1.1	1.2	1.3
	17 - 24	1.3	1.5	2.1	1.9	1.3	1.0	2.9	2.2
October	1 - 8	2.1	1.7	1.7	2.3	2.2	3.1	3.7	5.1
	9 - 16	5.5	4.5	3.0	2.6	2.7	1.9	2.7	3.4
	17 - 24	3.3	3.3	1.7	2.3	2.4	2.2	2.7	2.4
November	1 - 8	3.5	3.2	3.8	4.2	3.2	4.4	4.7	4.7
	9 - 16	4.9	5.5	5.0	4.4	4.8	4.7	6.2	5.4
	17 - 24	4.5	3.3	2.5	2.9	3.9	4.9	3.2	2.3
December	1 - 8	3.5	4.4	6.7	3.8	6.6	5.7	4.2	4.9
	9 - 16	8.5	7.9	9.5	7.8	6.5	6.8	7.5	8.2
	17 - 24	8.2	5.6	3.5	4.6	4.9	5.1	4.0	3.5

### 3.10 Treatment of Intermittent Sources for NO<sub>2</sub> 1-Hour Analysis

In its most recent guidance on NO<sub>2</sub> 1-hour modeling (EPA 2011), EPA has recognized that intermittent sources that do not operate continuously or frequently enough, specifically emergency generators, are less likely to contribute significantly to the annual distribution of daily maximum 1-hour values. EPA also recommends *“that compliance demonstrations for the 1-hour NO<sub>2</sub> NAAQS be based on emission scenarios that can logically be assumed to be relatively continuous or which occur frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations”* (EPA 2011). Also, *“EPA believes the most appropriate data to use for compliance demonstration for the 1-hour NO<sub>2</sub> NAAQS are those based on emission scenarios that are continuous enough or frequent enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations”* (EPA 2011).

The emergency equipment for the Project includes backup power generators and fire pumps. This equipment is essential to ensure safety and uninterrupted operation in case of unforeseen power failure and/or other emergency situations. This equipment is proposed to operate for 500 hours per year for the purpose of determining potential to emit, but it may operate for far fewer hours and on a random schedule. Thus, operation of the emergency equipment will not be frequent enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations, and inclusion of the equipment's maximum hourly emissions does not represent a logical emission scenario. Therefore, emissions from the emergency equipment were based on continuous operation at the average hourly rate, that is, the maximum hourly rate times 500 hours per year divided by 8,760 hours per year for the NO<sub>2</sub> 1-hour analysis.

### 3.11 Particulate Modeling

Default particulate modeling methods including deposition (to account for depletion due to particulate settling) were used for estimating PM<sub>2.5</sub> and PM<sub>10</sub> impacts for this analysis. To apply particulate settling, AERMOD requires the following source-specific variables:

1. Mass-mean aerodynamic particle diameter (PARTDIAM) for each particle size bin
2. Mass fraction (MASSFRAX) for each particle size bin
3. Particle density (PARTDENS) for each particle size bin

A list of references used to develop broad source-category-based particle size bins and associated mass fractions is provided in Table 3-18. This table also provides the densities in grams per cubic centimeter (g/cm<sup>3</sup>) for each broad source category and associated reference.

**Table 3-18. References Used to Develop Deposition Parameters**

Source Category	Particle Size Bin and Mass Fraction Reference	Density (g/cm <sup>3</sup> )	Density Reference
Road Dust	AP-42, Sec. 13.2.2, Eqs. 1a and 2, and Tab. 13.2.2-2, 11/06	2.7	Donlin Gold
Blasting	AP-42, Sec. 11.9, Tab. 11.9-1, 7/98 (blasting, overburden)	2.7	Donlin Gold
Material (Ore and Waste) Handling	AP-42, Pg. 13.2.4-4, 11/06	2.7	Donlin Gold
Diesel Engines	AP-42, App. B-2, Tab. B.2-2, Pg. B.2-11 (Category 1, Stationary Internal Combustion Engines, Gasoline and Diesel Fuel), 01/95	1	(ADEC 2014)
Boilers and Heaters	AP-42, App. B-2, Tab. B.2.2, Pg. B.2-12 (Category 2, Combustion, Mixed Fuels, Boilers), 01/95	1	(ADEC 2014)
Process Source Baghouses	AP-42, App. B-1, Pg. B.1-77, Sec. 11.21 (Phosphate Rock Processing: Roller Mill and Bowl Mill Grinding), 10/86	2.7	Donlin Gold
Silo Baghouses	AP-42, App. B-1, Pg. B.1-77, Sec. 11.21 (Phosphate Rock Processing: Roller Mill and Bowl Mill Grinding), 10/86	0.94	AP-42, App. A (lime)
Incinerators	AP-42, App. B-1, Pg. B.1-8, Sec. 2.1 (Refuse Incineration: Municipal Waste Mass Burn Incinerator), 10/86	1	(ADEC 2014)
Refinery Sources	AP-42, App. B-2, Tab. B.2.2, Pg. B.2-18 (Category 8, Melting, Smelting, Refining, Metals, except Aluminum), 01/95	1	(ADEC 2014)

The INPIT model ID in Table 3-12 represents the emissions from mining activities occurring within the pit and includes the following sources of particulate emissions: drilling, ore and waste loading, and mobile machinery tailpipes. However, most of these emissions (99 percent) are associated with material movement (ore and waste loading, and drilling). Because of this, the mass fractions for the INPIT source are based on the particle size multiplier for Equation 1 in AP-42, Page 13.2.4-4 (material transfers).

An example calculation of deposition parameters for the INPIT model ID is provided in Table 3-19. In addition to the deposition parameters, this table also shows the step-by-step calculations to determine mass mean diameter for each bin. The particle density shown in this table is the average of the Project's ore and waste materials.

**Table 3-19. Deposition Parameters for Model ID INPIT**

Step	Parameter	PM <sub>10</sub>				PM <sub>2.5</sub>	
		Bin 0 <sup>(1)</sup>	Bin 1	Bin 2	Bin 3	Bin 0 <sup>(1)</sup>	Bin 1
	Bin Upper Diameter (μm)	1.60	2.50	5.00	10.00	1.60	2.50
	Particle Size Multiplier	--	0.05	0.20	0.35	--	0.05
1	Cumulative Mass Fraction	--	0.15	0.57	1.00	--	1.00
2	Mass Fraction	--	0.15	0.42	0.43	--	1.00
3	Spherical Volume (μm <sup>3</sup> )	2.14	8.18	65.45	523.60	2.14	8.18
4	Mean Spherical Volume (μm <sup>3</sup> )	--	5.16	36.82	294.52	--	5.16
5	Mass Mean Diameter (μm)	--	2.14	4.13	8.25	--	2.14
	Particle Density (g/cm <sup>3</sup> )	--	2.70	2.70	2.70	--	2.70

<sup>(1)</sup> Bin 0 is not input to the model. It is only used to estimate the mass mean diameter of Bin 1. The upper diameter for Bin 0 is estimated by linear interpolation of Bins 1 and 2, and by setting the particle size multiplier for Bin 0 to zero.

The calculation steps listed in Table 3-19 are described below. All example calculations provided in these steps are for PM<sub>10</sub> deposition parameters.

Step 1: The cumulative mass fraction for each bin is calculated by dividing the particle size multiplier by that of the highest bin: Bin 3 in this case. Examples:

- Bin 3 cumulative mass fraction (1.0) = Bin 3 particle size multiplier (0.35) divided by Bin 3 particle size multiplier (0.35)
- Bin 2 cumulative mass fraction (0.57) = Bin 2 particle size multiplier (0.2) divided by Bin 3 particle size multiplier (0.35)

Step 2: The mass fraction for each bin is calculated by subtracting the cumulative mass fraction of the next lower bin from the cumulative mass fraction for that bin. Examples:

- Bin 3 mass fraction (0.43) = Bin 3 cumulative mass fraction (1.0) minus Bin 2 cumulative mass fraction (0.57)
- Bin 2 mass fraction (0.42) = Bin 2 cumulative mass fraction (0.57) minus Bin 1 cumulative mass fraction (0.15)

Step 3: The spherical volume for each bin is calculated as:

$$Spherical\ Volume = \frac{4}{3}\pi \left( \frac{Bin\ Upper\ Diameter}{2} \right)^3$$

Step 4: The mean spherical volume for each bin is calculated as the average of spherical volumes of that bin and the next lower bin. Examples:

- Bin 3 mean spherical volume (294.52) = The average of Bin 3 (523.6) and Bin 2 (65.45) spherical volumes
- Bin 2 mean spherical volume (36.82) = The average of Bin 2 (65.45) and Bin 1 (8.18) spherical volumes

Step 5: The mass mean diameter for each bin is calculated from the mean spherical volume as:

$$\text{Mass Mean Diameter} = 2 \left( \frac{3 \times \text{Mean Spherical Volume}}{4\pi} \right)^{\frac{1}{3}}$$

The deposition parameters for the source categories are provided in Table 3-20.

**Table 3-20. Deposition Parameters by Source Category**

Source Category	Parameter	PM <sub>10</sub>					PM <sub>2.5</sub>		
		Bin 0 <sup>(1)</sup>	Bin 1	Bin 2	Bin 3	Bin 4	Bin 0 <sup>(1)</sup>	Bin 1	Bin 2
Road Dust	Bin Upper Diameter (μm)	1.67	2.50	10.00	--	--	1.67	2.50	--
	Mass Fraction	--	0.10	0.90	--	--	--	1.00	--
	Mass Mean Diameter (μm)	--	2.16	7.98	--	--	--	2.16	--
	Particle Density (g/cm <sup>3</sup> )	--	2.70	2.70	--	--	--	2.70	--
Material (Ore and Waste) Handling	Bin Upper Diameter (μm)	1.60	2.50	5.00	10.00	--	1.60	2.50	--
	Mass Fraction	--	0.15	0.42	0.43	--	--	1.00	--
	Mass Mean Diameter (μm)	--	2.14	4.13	8.26	--	--	2.14	--
	Particle Density (g/cm <sup>3</sup> )	--	2.70	2.70	2.70	--	--	2.70	--
Diesel Engines	Bin Upper Diameter (μm)	--	1.00	2.50	6.00	10.00	--	1.00	2.50
	Mass Fraction	--	0.85	0.08	0.03	0.03	--	0.91	0.09
	Mass Mean Diameter	--	0.79	2.03	4.87	8.47	--	0.79	2.03
	Particle Density (g/cm <sup>3</sup> )	--	1.00	1.00	1.00	1.00	--	1.00	1.00
Boilers and Heaters	Bin Upper Diameter (μm)	--	1.00	2.50	6.00	10.00	--	1.00	2.50
	Mass Fraction	--	0.29	0.28	0.32	0.11	--	0.51	0.49
	Mass Mean Diameter (μm)	--	0.79	2.03	4.87	8.47	--	0.79	2.03
	Particle Density (g/cm <sup>3</sup> )	--	1.00	1.00	1.00	1.00	--	1.00	1.00
Process Source Baghouses	Bin Upper Diameter (μm)	0.56	2.50	6.00	10.00	--	0.56	2.50	--
	Mass Fraction	--	0.28	0.50	0.22	--	--	1.00	--
	Mass Mean Diameter (μm)	--	1.99	4.87	8.47	--	--	1.99	--
	Particle Density (g/cm <sup>3</sup> )	--	2.70	2.70	2.70	--	--	2.70	--
Silo Baghouses	Bin Upper Diameter (μm)	0.56	2.50	6.00	10.00	--	0.56	2.50	--
	Mass Fraction	--	0.28	0.50	0.22	--	--	1.00	--
	Mass Mean Diameter (μm)	--	1.99	4.87	8.47	--	--	1.99	--
	Particle Density (g/cm <sup>3</sup> )	--	0.94	0.94	0.94	--	--	0.94	--
Incinerators	Bin Upper Diameter (μm)	--	2.50	6.00	10.00	--	--	2.50	--
	Mass Fraction	--	0.68	0.12	0.20	--	--	1.00	--
	Mass Mean Diameter (μm)	--	1.98	4.87	8.47	--	--	1.98	--
	Particle Density (g/cm <sup>3</sup> )	--	1.00	1.00	1.00	--	--	1.00	--
Refinery Sources	Bin Upper Diameter (μm)	--	1.00	2.50	6.00	10.00	--	1.00	2.50
	Mass Fraction	--	0.78	0.11	0.08	0.03	--	0.88	0.12
	Mass Mean Diameter (μm)	--	0.79	2.03	4.87	8.47	--	0.79	2.03
	Particle Density (g/cm <sup>3</sup> )	--	1.00	1.00	1.00	1.00	--	1.00	1.00
Blasting	Bin Upper Diameter (μm)	2.04	2.50	10.00	--	--	2.04	2.50	--
	Mass Fraction	--	0.06	0.94	--	--	--	1.00	--
	Mass Mean Diameter (μm)	--	2.29	7.98	--	--	--	2.29	--
	Particle Density (g/cm <sup>3</sup> )	--	2.70	2.70	--	--	--	2.70	--

<sup>(1)</sup> Bin 0 is not input to the model. It is only used to estimate the mass mean diameter of Bin 1. The upper diameter for Bin 0 is estimated by linear interpolation of Bins 1 and 2, and by setting the particle size multiplier for Bin 0 to zero.

### 3.12 Nearby Sources

As discussed in Section 1.0, ADEC issued a PSD permit for the Project on June 30, 2017. The PSD application for this permit was submitted and deemed complete on October 15, 2015. Therefore, the minor source baseline date was triggered for the Project area on October 15, 2015. The potential for increment consuming minor sources after the October 15, 2015, minor source baseline date, and increment consuming major sources was discussed with ADEC on September 20, 2021. An additional inquiry was made on October 11, 2021. As of the date of this application, ADEC has not identified any minor or major nearby sources for inclusion in the Project cumulative air quality impacts analysis. Thus, only the Project's emission sources were modeled for both PSD increment and AAQS compliance demonstration.

### 3.13 Results and Compliance Demonstration

This section provides the Project model results and compliance demonstration with the PSD increments and AAQS (Section 3.13.1), an analysis of secondary PM<sub>2.5</sub> formation (Section 3.13.2), an O<sub>3</sub> assessment (Section 3.13.3), and PSD additional impact analyses (Section 3.13.4). Copies of electronic files associated with these analyses are provided on digital media in Attachment D 1.

#### 3.13.1 PSD Increments and AAQS

The AERMOD dispersion modeling results for the Project's emission sources and their comparison to applicable PSD increments are provided in Table 3-21.

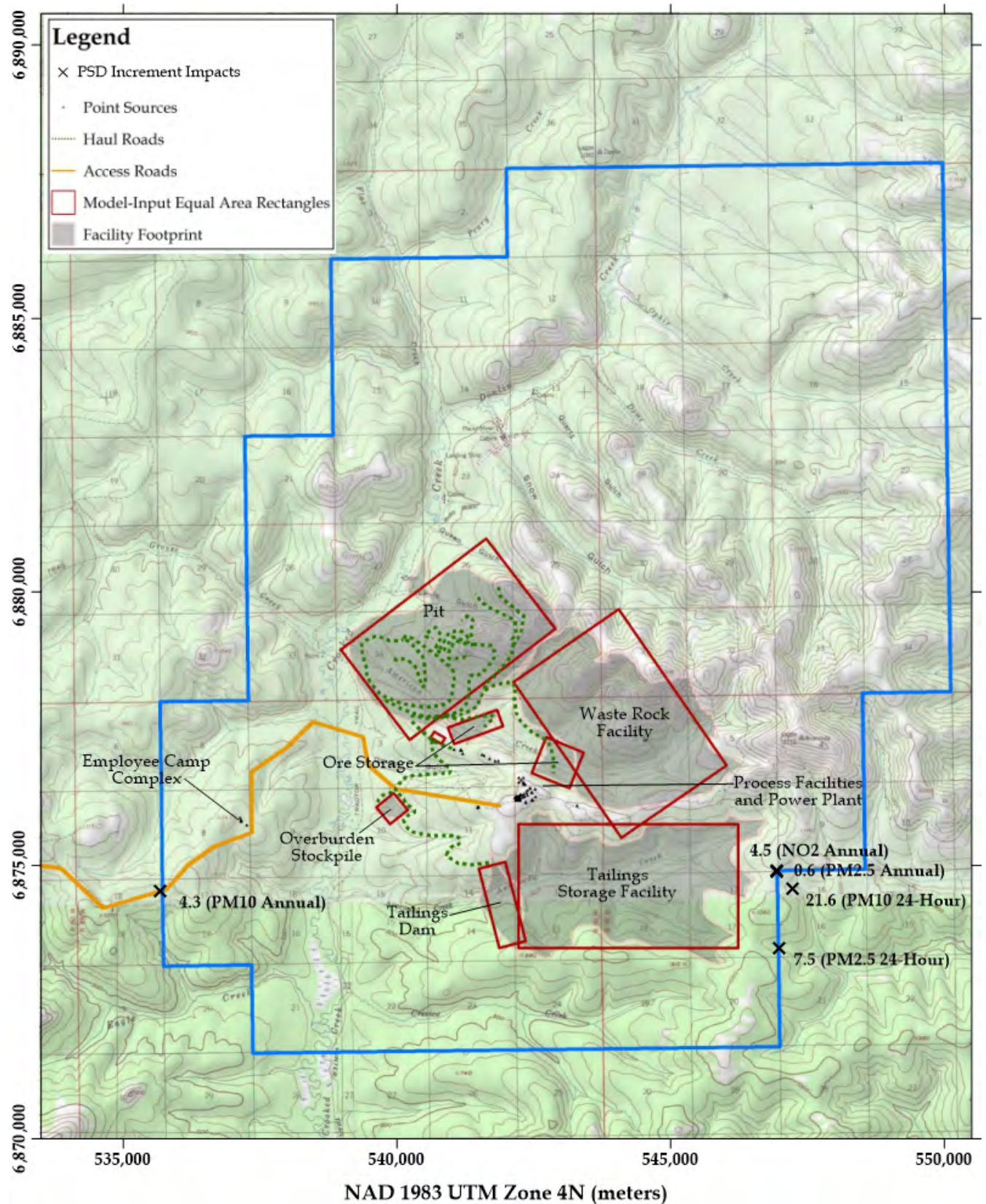
**Table 3-21. Modeling Results and PSD Increment Compliance Demonstration**

Pollutant	Averaging Period	Maximum Impact ( $\mu\text{g}/\text{m}^3$ )	PSD Increment ( $\mu\text{g}/\text{m}^3$ )	PSD Increment Compliance
NO <sub>2</sub>	Annual	4.5	25	Yes
PM <sub>2.5</sub>	Annual	0.6	4	Yes
	24-Hour (2 <sup>nd</sup> high)	7.5	9	Yes
PM <sub>10</sub>	Annual	4.3	17	Yes
	24-Hour (2 <sup>nd</sup> high)	21.6	30	Yes

This table shows that all the modeled results for the PSD increment analysis are below their applicable standards. The locations of these impacts are provided in Figure 3-8.



Figure 3-8. Location of Highest PSD Increment Impacts ( $\mu\text{g}/\text{m}^3$ )



The AERMOD dispersion modeling results (including background concentrations) for the Project's emission sources and their comparison to applicable AAQS are provided in Table 3-22.

**Table 3-22. Modeling Results and AAQS Compliance Demonstration**

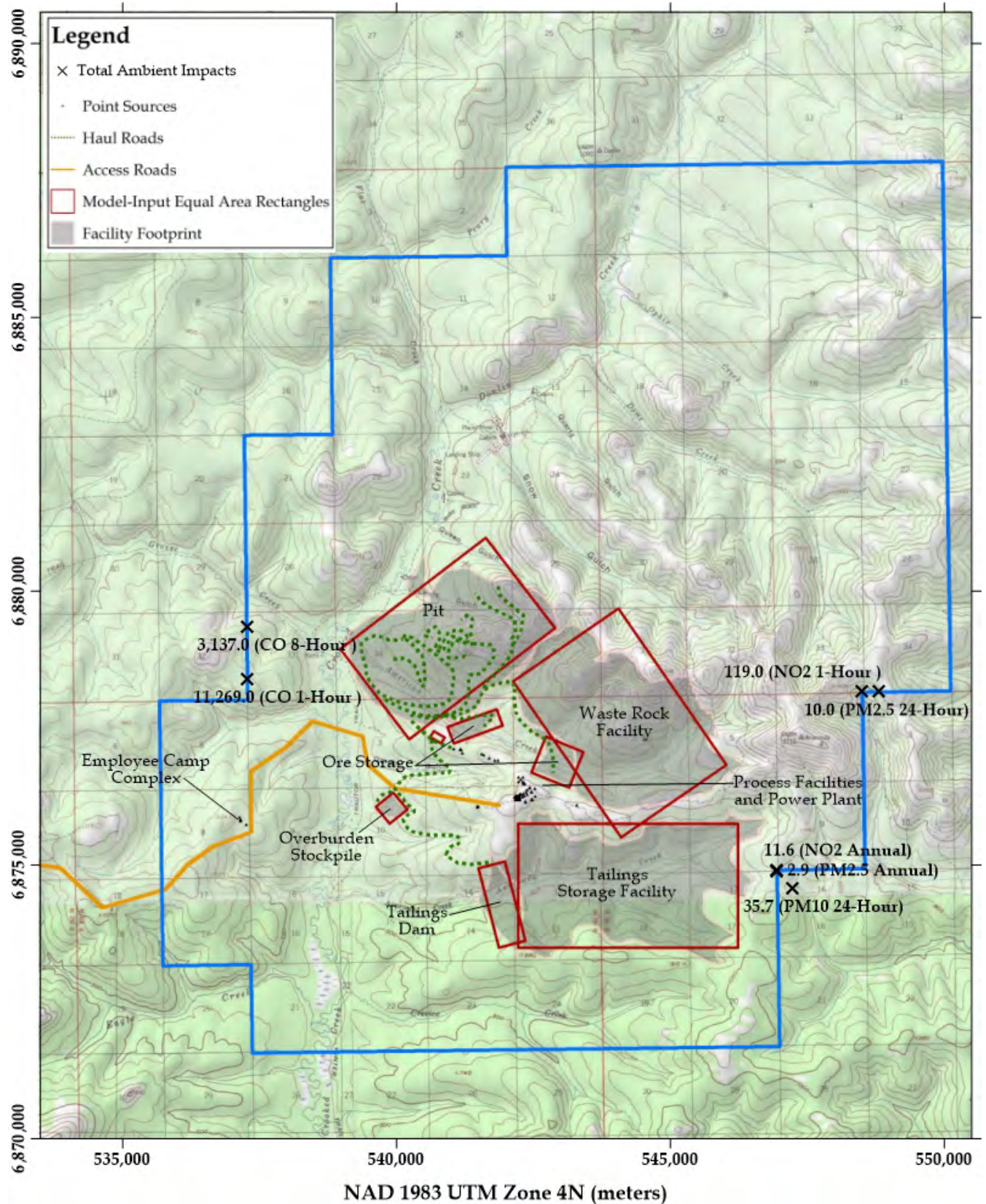
Pollutant	Averaging Period	Maximum Impact ( $\mu\text{g}/\text{m}^3$ )	Background Concentration ( $\mu\text{g}/\text{m}^3$ )	Total Concentration ( $\mu\text{g}/\text{m}^3$ )	AAQS ( $\mu\text{g}/\text{m}^3$ )	AAQS Compliance
CO	8-Hour (2 <sup>nd</sup> high)	2,679.1	457.9	3,137.0	10,000	Yes
	1-Hour (2 <sup>nd</sup> high)	10,582.1	686.9	11,269.0	40,000	Yes
NO <sub>2</sub>	Annual	11.6	(included) <sup>(1)</sup>	11.6	100	Yes
	1-Hour (8 <sup>th</sup> high)	119.0	(included) <sup>(1)</sup>	119.0	188	Yes
PM <sub>2.5</sub>	Annual	0.6	2.3	2.9	12	Yes
	24-Hour (8 <sup>th</sup> high)	3.2	6.8	10.0	35	Yes
PM <sub>10</sub>	24-Hour (2 <sup>nd</sup> high)	21.6	14.1	35.7	150	Yes

<sup>(1)</sup> See Table 3-17 for the monthly-hour-of-day NO<sub>2</sub> background concentration profile.

This table shows that all the modeled results for the AAQS analysis are below their applicable standards. The locations of these impacts are provided in Figure 3-9.



Figure 3-9. Location of Highest Total Ambient Impacts ( $\mu\text{g}/\text{m}^3$ )



### 3.13.2 Secondary PM<sub>2.5</sub> Formation

This section addresses the potential secondary PM<sub>2.5</sub> formation associated with the Project's emissions. The qualitative approach used herein follows the concepts developed/accepted by EPA's Region 10 office for a qualitative assessment of secondary PM<sub>2.5</sub> impacts for an Alaska project, which is cited as an example in EPA's May 20, 2014, memorandum "Guidance for PM<sub>2.5</sub> Permit Modeling" (EPA 2014a). The factors considered in the assessment, and the application of each of these factors to the Project, are outlined below. In addition to AAQS compliance demonstration, this secondary PM<sub>2.5</sub> evaluation also has technical relevance to PSD increment compliance demonstration.

1. **The regional background PM<sub>2.5</sub> monitoring data and aspects of secondary PM<sub>2.5</sub> formation from existing sources:** Donlin Gold has monitored the ambient PM<sub>2.5</sub> concentrations to establish the baseline conditions (Section 2.4.2.3). The monitoring data were quality-checked and approved by ADEC for this air quality analysis. Donlin Gold believes that the monitoring data capture any secondary PM<sub>2.5</sub> formation from existing regional emissions. The monitoring data show that the measured annual and 24-hour PM<sub>2.5</sub> concentrations are well below their respective AAQS (Table 2-5). Therefore, there is no indication that secondary formation of PM<sub>2.5</sub> from existing sources in the region of the Project is currently causing or contributing to exceedances or a violation of the PM<sub>2.5</sub> AAQS.
2. **The relative ratio of the combined (modeled primary and background) PM<sub>2.5</sub> concentrations to AAQS:** Table 3-22 shows that the modeled PM<sub>2.5</sub> concentrations combined with the measured background concentrations are significantly less (over 70 percent less) than the respective AAQS for both annual and 24-hour averaging periods. This table presents the design 8<sup>th</sup> highest 24-hour concentration for demonstrating compliance with the AAQS. Even when considering a conservative "first-tier" 24-hour averaging period modeling approach (previously recommended by EPA to account for secondary PM<sub>2.5</sub> impacts (EPA 2010)) to combine the 1<sup>st</sup> highest modeled concentration (8.9 µg/m<sup>3</sup>) with the monitored background concentration (6.8 µg/m<sup>3</sup>), the total 24-hour concentration is estimated at 15.7 µg/m<sup>3</sup>, which is significantly less than the applicable AAQS of 35 µg/m<sup>3</sup>. Thus, considerable formation of secondary PM<sub>2.5</sub> emissions could occur before the AAQS would be threatened, though this is not expected to occur.

With regards to the PSD increment, both the 1<sup>st</sup> highest modeled concentration (8.9 µg/m<sup>3</sup>) and the 2<sup>nd</sup> highest modeled concentration (7.5 µg/m<sup>3</sup>) are below the PSD increment of 9 µg/m<sup>3</sup>.

3. **The spatial and temporal correlation of the primary and secondary PM<sub>2.5</sub> impacts:** Due to the gradual formation of secondary PM<sub>2.5</sub>, the highest primary and secondary PM<sub>2.5</sub> impacts are unlikely to temporally and/or spatially coincide. The highest primary PM<sub>2.5</sub>

impacts are expected to occur closer to the facility, while the highest secondary PM<sub>2.5</sub> impacts are expected to occur further downwind after sufficient time has passed for the gaseous PM<sub>2.5</sub> precursors (i.e., SO<sub>2</sub> and NO<sub>x</sub>) to convert to PM<sub>2.5</sub>. Consequently, it is unlikely that maximum primary PM<sub>2.5</sub> impacts and maximum secondary PM<sub>2.5</sub> impacts from the Project will occur at the same time (paired in time) or location (paired in space). See (EPA 2010).

4. **Meteorological characteristics of the region during periods of precursor emissions:** Due to the remote location of the Project and absence of any significant existing anthropogenic sources in the vicinity, there is no significant potential of high ambient concentrations of precursor pollutants associated with changing wind directions or meteorological conditions at the Project site.
5. **Existing levels of precursor species:** Due to the remote location of the Project and absence of any significant existing anthropogenic sources in the vicinity, the background concentrations of certain chemical species (including ammonia [NH<sub>3</sub>] and VOC) that participate in photochemical reactions to form secondary PM<sub>2.5</sub> are expected to be negligible. In addition, modeling of the Project's NH<sub>3</sub> emissions shows that the maximum 8-hour NH<sub>3</sub> impact (2<sup>nd</sup> high) is only 1.5 µg/m<sup>3</sup>, which is less than one percent of the Alaska AAQS (2,100 µg/m<sup>3</sup>). Therefore, these precursor emissions are not expected to be significant for converting NO<sub>x</sub> emissions to secondary particles in the areas impacted by primary PM<sub>2.5</sub> emissions.
6. **The level of conservatism associated with the modeling of the primary PM<sub>2.5</sub> component and other elements of conservatism built into the overall AAQS compliance demonstration:** There is a considerable conservatism inherent to the regulatory modeling and AAQS compliance demonstration for the primary PM<sub>2.5</sub> impacts. First, the concentrations estimated by the AERMOD dispersion model are conservatively high. Model evaluation studies conducted by EPA (EPA 2014b) indicate that AERMOD can produce modeled impacts in the range of 1.5 to 5 times higher than the corresponding monitored concentrations. These studies suggest that AERMOD is biased towards over-prediction. Second, the Project air impact results provided in this report are based on conservatively high potential emission rates assuming that all activities occur concurrently and continuously. The actual level of activity and emissions are expected to be significantly lower than the potential activity and emissions. Third, as demonstrated in Item #2 above, even with the conservative "first-tier" approach, the estimated primary PM<sub>2.5</sub> impacts are significantly below the applicable AAQS.

With regards to PSD increment, the "first-tier" approach and the inherent model conservatism discussed above also apply.

7. **Post-construction monitoring:** It is expected that post-construction PM<sub>2.5</sub> monitoring will not be deemed necessary due to the low relative ratio of the modeled primary PM<sub>2.5</sub> and background PM<sub>2.5</sub> concentrations to the PM<sub>2.5</sub> AAQS.

Based on these factors, and consistent with current guidance, Donlin Gold believes that an adequate assessment has been made to demonstrate that the PM<sub>2.5</sub> AAQS and PSD increments will be protected, accounting for primary PM<sub>2.5</sub> impacts and potential contributions due to PM<sub>2.5</sub> precursors from the Project, and that it is not necessary to further evaluate potential secondary PM<sub>2.5</sub> formation from the Project's emissions.

### 3.13.3 O<sub>3</sub> Assessment

Potential Project O<sub>3</sub> impacts were analyzed qualitatively by comparing the Project's O<sub>3</sub> precursor emissions (NO<sub>x</sub> and VOC) (Table 2-1) and monitored O<sub>3</sub> background concentrations (Table 3-6) to the same from a more industrialized/populated location. The purpose of this comparison was to qualitatively assess how an increase in O<sub>3</sub> precursor emissions at the Project site might affect the regional O<sub>3</sub> levels.

The Project is in the Yukon-Kuskokwim region of southwest Alaska, a remote, mountainous area with no existing road or rail access or other public infrastructure, approximately 280 miles west of Anchorage. The Project is in the State of Alaska's South Central Alaska Intrastate Air Quality Control Region 10 (40 CFR 81.247). This region is designated as attainment or unclassifiable for all criteria pollutants, including O<sub>3</sub> (40 CFR 81.302).

It is important to note that there are no O<sub>3</sub> non-attainment areas in Alaska. This implies that even for the industrialized/urban areas of Alaska with much higher O<sub>3</sub> precursor activity than the Project, the measured O<sub>3</sub> concentrations are still well below the AAQS. For this analysis, Anchorage was selected for comparison to the Project as it is the most populated region in Alaska with relatively high O<sub>3</sub> precursor activity.

A comparison of Project and Anchorage area O<sub>3</sub> precursor emissions and monitored concentrations with the 8-hour O<sub>3</sub> AAQS is provided in Table 3-23.

**Table 3-23. Project and Anchorage Area O<sub>3</sub> Comparison**

Source	O <sub>3</sub> Precursor Emissions (ton/yr)			Monitored 8-Hour O <sub>3</sub> Concentration (ppb)	8-Hour O <sub>3</sub> AAQS (ppb)
	NO <sub>x</sub>	VOC	Total		
Project	3,258	1,279	4,537	51.3	75
Anchorage Area <sup>(1), (2)</sup>	12,298	14,428	26,726	45	

<sup>(1)</sup> Emissions source: <https://www.epa.gov/air-emissions-inventories/2011-national-emissions-inventory-nei-data>

<sup>(2)</sup> Monitoring data source: EPA AirData Database; <http://www.epa.gov/airdata>

Table 3-23 provides the Project's maximum potential O<sub>3</sub> precursor (NO<sub>x</sub> and VOC) emissions, along with the onsite monitored O<sub>3</sub> background concentration. This table also presents the most recent available Anchorage area monitored O<sub>3</sub> concentration (2010–2012 data from the 3000 East 16<sup>th</sup> Avenue monitoring station) and the concurrent (2011) NO<sub>x</sub> and VOC emissions from all sources (mobile, industrial, etc.). The Anchorage area emissions data were obtained from EPA's National Emissions Inventory (NEI) database.

As shown in Table 3-23, the expected emissions from the Project represent a small fraction (approximately 17 percent) of the Anchorage area emissions. The Anchorage area emissions are about four times and 11 times higher than the Project's potential emissions for NO<sub>x</sub> and VOC, respectively, and yet the measured O<sub>3</sub> concentrations in the Anchorage area are still well below the AAQS (approximately 60 percent of AAQS).

Considering these factors, the Project's potential emissions contribution to O<sub>3</sub> formation in the region is not expected to be significant, nor is it expected to cause or contribute to an exceedance of the O<sub>3</sub> AAQS.

### 3.13.4 Additional Impact Analyses

PSD projects are required to address air-quality-related impacts on visibility, soil, and vegetation per 40 CFR 52.21(o)(1).

#### 3.13.4.1 Visibility

For the visibility analysis, the most recent version of EPA's visibility impairment screening model VISCREEN (version 13190) (EPA 1992) was used to determine if a plume from the Project could potentially be visible by a human observer at an area of interest. Plume blight is when a coherent plume from a source is perceptible against a viewing background (e.g., the sky or a terrain feature such as a mountain) to a casual observer. The primary parameter of plume blight is the contrast between the plume and background. The model considers the absolute contrast and the difference in color contrast, which provides a measure of the difference between two arbitrary colors as perceived by humans.

The Project's associated mobile machinery tailpipe and mining activity (e.g., drilling, blasting, material extraction and transportation) emissions are fugitive in nature and would be spread over large areas. Thus, these plumes would likely not be coherent or co-located. However, plumes from point sources (power plant, dust collectors and baghouses, refining sources, etc.) would likely be coherent plumes. Therefore, this visibility analysis was based on annual emissions from all the process and auxiliary point sources. For a conservative estimate, this analysis was performed using the PM emissions, rather than the PM<sub>10</sub> emissions. The annual natural background visual range and background ozone concentration of 250 km and 40 ppb, respectively, were used according to Alaska guidance (ADEC 2013a) (ADEC 2015c).

The visibility analysis was performed for an observer location inside the DNP, which is located approximately 315 km northeast of the Project. ADEC recommended (ADEC 2015c) that the Project visibility analysis was only required to evaluate the "inside Class I area" scenario, and because there was no integral vista at the Project site, the "outside Class I area" scenario was not required.

Following the ADEC guidance (ADEC 2015c), the "Level 1" analysis for the DNP was performed at a source-to-observer distance of 50 km (VISCREEN maximum range). The Level 1 analysis is a screening method that conservatively assumes 1-meter-per-second (m/s) wind speed under the extremely stable "F" stability condition. The Level 1 analysis for a DNP observer located 50 km from the Project did not pass; therefore, a "Level 2" analysis was performed.

The more refined Level 2 analysis uses site-specific wind data to estimate the worst-case visibility impacts from realistic meteorological conditions and plume travel times. As part of a Level 2 analysis, the model is run for the worst-case wind conditions (wind speed and stability) for which the plume travel time between source and observer is 12 hours or less. A sustained wind speed of 8 m/s would transport a plume the 315 km between the Project and the DNP within 12 hours. The 2020–2021 site-specific meteorological data collected at the Camp station was used for this analysis. This dataset was filtered for 8 m/s or higher wind speeds, and it was determined that the worst-case stability class for consideration was "D." Therefore, per ADEC guidance (ADEC 2015c), the Level 2 analysis included modeling an observer distance of 50 km, a wind speed of 8 m/s, and a stability class of "D." The Level 2 analysis demonstrated that the plumes resulting from the Project are not likely to be visible to a casual observer at the DNP.

The VISCREEN analysis files are also provided in Attachment D 1.

### **3.13.4.2 Soil and Vegetation**

ADEC guidance (ADEC 2007b) recommends showing compliance with the secondary AAQS as a surrogate for impacts on soil and vegetation. The secondary standards were developed to provide public welfare protection, including protection against decreased visibility and damage



to animals, crops, vegetation, and buildings. The secondary standards are always either equal to or greater than the corresponding primary standards (i.e., less stringent); therefore, showing compliance with the primary standards (Table 3-22) also demonstrates compliance with the secondary standards.

#### **3.13.4.3 Commercial, Residential, and Other Growth**

40 CFR 52.21(o)(2) requires that PSD applicants address the Project-related impacts from general commercial, residential, and other growth. Donlin Gold does not expect significant changes in these categories because of the Project; therefore, these impacts are not considered significant.

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## **Attachment D 1 – Electronic Files**

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The electronic files can be accessed via the following link:

[https://drive.google.com/drive/folders/1XknbndRt12EXG0ANTuDR\\_ETXBVAJnpTZ?usp=sharing](https://drive.google.com/drive/folders/1XknbndRt12EXG0ANTuDR_ETXBVAJnpTZ?usp=sharing)



## **Appendix E - Fugitive Dust Control Plan**

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## **Fugitive Dust Control Plan**

### **Donlin Gold Project, Alaska**

PREPARED FOR:  
DONLIN GOLD LLC

PROJECT NO. 281-15-2  
OCTOBER 2015  
(RESUBMITTED  
OCTOBER 27, 2021)

# TABLE OF CONTENTS

---

1.0 Introduction .....	3
1.1 Objective and Best Practical Methods.....	3
2.0 Fugitive Dust Control Plan .....	4
2.1 Drilling and Blasting.....	4
2.2 Material Loading and Unloading.....	5
2.3 Haul Roads and Access Roads .....	5
2.4 Ore Crushing .....	6
2.5 Construction and Maintenance .....	6
2.6 Reducing Wind Erosion.....	7
3.0 Training and Assessments .....	8
3.1 Personnel Training.....	8
3.2 Performance Assessments .....	8

# 1.0 INTRODUCTION

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Donlin Gold LLC (Donlin Gold) is proposing to construct and operate the Donlin Gold mine: a hard rock, open-pit, gold mine (Project). The Project is located in southwest Alaska, approximately 280 miles west of Anchorage. Donlin Gold is an Alaskan operated company that is owned by Barrick Gold U.S. Inc., a subsidiary of Barrick Gold Corporation, and NovaGold Resources Alaska Inc., a subsidiary of NovaGold Resources, Inc.

The Project has the potential to generate fugitive dust emissions. This document provides a Fugitive Dust Control Plan (FDCP) for minimizing fugitive dust emissions.

## 1.1 Objective and Best Practical Methods

The objective of the FDCP is to ensure that fugitive dust generated from the Project will be controlled to minimize its potential to adversely affect local air quality. Best practical methods (BPMs) will be used to limit controllable fugitive dust emissions. The BPMs utilized at any time will depend on site conditions and will not compromise the safe operation of the mine.

The Project also incorporates design features that minimize dust emissions from ore processing activities (i.e., ore crushing, ore conveying, and stockpiling of crushed ore) through a combination of emissions capture and control, and enclosures.

Donlin Gold's goal is to keep the fugitive dust emissions resulting from the Project's activities within air quality compliance standards through the diligent use of BPMs for fugitive dust control, personnel training, and performance assessments.

## 2.0 FUGITIVE DUST CONTROL PLAN

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The Project's activities and areas contributing to fugitive dust will include drilling and blasting, material loading and unloading, haul roads, access roads (airstrip, camp, and Jungjuk Port), ore crushing, construction and maintenance, and wind erosion from exposed areas such as tailings, waste rock storage, and ore and overburden stockpiles. As practicable, measures will be taken to control fugitive dust during the course of the Project, and surface disturbances will be limited to those areas that are reasonably necessary.

Employees, contractors, and visitors on the Project's site will be informed of their responsibility to control and report fugitive dust, as discussed in Section 3.0, Training and Compliance. Donlin Gold's area supervisors, construction managers, or appointed equivalents will be authorized to temporarily cease operations in an event of adverse wind or other meteorological conditions that cause excessive dust. All Donlin Gold's employees and contractors are empowered to report dusty conditions.

The following sections of this FDCP identify the BPMs that will be used as needed and when practical to minimize fugitive dust emissions from the Project's activities.

### 2.1 Drilling and Blasting

The BPMs for controlling fugitive dust from drilling and blasting in the pits are as follows:

1. Allow natural conditions such as wet weather (rain and snow) or inherent material moisture content to maintain dust control until the use of conventional dust control methods is necessary.
2. Avoid drilling and blasting during adverse wind or other meteorological conditions that cause excessive dust.
3. When practical, utilize drilling and blasting techniques that minimize dust generation, such as the following:
  - a. Good-quality blast hole stemming to confine blast energy
  - b. Wet and/or shrouded drilling

## **2.2 Material Loading and Unloading**

Material loading and unloading activities generate dust emissions from the handling of materials (e.g., loading of haul trucks via a shovel, truck dumping, etc.). The BPMs for controlling these emissions are as follows:

1. Allow natural conditions such as wet weather (rain and snow) or inherent material moisture content to maintain dust control until the use of conventional dust control methods is necessary.
2. Avoid material handling activities during adverse wind or other meteorological conditions that cause excessive dust.
3. Use water trucks to apply water in working areas.

## **2.3 Haul Roads and Access Roads**

Haul trucks and light vehicles traveling on unpaved roads (haul roads and access roads) can generate fugitive dust emissions. The BPMs for controlling these emissions are as follows:

1. Allow natural conditions such as wet weather (rain and snow) or inherent material moisture content to maintain dust control until the use of conventional dust control methods is necessary.
2. Use large-capacity haul trucks (400-ton) to minimize haul road travel, where practical.
3. Limit the speed of the haul trucks and light vehicles.
4. Apply water and chemical dust suppressants on road surfaces.
5. During winter, use graders to blade snow over road surfaces where this may be done safely.

As described above, Donlin Gold will employ a combination of water (or snow, as applicable) and chemical dust suppressant application to control dust from unpaved roads. The application frequency will depend on the natural moisture condition of the road surfaces due to ice, rain, or snow; maintaining safe driving conditions; and visible observations of dust levels from the road surfaces.

## **2.4 Ore Crushing**

The Project's ore crushing circuit includes run-of-mine ore gyratory crushing, coarse ore transfers, and recycle pebble crushing. Particulate emissions are generated by the crushing and handling of the ore.

Mined ore is loaded through a dump pocket (with a rock breaker) to the gyratory crusher (GC). The GC discharges through a surge pocket and apron feeder to a conveyor system. Ore is carried by conveyor to the coarse ore stockpile. The coarse ore stockpile is reclaimed by four apron feeders and transferred to the semi-autogenous grinding (SAG) mill feed conveyor. The SAG mill is a wet process and does not generate particulate emissions.

Material discharged from the SAG mill is washed and screened, and the oversized material is sent to the pebble crushers. After crushing, the ore is discharged to the pebble discharge conveyor, which transfers to the SAG mill feed conveyor.

The crushing and handling of ore will generate dust emissions. Each emission point in these circuits will be controlled by a dust collector or enclosure as described below:

1. An enclosure will be installed at the dump pocket. The enclosure will have openings to allow haul trucks to enter and dump ore into the dump pocket from two sides.
2. Dust emissions from gyratory crushing (including ore transfers out of the crusher) will be captured and controlled by a dust collection system.
3. Enclosures will be installed at the transfers to and from the coarse ore stockpile feed conveyor.
4. Dust emissions from the coarse ore stockpile reclaim apron feeders will be captured and controlled by dust collection systems.
5. An enclosure will be installed at the SAG mill feed conveyor discharge.
6. Dust emissions from the pebble crushers (including ore transfers in and out of the crushers) will be captured and controlled by a dust collection system.
7. An enclosure will be installed at the transfer from the pebble discharge conveyor.

## **2.5 Construction and Maintenance**

Construction and maintenance activities such as road grading, bulldozing, and earth moving can generate dust emissions. The BPMs for controlling these emissions are as follows:

1. Allow natural conditions such as wet weather (rain and snow) or inherent material moisture content to maintain dust control until the use of conventional dust control methods is necessary.
2. Avoid construction and maintenance activities during adverse wind or other meteorological conditions that cause excessive dust.
3. Use water trucks to apply water in working areas.
4. Apply water and chemical dust suppressants to haul roads and access roads as discussed in Section 2.3, Haul Roads and Access Roads, to control dust from these surfaces during grading.

## **2.6 Reducing Wind Erosion**

Wind erosion can generate dust emissions from exposed and active mining areas such as the tailings impoundment beach, waste rock dump, run-of-mine ore and overburden stockpiles, and the haul and access roads. The BPMs for controlling these emissions are as follows:

1. Allow natural conditions such as wet weather (rain and snow) or inherent material moisture content to maintain dust control until the use of conventional dust control methods is necessary.
2. Use a phased approach to surface disturbance rather than disturbing the entire area all at once, and, concurrent with operations, reclaim disturbed areas once they are no longer required for active mining or other operations.
3. Use dozers to maintain the waste facility surfaces.
4. Use water trucks to apply water in working areas.
5. Promote encrustation of exposed areas by applying chemical dust suppressants.
6. Apply water and chemical dust suppressants to haul roads and access roads as discussed in Section 2.3 to control windblown dust from these surfaces.
7. Install a cover over the coarse ore stockpile.



## **3.0 TRAINING AND ASSESSMENTS**

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### **3.1 Personnel Training**

Donlin Gold will provide its employees, contractors, and visitors with the necessary training to meet the objective set forth in this FDCP. Dust control and dusty condition reporting training will be provided to all employees and contractors. Site visitors will receive instructions on reporting dusty conditions during visitor orientation.

### **3.2 Performance Assessments**

The FDCP will be reviewed periodically to evaluate if the BPMs employed are sufficient to meet the plan's objective. These performance assessments will be accomplished through routine inspections by Donlin Gold's environmental staff and by follow-up on observations reported by Donlin Gold's staff, contractors, and visitors. Donlin Gold's staff will observe each of the fugitive dust sources listed herein and determine whether the appropriate dust control is being achieved. Changes will be made to the FDCP as appropriate based on the findings of the performance assessments.

## **Appendix F - Vendor Data**

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## **Vendor Data**

### **Donlin Gold Project, Alaska**

**PREPARED FOR:  
DONLIN GOLD LLC**

**PROJECT NO. 281-15-2  
OCTOBER 2015  
(RESUBMITTED  
OCTOBER 27, 2021)**

## Appendix F Table of Contents

Equipment Description	Make	Model	Rating	Page No.
Power Plant Generator Engine	Wärtsilä	18V50DF	17,076 kWe	3
Black Start Generator Engine	Cummins	DQCA (Engine Model QSK23-G7 NR2)	600 kWe	4
Emergency Generator Engine	Cummins	1500 DQGAB (Engine Model QSK50-G4 NR2)	1,500 kWe	8
Fire Pump Engine	Clarke	JW6H-UF38	252 hp	13
POX Boiler	Clayton Industries	E704	29.29 MMBtu/hr	15
Oxygen Plant Boiler	Clayton Industries	E504	20.66 MMBtu/hr	17
SO2 Burner	A. H. Lundberg Associates, Inc.	--	2 MMBtu/hr	19
Building Heater	TRANE	GAND017AEG	0.175 MMBtu/hr	20
Air Handler Heater	Bousquet	HDG(H)-400	5 MMBtu/hr	21
Air Handler Heater	Bousquet	HDG(H)-200	2.5 MMBtu/hr	23
Portable Building Heater	Wacker Neuson	Pureheat	0.86 MMBtu/hr	25
Gyratory Crusher	FLSmith	Fuller-Traylor (63" X 91") Type "TSU"	5,100 ton/hr	27
Gyratory Crusher Circuit Dust Collector	Donaldson Torit	DFT 4-96	25,015 ACFM	30
Reclaim Ore Apron Feeder Dust Collector	Donaldson Torit	DFT 3-24	5,591 ACFM	34
Pebble Crusher Dust Collector	Donaldson Torit	DFT 3-54	30,017 ACFM	37
Lime Handling and Storage System	Various	--	-- --	43



Wärtsilä North America, Inc.

Donlin Gold LLC  
Mr. Mike Rieser, Senior Environmental Engineer  
4720 Business Park Blvd., Suite G-25  
Anchorage, Alaska 99503

Dear Mike,

You have requested that Wärtsilä confirm some performance values for our 18V50DF type generator sets and in response I provide the following information.

- 1) The Wärtsilä 18V50DF has been rated at **17076 kWe** for a long time. In this case for the Donlin Creek project, for gas operation there is no derating, but due to the site elevation there is derating for liquid fuel operation. In my files I have the site elevation for Donlin at 984 feet. At this elevation, the gross (generator terminal) output is **17,076 kWe on gas**, and the gross output is **16,786 kWe** when running on diesel fuel.
- 2) The gross heat rate (generator terminal heat rate) of the 18V50DF for gas operation is **7462 BTU/kWh (LHV)** and the gross heat rate of the set on diesel fuel would be **7914 BTU/kWh (LHV)**.
- 3) You provided some emissions data as follows and requested our comments.

	Natural Gas Operation	Diesel fuel operation
CO	0.12	0.18 g/kWhe
NOX	0.08	0.53 g/kWhe
PM(1)	0.13	0.15 g/kWhe
VOC (CH4)	0.09	0.21 g/kWhe
NH3 (SCR slip)	9	9 ppmvd

(1) PM limit during ULSD firing is front half PM only.

Our comments: The g/kWh figures are OK, with a couple of comments. We normally have language with regard to the VOC emissions which states if certain components of the fuel gas change, it can affect the VOC emissions. This language looks like this:

**Correction based upon the influence of gas composition on VOC emissions:**

If the concentration the sum of propane + butane + pentane + hexane ( $C_3H_8 + C_4H_{10} + C_5H_{12} + C_6H_{14}$ ) in the pipeline natural gas exceed the values specified in paragraph "Gas composition" in this document the VOC emissions shall be corrected according to the table below. In the table the sum of propane + butane + pentane + hexane is denoted  $C_{GasVOC}$ .

	Corrected VOC emissions (ppm-v, 15% O <sub>2</sub> , dry) [ g/kWh at alternator terminals]
Concentration of VOC components in feed gas	100% load
$C_{GasVOC} < 0.30$ vol-%	20 ppm-v, 15% O <sub>2</sub> , dry [0.09 g/kWh]
$0.30 \text{ vol-\%} \leq C_{GasVOC} < 0.50$ vol-%	25 ppm-v, 15% O <sub>2</sub> , dry [0.12 g/kWh]
$0.50 \text{ vol-\%} \leq C_{GasVOC} < 1.00$ vol-%	33 ppm-v, 15% O <sub>2</sub> , dry [0.15 g/kWh]
$1.00 \text{ vol-\%} \leq C_{GasVOC} < 1.50$ vol-%	40 ppm-v, 15% O <sub>2</sub> , dry [0.18 g/kWh]

The EPA test method used to measure the front half PM emissions for the liquid fuel PM limit is Test Method 5.

Regards,

Christopher L. Whitney  
Manager, Sales Support

Wärtsilä North America, Inc.  
900 Bestgate Road  
Suite 400  
Annapolis, Maryland 21401

Tel. (410) 573-2100  
Fax (410) 573-2200

**Model:** **DQCA**  
**Frequency:** 60  
**Fuel type:** Diesel  
**KW rating:** 600 standby  
545 prime

**Emissions level:** EPA NSPS Stationary Emergency Tier 2

➤ **Generator set data sheet**

**Our energy working for you.™**



**Power  
Generation**

<b>Exhaust emission data sheet:</b>	<b>EDS-1086</b>
<b>Exhaust emission compliance sheet:</b>	<b>EPA-1120</b>
<b>Sound performance data sheet:</b>	<b>MSP-1064</b>
<b>Cooling performance data sheet:</b>	<b>MCP-173</b>
<b>Prototype test summary data sheet:</b>	<b>PTS-160</b>
<b>Standard set-mounted radiator cooling outline:</b>	
<b>Optional set-mounted radiator cooling outline:</b>	
<b>Optional heat exchanger cooling outline:</b>	
<b>Optional remote radiator cooling outline:</b>	

<b>Fuel consumption</b>	<b>Standby</b>				<b>Prime</b>				<b>Continuous</b>
	<b>kW (kVA)</b>				<b>kW (kVA)</b>				<b>kW (kVA)</b>
<b>Ratings</b>	600 (750)				545 (681)				
<b>Load</b>	<b>1/4</b>	<b>1/2</b>	<b>3/4</b>	<b>Full</b>	<b>1/4</b>	<b>1/2</b>	<b>3/4</b>	<b>Full</b>	<b>Full</b>
<b>US gph</b>	13.0	22.5	33.0	42.0	12.0	21.0	30.0	38.5	
<b>L/hr</b>	49.2	85.2	124.9	159.0	45.4	79.5	113.6	145.7	

<b>Engine</b>	<b>Standby rating</b>	<b>Prime rating</b>	<b>Continuous rating</b>
Engine manufacturer	Cummins Inc.		
Engine model	QSK23-G7 NR2		
Configuration	Cast Iron, in line 6 cylinder		
Aspiration	Turbocharged and air-to-air aftercooled		
Gross engine power output, kWm (bhp)	910 (1220)	809 (1085)	
BMEP at set rated load, kPa (psi)	1944 (282)	1752 (254)	
Bore, mm (in)	170 (6.69)		
Stroke, mm (in)	170 (6.69)		
Rated speed, rpm	1800		
Piston speed, m/s (ft/min)	10.21 (2010)		
Compression ratio	16:1		
Lube oil capacity, L (qt)	102 (108)		
Overspeed limit, rpm	2100		
Regenerative power, kW	93		

<b>Fuel flow</b>		
Maximum fuel flow, L/hr (US gph)	685 (181)	
Maximum fuel inlet restriction, kPa (in Hg)	13.44 (4)	
Maximum fuel inlet temperature, °C (°F)	71 (160)	

<b>Air</b>	<b>Standby rating</b>	<b>Prime rating</b>	<b>Continuous rating</b>
Combustion air, m <sup>3</sup> /min (scfm)	59 (2081)	56 (1961)	
Maximum air cleaner restriction, kPa (in H <sub>2</sub> O)	6.2 (25)		
Alternator cooling air, m <sup>3</sup> /min (cfm)	117 (4156)		

## Exhaust

Exhaust flow at set rated load, m <sup>3</sup> /min (cfm)	137 (4830)	128 (4515)	
Exhaust temperature, °C (°F)	440 (824)	429 (804)	
Maximum back pressure, kPa (in H <sub>2</sub> O)	10.1 (40.8)		

## Standard set-mounted radiator cooling

Ambient design, °C (°F)	50 (122)		
Fan load, kW <sub>m</sub> (HP)	27 (36)		
Coolant capacity (with radiator), L (US gal)	89 (23.5)		
Cooling system air flow, m <sup>3</sup> /min (scfm)	1252 (44183)		
Total heat rejection, MJ/min (Btu/min)	26.4 (25002)	23.9 (22706)	
Maximum cooling air flow static restriction, kPa (in H <sub>2</sub> O)	0.12 (0.5)		
Maximum fuel return line restriction kPa (in Hg)	30.47 (9)		

## Optional set-mounted radiator cooling

Ambient design, °C (°F)			
Fan load, kW <sub>m</sub> (HP)			
Coolant capacity (with radiator), L (US gal)			
Cooling system air flow, m <sup>3</sup> /min (scfm)			
Total heat rejection, MJ/min (Btu/min)			
Maximum cooling air flow static restriction, kPa (in H <sub>2</sub> O)			
Maximum fuel return line restriction, kPa (in Hg)			

## Optional heat exchanger cooling

Set coolant capacity, L (US gal)			
Heat rejected, jacket water circuit, MJ/min (Btu/min)			
Heat rejected, aftercooler circuit, MJ/min (Btu/min)			
Heat rejected, fuel circuit, MJ/min (Btu/min)			
Total heat radiated to room, MJ/min (Btu/min)			
Maximum raw water pressure, jacket water circuit, kPa (psi)			
Maximum raw water pressure, aftercooler circuit, kPa (psi)			
Maximum raw water pressure, fuel circuit, kPa (psi)			
Maximum raw water flow, jacket water circuit, L/min (US gal/min)			
Maximum raw water flow, aftercooler circuit, L/min (US gal/min)			
Maximum raw water flow, fuel circuit, L/min (US gal/min)			
Minimum raw water flow at 27 °C (80 °F) inlet temp, jacket water circuit, L/min (US gal/min)			
Minimum raw water flow at 27 °C (80 °F) inlet temp, aftercooler circuit, L/min (US gal/min)			
Minimum raw water flow at 27 °C (80 °F) inlet temp, fuel circuit, L/min (US gal/min)			
Raw water delta P at min flow, jacket water circuit, kPa (psi)			
Raw water delta P at min flow, aftercooler circuit, kPa (psi)			
Raw water delta P at min flow, fuel circuit, kPa (psi)			
Maximum jacket water outlet temp, °C (°F)			
Maximum aftercooler inlet temp, °C (°F)			
Maximum aftercooler inlet temp at 25 °C (77 °F) ambient, °C (°F)			
Maximum fuel return line restriction, kPa (in Hg)			

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D-3352e (7/10)

Optional remote radiator cooling <sup>1</sup>	Standby rating	Prime rating	Continuous rating
Set coolant capacity, L (US gal)			
Max flow rate at max friction head, jacket water circuit, L/min (US gal/min)			
Max flow rate at max friction head, aftercooler circuit, L/min (US gal/min)			
Heat rejected, jacket water circuit, MJ/min (Btu/min)			
Heat rejected, aftercooler circuit, MJ/min (Btu/min)			
Heat rejected, fuel circuit, MJ/min (Btu/min)			
Total heat radiated to room, MJ/min (Btu/min)			
Maximum friction head, jacket water circuit, kPa (psi)			
Maximum friction head, aftercooler circuit, kPa (psi)			
Maximum static head, jacket water circuit, m (ft)			
Maximum static head, aftercooler circuit, m (ft)			
Maximum jacket water outlet temp, °C (°F)			
Maximum aftercooler inlet temp at 25 °C (77 °F) ambient, °C (°F)			
Maximum aftercooler inlet temp, °C (°F)			
Maximum fuel flow, L/hr (US gph)			
Maximum fuel return line restriction, kPa (in Hg)			

## Weights<sup>2</sup>

Unit dry weight kgs (lbs)	6379 (14061)
Unit wet weight kgs (lbs)	6521 (14372)

### Notes:

<sup>1</sup> For non-standard remote installations contact your local Cummins Power Generation representative.

<sup>2</sup> Weights represent a set with standard features. See outline drawing for weights of other configurations.

## Derating factors

<b>Standby</b>	Engine power available up to 2705 m (8875 ft) at ambient temperatures up to 40 °C (104 °F). Above these elevations, derate at 4.4% per 305 m (1000 ft). Above 40 °C (104 °F) derate 10% per 10 °C (18 °F).
<b>Prime</b>	Engine power available up to 2641 m (8665 ft) at ambient temperatures up to 40 °C (104 °F). Above these elevations, derate at 4.5% per 305 m (1000 ft). Above 40 °C (104 °F) derate 20.9% per 10 °C (18 °F).
<b>Continuous</b>	

## Ratings definitions

Emergency standby power (ESP):	Limited-time running power (LTP):	Prime power (PRP):	Base load (continuous) power (COP):
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.	Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) is in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.

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D-3352e (7/10)



## Alternator data

Voltage	Connection <sup>1</sup>	Temp rise degrees C	Duty <sup>2</sup>	Single phase factor <sup>3</sup>	Max surge kVA <sup>4</sup>	Winding No.	Alternator data sheet	Feature Code
380-480	Wye	125/105	S/P		2944	312	ADS-309	B282-2
600	Wye	125/105	S/P		2944	7	ADS-309	B300-2
600	Wye	105/80	S/P		2944	7	ADS-309	B301-2
220/380	Wye	105/80	S/P		3313	311	ADS-310	B599-2
480	Wye	105/80	S/P		2944	312	ADS-309	B600-2
480	Wye	80	S		2944	312	ADS-309	B601-2
600	Wye	80	S		2944	7	ADS-309	B604-2
380	Wye	80	S		3866	312	ADS-311	B660-2
190-480	Wye	125/105	S/P		2944	311	ADS-309	B731-2
208/416	Wye	105/80	S/P		2944	311	ADS-309	B733-2
208/416	Wye	80	S		3313	311	ADS-310	B734-2
440	Wye	125/105	S/P		2944	312	ADS-309	B741-2

### Notes:

<sup>1</sup> Limited single phase capability is available from some three phase rated configurations. To obtain single phase rating, multiply the three phase kW rating by the Single Phase Factor<sup>3</sup>. All single phase ratings are at unity power factor.

<sup>2</sup> Standby (S), Prime (P) and Continuous ratings (C).

<sup>3</sup> Factor for the *Single Phase Output from Three Phase Alternator* formula listed below.

<sup>4</sup> Maximum rated starting kVA that results in a minimum of 90% of rated sustained voltage during starting.

## Formulas for calculating full load currents:

### Three phase output

$$\frac{\text{kW} \times 1000}{\text{Voltage} \times 1.73 \times 0.8}$$

### Single phase output

$$\frac{\text{kW} \times \text{SinglePhaseFactor} \times 1000}{\text{Voltage}}$$

### Cummins Power Generation

1400 73<sup>rd</sup> Avenue N.E.  
Minneapolis, MN 55432 USA  
Phone: 763 574 5000  
Fax: 763 574 5298

**Warning:** Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

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**Model:** **DQGAB**  
**Frequency:** 60  
**Fuel type:** Diesel  
**KW rating:** 1500 standby  
1350 prime

**Emissions level:** EPA NSPS Stationary Emergency Tier 2

➤ **Generator set data sheet**

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<b>Exhaust emission data sheet:</b>	<b>EDS-1059</b>
<b>Exhaust emission compliance sheet:</b>	<b>EPA-1093</b>
<b>Sound performance data sheet:</b>	<b>MSP-1034</b>
<b>Cooling performance data sheet:</b>	<b>MCP-152</b>
<b>Prototype test summary data sheet:</b>	<b>PTS-265</b>
<b>Standard set-mounted radiator cooling outline:</b>	<b>0500-4357</b>
<b>Optional set-mounted radiator cooling outline:</b>	
<b>Optional heat exchanger cooling outline:</b>	
<b>Optional remote radiator cooling outline:</b>	<b>0500-4309</b>

<b>Fuel consumption</b>	<b>Standby</b>				<b>Prime</b>				<b>Continuous</b>
	<b>kW (kVA)</b>				<b>kW (kVA)</b>				<b>kW (kVA)</b>
<b>Ratings</b>	1500 (1875)				1350 (1688)				
<b>Load</b>	<b>1/4</b>	<b>1/2</b>	<b>3/4</b>	<b>Full</b>	<b>1/4</b>	<b>1/2</b>	<b>3/4</b>	<b>Full</b>	<b>Full</b>
<b>US gph</b>	32.5	60.2	83.4	109.4	30.1	55.2	78.1	97.8	
<b>L/hr</b>	123	227.9	315.7	414.1	113.9	209	295.6	370.2	

<b>Engine</b>	<b>Standby rating</b>	<b>Prime rating</b>	<b>Continuous rating</b>
Engine manufacturer	Cummins Inc.		
Engine model	QSK50-G4 NR2		
Configuration	Cast iron, V 16 cylinder		
Aspiration	Turbocharged and low temperature aftercooled		
Gross engine power output, kWm (bhp)	1656 (2220)	1470 (1971)	
BMEP at set rated load, kPa (psi)	2192 (318)	1957 (284)	
Bore, mm (in)	159 (6.25)		
Stroke, mm (in)	159 (6.25)		
Rated speed, rpm	1800		
Piston speed, m/s (ft/min)	9.5 (1875)		
Compression ratio	15:1		
Lube oil capacity, L (qt)	235 (248)		
Overspeed limit, rpm	2100 ±50		
Regenerative power, kW	168		

<b>Fuel flow</b>		
Maximum fuel flow, L/hr (US gph)	757 (200)	
Maximum fuel inlet restriction, kPa (in Hg)	30 (9.0)	
Maximum fuel inlet temperature, °C (°F)	70 (160)	

<b>Air</b>	<b>Standby rating</b>	<b>Prime rating</b>	<b>Continuous rating</b>
Combustion air, m <sup>3</sup> /min (scfm)	139 (4895)	133 (4700)	
Maximum air cleaner restriction, kPa (in H <sub>2</sub> O)	6.2 (25)		
Alternator cooling air, m <sup>3</sup> /min (cfm)	207 (7300)		

## Exhaust

Exhaust flow at set rated load, m <sup>3</sup> /min (cfm)	342 (12065)	312 (11000)	
Exhaust temperature, °C (°F)	491 (915)	446 (835)	
Maximum back pressure, kPa (in H <sub>2</sub> O)	6.78 (27)		

## Standard set-mounted radiator cooling

Ambient design, °C (°F)	40 (104)		
Fan load, kW <sub>m</sub> (HP)	45 (60)		
Coolant capacity (with radiator), L (US gal)	541 (143)		
Cooling system air flow, m <sup>3</sup> /min (scfm)	1705 (60150)		
Total heat rejection, MJ/min (Btu/min)	72.3 (68580)	64.8 (61510)	
Maximum cooling air flow static restriction, kPa (in H <sub>2</sub> O)	0.12 (0.5)		
Maximum fuel return line restriction kPa (in Hg)			

## Optional set-mounted radiator cooling

Ambient design, °C (°F)			
Fan load, kW <sub>m</sub> (HP)			
Coolant capacity (with radiator), L (US gal)			
Cooling system air flow, m <sup>3</sup> /min (scfm)			
Total heat rejection, MJ/min (Btu/min)			
Maximum cooling air flow static restriction, kPa (in H <sub>2</sub> O)			
Maximum fuel return line restriction, kPa (in Hg)			

## Optional heat exchanger cooling

Set coolant capacity, L (US gal)			
Heat rejected, jacket water circuit, MJ/min (Btu/min)			
Heat rejected, aftercooler circuit, MJ/min (Btu/min)			
Heat rejected, fuel circuit, MJ/min (Btu/min)			
Total heat radiated to room, MJ/min (Btu/min)			
Maximum raw water pressure, jacket water circuit, kPa (psi)			
Maximum raw water pressure, aftercooler circuit, kPa (psi)			
Maximum raw water pressure, fuel circuit, kPa (psi)			
Maximum raw water flow, jacket water circuit, L/min (US gal/min)			
Maximum raw water flow, aftercooler circuit, L/min (US gal/min)			
Maximum raw water flow, fuel circuit, L/min (US gal/min)			
Minimum raw water flow at 27 °C (80 °F) inlet temp, jacket water circuit, L/min (US gal/min)			
Minimum raw water flow at 27 °C (80 °F) inlet temp, aftercooler circuit, L/min (US gal/min)			
Minimum raw water flow at 27 °C (80 °F) inlet temp, fuel circuit, L/min (US gal/min)			
Raw water delta P at min flow, jacket water circuit, kPa (psi)			
Raw water delta P at min flow, aftercooler circuit, kPa (psi)			
Raw water delta P at min flow, fuel circuit, kPa (psi)			
Maximum jacket water outlet temp, °C (°F)			
Maximum aftercooler inlet temp, °C (°F)			
Maximum aftercooler inlet temp at 25 °C (77 °F) ambient, °C (°F)			
Maximum fuel return line restriction, kPa (in Hg)			

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D-3334j (7/10)

Optional remote radiator cooling <sup>1</sup>	Standby rating	Prime rating	Continuous rating
Set coolant capacity, L (US gal)			
Max flow rate at max friction head, jacket water circuit, L/min (US gal/min)	1779 (470)		
Max flow rate at max friction head, aftercooler circuit, L/min (US gal/min)	492 (130)		
Heat rejected, jacket water circuit, MJ/min (Btu/min)	35.44 (33610)	32.11 (30455)	
Heat rejected, aftercooler circuit, MJ/min (Btu/min)	26.93 (25545)	23.96 (22725)	
Heat rejected, fuel circuit, MJ/min (Btu/min)			
Total heat radiated to room, MJ/min (Btu/min)	9.94 (9425)	8.78 (8330)	
Maximum friction head, jacket water circuit, kPa (psi)	67 (10)		
Maximum friction head, aftercooler circuit, kPa (psi)	48 (7)		
Maximum static head, jacket water circuit, m (ft)	18.3 (60)		
Maximum static head, aftercooler circuit, m (ft)	18.3 (60)		
Maximum jacket water outlet temp, °C (°F)	104 (220)	100 (212)	
Maximum aftercooler inlet temp at 25 °C (77 °F) ambient, °C (°F)	49 (120)		
Maximum aftercooler inlet temp, °C (°F)	71 (160)	66 (150)	
Maximum fuel flow, L/hr (US gph)			
Maximum fuel return line restriction, kPa (in Hg)			

## Weights<sup>2</sup>

Unit dry weight kgs (lbs)	10989 (24220)
Unit wet weight kgs (lbs)	11493 (25330)

### Notes:

<sup>1</sup> For non-standard remote installations contact your local Cummins Power Generation representative.

<sup>2</sup> Weights represent a set with standard features. See outline drawing for weights of other configurations.

## Derating factors

<b>Standby</b>	Engine power available up to 890 m (2920 ft) at ambient temperatures up to 40 °C (104 °F). Above these elevations, derate at 6.6% per 305 m (1000 ft) and 14.0% per 10 °C (18 °F).
<b>Prime</b>	Engine power available up to 562 m (1844 ft) at ambient temperatures up to 40 °C (104 °F). Above these elevations, derate at 6.6% per 305 m (1000 ft) and 14.0% per 10 °C (18 °F).
<b>Continuous</b>	

## Ratings definitions

Emergency standby power (ESP):	Limited-time running power (LTP):	Prime power (PRP):	Base load (continuous) power (COP):
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.	Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) is in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.

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D-3334j (7/10)

## Alternator data

Voltage	Connection <sup>1</sup>	Temp rise degrees C	Duty <sup>2</sup>	Single phase factor <sup>3</sup>	Max surge kVA <sup>4</sup>	Winding No.	Alternator data sheet	Feature Code
380	Wye, 3-phase	125	P		5743		ADS-332	B596-2
380	Wye, 3-phase	150/105	S/P		6716		ADS-333	B595-2
380	Wye, 3-phase	80	P		6716		ADS-333	B687-2
380	Wye, 3-phase	105/80	S/P		7361		ADS-334	B599-2
380	Wye, 3-phase	80	S		7695		ADS-335	B660-2
440	Wye, 3-phase	125	P		4602		ADS-330	B692-2
440	Wye, 3-phase	150/125	S/P		5521		ADS-331	B691-2
440	Wye, 3-phase	125/105	S/P		5743		ADS-332	B663-2
440	Wye, 3-phase	80	S		6716		ADS-333	B688-2
440	Wye, 3-phase	80	P		7695		ADS-331	B689-2
480	Wye, 3-phase	105	P		4602		ADS-330	B693-2
480	Wye, 3-phase	125/105	S/P		5521		ADS-331	B276-2
480	Wye, 3-phase	80	P		5521		ADS-331	B694-2
480	Wye, 3-phase	105/80	S/P		5743		ADS-332	B600-2
480	Wye, 3-phase	80	S		6716		ADS-333	B601-2
600	Wye, 3-phase	105	P		4602		ADS-330	B581-2
600	Wye, 3-phase	125/105	S/P		5521		ADS-331	B602-2
600	Wye, 3-phase	80	P		5521		ADS-331	B695-2
600	Wye, 3-phase	105/80	S/P		5743		ADS-332	B603-2
600	Wye, 3-phase	80	S		6716		ADS-333	B604-2
4160	Wye, 3-phase	105	P		6204		ADS-322	B312-2
4160	Wye, 3-phase	105/80	S/P		7005		ADS-323	B313-2

### Notes:

<sup>1</sup> Limited single phase capability is available from some three phase rated configurations. To obtain single phase rating, multiply the three phase kW rating by the Single Phase Factor<sup>3</sup>. All single phase ratings are at unity power factor.

<sup>2</sup> Standby (S), Prime (P) and Continuous ratings (C).

<sup>3</sup> Factor for the *Single Phase Output from Three Phase Alternator* formula listed below.

<sup>4</sup> Maximum rated starting kVA that results in a minimum of 90% of rated sustained voltage during starting.

## Formulas for calculating full load currents:

### Three phase output

$$\frac{\text{kW} \times 1000}{\text{Voltage} \times 1.73 \times 0.8}$$

### Single phase output

$$\frac{\text{kW} \times \text{SinglePhaseFactor} \times 1000}{\text{Voltage}}$$

### Cummins Power Generation

1400 73<sup>rd</sup> Avenue N.E.  
Minneapolis, MN 55432 USA  
Phone: 763 574 5000  
Fax: 763 574 5298

**Warning:** Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

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D-3334j (7/10)



# EPA Tier 2 Exhaust Emission Compliance Statement 1500DQGAB 60 Hz Diesel Generator Set

## Compliance Information:

The engine used in this generator set complies with the Tier 2 emissions limits of U.S EPA New Source Performance Standards for Stationary Emergency engines under the provisions of 40 CFR 60 Subpart IIII when tested per ISO 8178 D2.

Engine Manufacturer:	Cummins Inc
EPA Certificate Number:	CEX-STATCI-11-04
Effective Date:	06/08/2010
Date Issued:	06/08/2010
EPA Diesel Engine Family:	BCEXL050.AAD
CARB Executive Order:	

## Engine Information:

Model:	Cummins Inc QSK50-G4 NR2	Bore:	6.25 in. (159 mm)
Engine Nameplate HP:	2220		
Type:	4 Cycle, 60°V, 16 Cylinder Diesel	Stroke:	6.25 in. (159 mm)
Aspiration:	Turbocharged and Low Temperature Aftercooled	Displacement:	3067 cu. in. ( 50.2 liters )
Compression Ratio:	15.0:1		
Emission Control Device:	Turbocharged and Low Temperature Aftercooled		

## U.S. Environmental Protection Agency NSPS Stationary Emergency Tier 2 Limits

(All values are Grams per HP-Hour)

<u>COMPONENT</u>	
NOx + HC (Oxides of Nitrogen as NO2 + Non Methane Hydrocarbons)	4.77
CO (Carbon Monoxide)	2.61
PM (Particulate Matter)	0.15

Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

## JW6H-UF38

# Stationary Fire Pump Engine Driver EMISSION DATA EPA 40 CFR Part 60

6 Cylinders  
Four Cycle  
Lean Burn  
Turbocharged & Jacket Water Aftercooled

500 PPM SULFUR #2 DIESEL FUEL								
RPM	BHP <sup>(3)</sup>	FUEL GAL/HR (L/HR)	GRAMS / HP- HR				EXHAUST	
			NMHC	NOx	CO	PM <sup>(4)</sup>	°F (°C)	CFM (m <sup>3</sup> /min)
1760	252	14 (54)	0.27	7.43	0.87	0.17	832 (445)	1351 (38)

Notes:

- 1) 6081AF001 Base Engine Model manufactured by John Deere Corporation.  
For John Deere Emissions Conformance to EPA 40 CFR Part 60 see Page 2 of 2.
- 2) The Emission Warranty for this engine is provided directly to the owner  
by John Deere Corporation. A copy of the John Deere Emission Warranty can  
be found in the Clarke Operation and Maintenance Manual.
- 3) Engines are rated at standard conditions of 29.61in. (7521 mm) Hg barometer  
and 77°F (25° C) inlet air temperature. (SAE J1349)
- 4) PM is a measure of total particulate matter, including PM<sub>10</sub>.

## CLARKE

### FIRE PROTECTION PRODUCTS

3133 EAST KEMPER ROAD  
CINCINNATI, OH 45241

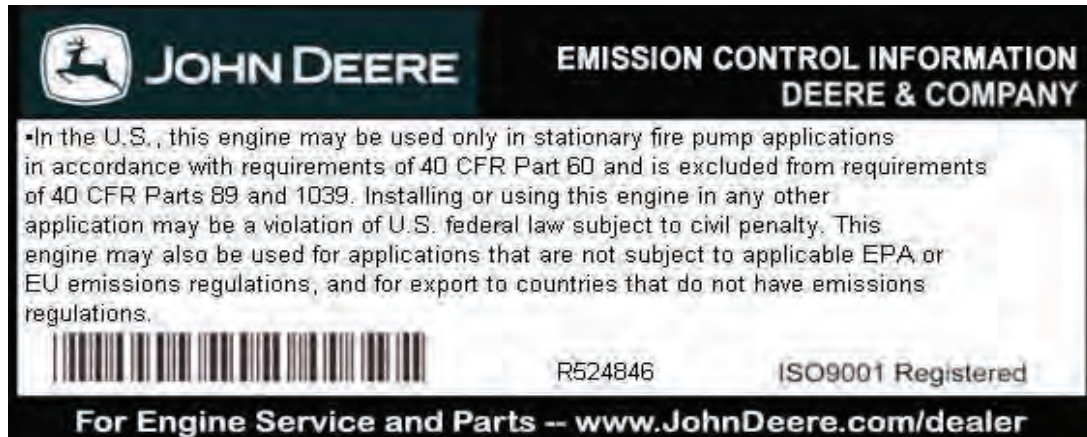


John Deere Power Systems  
3801 W. Ridgeway Ave., PO Box 5100  
Waterloo, Iowa USA 50704-5100

31 October 2007

**Subject: Fire Pump Ratings – Conformance to EPA 40 CFR Part 60 (NSPS requirements)**

All John Deere stationary fire pump engines conform to the requirements of 40 CFR Part 60. All such engines include an emission label, stating the engine conforms to the requirements of 40 CFR Part 60. An example of the emission label is shown below:



This label applies to all of the following engine models, sold to Clarke Fire Protection, for use in stationary fire pump applications:

John Deere Engine Model
<b>4045DF120</b>
<b>4045DF159</b>
<b>4045TF252</b>
<b>4045TF254</b>
<b>4045TF220</b>
<b>6068TF252</b>
<b>6068TF254</b>
<b>6068HF252</b>
<b>6068HF254</b>
<b>6068HF120</b>
<b>6068TF220</b>
<b>6081AF001</b>
<b>6081HF001</b>
<b>6125AF001</b>
<b>6125HF070</b>

All engines conforming to 40 CFR Part 60 (identified by emission label, as shown above) are covered under the emissions warranty of 40 CFR Part 89.

Sincerely,

Kyle J. Tingle  
Regional Sales Manager, JDPS



# Technical Specifications

Available in the following configurations:

- Standard configuration for most installations.
- Super Economizer (SE) for increased efficiency.
- Low NOx Burners or Flue Gas Recirculation for reduced emissions.
- Fully Modulating Burners
- Fuel Options: Natural Gas, Propane, #2 Fuel Oil, Biogas, Biofuels and Hydrogen



## Clayton Steam Generators:

- **SAVE FUEL**  
The unique counter flow design provides higher fuel-to-steam efficiency than traditional boilers.
- **ARE SAFE FOR PERSONNEL AND EQUIPMENT**  
Inherently safe, the Clayton design eliminates hazardous steam explosions.
- **PROVIDE RAPID RESPONSE**  
The Clayton design responds rapidly to sudden or fluctuating load demands.
- **START FAST**  
The Clayton design will provide full output from a cold start within fifteen minutes, without thermal stress.
- **ARE COMPACT AND LIGHTWEIGHT**  
The Clayton design typically occupies one-third of the floor space and weighs 75% less than a traditional boiler.
- **ENSURES HIGH QUALITY STEAM**  
Clayton provides a 99.5% quality separator to minimize moisture in the steam.
- **OFFERS ADVANCED CONTROLS**  
PLC controls, Variable Speed Drives and a linkage-less servo controlled burner management system are standard.
- **INCLUDES OUTSTANDING SUPPORT**  
Every Steam Generator is backed by Clayton factory direct sales and service plus full service feedwater treatment.



**E704** 700 BHP  
Steam Generator

# Clayton Steam Generator

# SPECIFICATIONS

		MODEL E704 Standard 700 BHP	MODEL SE704 with Super Economizer 700 BHP	MODEL E704-FMB with Low NOx Burner 700 BHP	MODEL SE704-FMB with Low NOx Burner and Super Economizer 700 BHP	MODEL E704-FGR with Flue Gas Recirculation 700 BHP	MODEL SE704-FGR with Flue Gas Recirculation and Super Economizer 700 BHP
BOILER HORSEPOWER		700 BHP	700 BHP	700 BHP	700 BHP	700 BHP	700 BHP
HEAT INPUT	Oil	27,895,833 BTU/HR	27,247,093 BTU/HR	NA	NA	27,895,833 BTU/HR	27,247,093 BTU/HR
	Gas	28,576,220 BTU/HR	27,895,833 BTU/HR	29,290,625 BTU/HR	28,576,220 BTU/HR	28,576,220 BTU/HR	27,895,833 BTU/HR
NET HEAT OUTPUT		23,432,500 BTU/HR	23,432,500 BTU/HR	23,432,500 BTU/HR	23,432,500 BTU/HR	23,432,500 BTU/HR	23,432,500 BTU/HR
EQUIVALENT OUTPUT (from and at 212°F feedwater and 0 PSIG steam)		24,150 LB/HR	24,150 LB/HR	24,150 LB/HR	24,150 LB/HR	24,150 LB/HR	24,150 LB/HR
DESIGN PRESSURE (see note 1)		65 - 500 PSIG	65 - 500 PSIG	65 - 500 PSIG	65 - 500 PSIG	65 - 500 PSIG	65 - 500 PSIG
STEAM OPERATING PRESSURE (determined by design pressure)		60 - 450 PSIG	60 - 450 PSIG	60 - 450 PSIG	60 - 450 PSIG	60 - 450 PSIG	60 - 450 PSIG
OIL CONSUMPTION		198 GPH	194 GPH	NA	NA	198 GPH	194 GPH
at maximum steam output (see note 2)							
GAS CONSUMPTION		28,576 Ft. <sup>3</sup> /HR	27,896 Ft. <sup>3</sup> /HR	29,291 Ft. <sup>3</sup> /HR	28,576 Ft. <sup>3</sup> /HR	28,576 Ft. <sup>3</sup> /HR	27,896 Ft. <sup>3</sup> /HR
at maximum steam output (see note 4)							
BURNER CONTROLS							
modulating		5 to 1 Turndown	5 to 1 Turndown	4 to 1 Turndown	4 to 1 Turndown	4 to 1 Turndown	4 to 1 Turndown
THERMAL EFFICIENCY as tested (see note 3)							
firing rate %		50% 100%	50% 100%	50% 100%	50% 100%	50% 100%	50% 100%
oil-fired efficiency %		85 84	87 86	NA NA	NA NA	85 84	87 86
gas-fired efficiency %		83 82	85 84	81 80	83 82	83 82	85 84
ELECTRIC MOTOR		Blower Pump	Blower Pump	Blower Pump Cooling	Blower Pump Cooling	Blower Pump Cooling	Blower Pump Cooling
design pressure 15-300 psig		60 HP 40 HP	60 HP 40 HP	75 HP 40 HP 7.5 HP	75 HP 40 HP 7.5 HP	60 HP 40 HP 7.5 HP	60 HP 40 HP 7.5 HP
design pressure 301-500 psig		60 HP 50 HP	60 HP 50 HP	75 HP 50 HP 7.5 HP	75 HP 50 HP 7.5 HP	60 HP 50 HP 7.5 HP	60 HP 50 HP 7.5 HP
ELECTRIC FLA, based on 460 V (see note 5)							
design pressure 15-300 psig		155	155	190	190	166	166
design pressure 301-500 psig		170	170	205	205	181	181
GAS SUPPLY REQUIRED							
pilot		5 to 60 psig	5 to 60 psig	5 to 60 psig	5 to 60 psig	5 to 60 psig	5 to 60 psig
main burner		5 to 10 psig	5 to 10 psig	5 to 10 psig	5 to 10 psig	5 to 10 psig	5 to 10 psig
AIR SUPPLY REQUIRED (pilot - see note 6)		NA	NA	150 SCFH @ 3 to 150 PSIG	150 SCFH @ 3 to 150 PSIG	NA	NA
AIR SUPPLY REQUIRED (burner - see note 7)		30 SCFM @ 70 to 100 PSIG	30 SCFM @ 70 to 100 PSIG	NA	NA	30 SCFM @ 70 to 100 PSIG	30 SCFM @ 70 to 100 PSIG
WATER SUPPLY REQUIRED		3711 GPH	3711 GPH	3711 GPH	3711 GPH	3711 GPH	3711 GPH
HEATING SURFACE		1,522.6 Ft. <sup>2</sup>	1,701.0 Ft. <sup>2</sup>	1,522.6 Ft. <sup>2</sup>	1,701.0 Ft. <sup>2</sup>	1,522.6 Ft. <sup>2</sup>	1,701.0 Ft. <sup>2</sup>
APPROXIMATE OVERALL DIMENSIONS							
length		141 IN	141 IN	160 IN	160 IN	159 IN	159 IN
width		140 IN	140 IN	149 IN	149 IN	140 IN	140 IN
height		205 IN	215 IN	205 IN	215 IN	227 IN	237 IN
WEIGHT							
installed - wet		29,400 LBS	30,400 LBS	29,400 LBS	30,400 LBS	29,400 LBS	30,400 LBS
shipping		24,400 LBS	25,100 LBS	24,400 LBS	25,100 LBS	24,400 LBS	25,100 LBS
SHIPPING CUBE		1,662 Ft. <sup>3</sup>	1,694 Ft. <sup>3</sup>	1,758 Ft. <sup>3</sup>	1,790 Ft. <sup>3</sup>	1,758 Ft. <sup>3</sup>	1,790 Ft. <sup>3</sup>

- 1) Design pressure available up to 3000 psig. Consult factory for details.
- 2) Based on No. 2 fuel oil with a High Heat Value (HHV) of 140,600 BTU/Gal.
- 3) Efficiencies shown are nominal. Small variations may occur due to manufacturing tolerance. Please consult factory for guaranteed values.
- 4) Based on natural gas with a High Heat Value (HHV) of 1,000 BTU/Ft.<sup>3</sup>
- 5) Continuous running. For 575 V multiply by 0.8; for 380 V multiply by 1.1; for 230 V multiply by 2.0; for 208 V multiply by 2.2.
- 6) Pilot air for FMB gas pilot only. Typically 10 seconds per light off.
- 7) Atomizing air required for oil burner, modulating units only.

**Clayton**  
**INDUSTRIES**

*Your Single Source for Steam Technology Since 1930*

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**World Leaders in Precision Steam Generators, Fluid Heaters, Heat Recovery Systems and Customer Service**

# TECHNICAL SPECIFICATIONS

## CLAYTON STEAM GENERATORS:

- \* **SAVE FUEL**

*The unique counter flow, controlled flow design provides higher fuel to steam efficiencies than traditional boilers.*

- \* **ARE SAFE FOR PERSONNEL & EQUIPMENT**

*The Clayton units inherently eliminate the potential for hazardous steam explosions due to their smaller physical size and low water volume.*

- \* **PROVIDE RAPID RESPONSE**

*With low water volume and physical size, Clayton units can respond very quickly to load changes*

- \* **PROVIDE FAST START-UP AND LOAD RESPONSE**

*The units will provide full output from a cold start within ten minutes, without thermal stress.*

- \* **ARE COMPACT AND LIGHTWEIGHT**

*The Clayton design typically occupies one-third of the floor space and is 75% lighter than a conventional boiler.*

- \* **ENSURE HIGH QUALITY STEAM**

*Provide greater than 99.5% quality steam.*

- \* **AFFORD FUEL VERSATILITY**

*Natural gas, propane, light or heavy oil burners are available or in combination.*

- \* **HAVE ADVANCED CONTROLS**

*Programmable Logic Controllers (PLC) are standard for accurate and reliable operation.*

- \* **ARE AVAILABLE WITH LOW NOx**

*Industry leading Low NOx burners are available to meet strict environmental regulations.*

- **ARE BACKED BY** Fast, Expert Factory-Direct service that is available 24 hours per day throughout the U.S., Canada, Mexico, Europe, Asia and service distributors worldwide.



**MODEL E504**

**STEAM GENERATOR**  
**500 BHP**



# CLAYTON STEAM GENERATOR

# SPECIFICATIONS

## MODEL E504

	MODEL E504 Standard	MODEL SE504 with Super Economizer	MODEL EG504-FMB with Low NOx Burner	MODEL SEG504-FMB with Low NOx Burner and Super Economizer
BOILER HORSEPOWER	500	500	500	500
HEAT INPUT, BTU/hr	Oil 20,165,663 Gas 20,411,585	19,462,209 19,691,176	NA 20,663,580	NA 19,691,176
NET HEAT OUTPUT, BTU/hr	16,737,500	16,737,500	16,737,500	16,737,500
EQUIVALENT OUTPUT (from and at 212°F feedwater and 0 PSIG steam)	17,250 lbs/hr	17,250 lbs/hr	17,250 lbs/hr	17,250 lbs/hr
DESIGN PRESSURE (see note 1)	65 - 500 PSIG	65 - 500 PSIG	65 - 500 PSIG	65 - 500 PSIG
STEAM OPERATING PRESSURE (determined by design pressure)	60 - 450 PSIG	60 - 450 PSIG	60 - 450 PSIG	60 - 450 PSIG
OIL CONSUMPTION at maximum steam output (see note 2)	143.4 gph	138.4 gph	N/A	N/A
GAS CONSUMPTION at maximum steam output (see note 3)	20,412 cfh	19,691 cfh	20,664 cfh	19,691 cfh
BURNER CONTROLS modulating	5 to 1 Turndown	5 to 1 Turndown	4 to 1 Turndown	4 to 1 Turndown
EFFICIENCY				
oil-fired efficiency %	83%	86%	NA	NA
gas-fired efficiency %	82%	85%	81%	85%
ELECTRIC MOTORS, HP	Blower   Pump	Blower   Pump	Blower   Pump   Cooling	Blower   Pump   Cooling
design pressure 15-300 psig	25   20	25   20	50   20   7.5	50   20   7.5
design pressure 301-500 psig	25   30	25   30	50   30   7.5	50   30   7.5
ELECTRIC FLA, based on 460 V (see note 4)				
design pressure 15-300 psig	66	66	108	108
design pressure 301-500 psig	79	79	122	122
GAS SUPPLY PRESSURE REQUIRED	5 to 10 psig	5 to 10 psig	5 to 10 psig	5 to 10 psig
ATOMIZING AIR REQUIRED (see note 5)				
Capacity	30 scfm	30 scfm	NA	NA
Minimum pressure	70 psig	70 psig	NA	NA
AIR SUPPLY REQUIRED (FMB -see note 6)	N/A	N/A	5 scfm @ 3 to 150 psig	5 scfm @ 3 to 150 psig
WATER SUPPLY REQUIRED	2,650 gph	2,650 gph	2,650 gph	2,650 gph
HEATING SURFACE	912 sq.ft.	1,207 sq.ft.	912 sq.ft.	1,207 sq.ft.
EXHAUST STACK DIAMETER, o.d.	31.75 in.	31.75 in.	31.75 in.	31.75 in.
APPROXIMATE OVERALL DIMENSIONS				
length	133 in.	133 in.	156 in.	156 in.
width	131 in.	131 in.	142 in.	142 in.
height	131 in.	157 in.	135 in.	161 in.
WEIGHT				
installed - wet	17,408 lbs	20,400 lbs	17,708 lbs	20,700 lbs
shipping	14,790 lbs	17,190 lbs	15,090 lbs	17,490 lbs
FW pump skid	2,000 lbs	2,000 lbs	2,000 lbs	2,000 lbs

1) Design pressures are available up to 3000 psig. Consult factory for details.

2) Based on No. 2 fuel oil with a High Heat Value (HHV) of 140,600 BTU/Gal.

3) Based on Natural Gas with a High Heat Value (HHV) of 1,000 BTU/Ft.<sup>3</sup>

4) Continuous running. For 575 V multiply by 0.8; for 380 V multiply by 1.1; for 230 V multiply by 2.0; for 208 V multiply by 2.2.

5) Atomizing air required for oil burner.

6) Compressed air required for FMB.

The description and specifications shown were in effect at the time this publication was approved for printing. Clayton Industries, whose policy is one of continuous improvement, reserves the right to discontinue models, or change specifications or design, without notice.



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**EQUIPMENT SPECIFICATIONS****Item No. 11:****Auxiliary Natural Gas Burner**

Number Required:

One

Capacity:

**2 MBTU/hr****CORRECTION: 2 MMBTU/hr**

Supply:

Includes low fire start switch, connection bracket for control valve c/w valve and valve assembly.

Note:

For preheating only, not required during normal operation.

**Tag Data - Indoor Gas Heating Products (Qty: 138)**

Item	Tag(s)	Qty	Description	Model Number
A1	DC-1-81-HEU-111 to 129; DC-1-81-HEU-134 to 141; DC-1-81-HEU-152 to 177; DC-1-81-HEU-188 to 191; DC-1-81-HEU-210 to 219; DC-1-81-HEU-226 to 239; DC-1-81-HEU-242 to 248; DC-1-81-HEU-280 to 286; DC-1-81-HEU-305 to 308; DC-1-81-HEU-425 to 439; DC-1-81-HEU-501 to 506; DC-1-81-HEU-562 to 579	138	Indoor Gas Heating Products	GAND017AEG

**Product Data - Indoor Gas Heating Products****Item: A1 Qty: 138 Tag(s): DC-1-81-HEU-1**

Separated combustion propeller fan gas unit heater

Natural gas

175 MBH input/140 MBH output

115/60/1 main power supply

Two stage gas control, intermittent pilot

#409 stainless steel heat exchanger

Totally enclosed motor – Trane Standard Design

Two stage room tstat TH522 (Fld)

409 stainless steel burners

409 stainless steel draft diverter

3/4" NPT high gas pressure regulator (Fld)

Horizontal concentric vent kit – **316 SS Construction** (Fld)

OSHA fan guard

4" Vent Cap (Fld) – **316 SS Construction**Reducer 5" to 4" (Fld) – **316SS Construction**

Air flow prove switch (Fld)

**NEMA 4X Electrical Enclosure****Performance Data - Indoor Gas Heating Products**

Tags	DC-1-81-HEU-1
Elevation (m)	220
Blower fan airflow (L/s)	1204
Input (MBH)	175
Output (MBH)	140



DONLIN CREEK  
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## TECHNICAL SPECIFICATION

<b>AIR HANDLING UNITS</b>	<b>166549-12-SP-002</b>
Donlin Creek Feasibility Study Update 2	REV. B
Alaska, USA	Project No. 166549

### APPENDIX – VENDOR DATA SHEETS (TO BE FILLED IN BY THE VENDOR)

EQUIPMENT DATA SHEET ITEM NO 1			
<b>AIR HANDLING UNITS</b>			
<b>EQUIPMENT NUMBER:</b> DC-1-81-HVA-104 TO 107, DC-1-81-HVA-109, 201, 126, 127, 111, 112, 113; 202 TO 207; 220, 230.			
DESCRIPTION	UNITS	SPECIFIED	VENDOR
Service		Process Buildings, Mine Site Truck shop	↔ Same
Quantity		<b>Nineteen (19)</b>	19
<b>Manufacture / Model</b>		By Vendor	Bousquet / HDG CH-400
Noise Level (Max)	dBA @ 1 m	≤80	≤ 80
<b>FAN SECTION</b>			
Air Flow Rate	m <sup>3</sup> / hr (cfm)	<b>68,000 (40,000)</b>	40000 CFM
External Static Pressure	Pa (in. WG)	250 (1")	1"
Wheel Size / Blade Type	-	By Vendor	Twin 32" / BI/AF
Drive Type	-	Belt with guard per OSHA	Belt w/guard per OSHA
Bearings Type / Life, L 10 Rating	hr	As Specified	As Specified
Motor Model / Enclosure		By Vendor	/ TEFC IEEE 841
Motor HP	kW (HP)	30 (40)	30HP
Fan & Motor Weight	kg (lbs)	By Vendor	TBA
<b>ELECTRICAL</b>			
Power Supply	V / Ph / Hz	480 / 3 / 60	480/3/60
Control Voltage	V / Ph / Hz	120 / 1 / 60 or by Vendor	120/1/60
Electrical /Control Panel (NEMA 4)		As Specified	NEMA 4
<b>GAS BURNER &amp; HEAT EXCHANGER</b>			
<b>Gas Burner Type / Model</b>		By Vendor	HDG (E) -400
Burner and HEX Material		Stainless Steel	304L SS.
Heating Output capacity	kW (MBH)	1,100 (3,750)	4,000 MBH.
Gas Supply Pressure	kPa (psi)	35 - 70 (5 - 10)	1/2 psig

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## TECHNICAL SPECIFICATION

<b>AIR HANDLING UNITS</b>	<b>166549-12-SP-002</b>
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Alaska, USA	Project No. 166549

EQUIPMENT DATA SHEET ITEM NO 1			
<b>AIR HANDLING UNITS</b>			
<b>EQUIPMENT NUMBER:</b> DC-1-81-HVA-104 TO 107, DC-1-81-HVA-109, 201, 126, 127, 111, 112, 113; 202 TO 207; 220, 230.			
DESCRIPTION	UNITS	SPECIFIED	VENDOR
Burner Control		By Vendor	Yes, as specified
Burner Turndown Ratio		Min. 1:8	25:1
<b>FILTERS</b>			
Arrangement	-	MERV 7 pre-filter only	Merv 7.
Air Friction: Clean / Dirty (average)	Pa W.G.	37.5 /250	73.9 / 250
Face Velocity	m/s	By Vendor	2.032
<b>CONSTRUCTION</b>			
Casing	-	Galvanized steel: Wall min 18Ga.; floor min 14Ga.	G-90 16ga exterior floor, 14ga checker plate
Insulation	-	50 mm (2") thick, 24 kg/m <sup>3</sup> (1.5 lb/ft <sup>3</sup> ) fiberglass	2"; 1.5 lb/ft <sup>3</sup> reinforced fiberglass
Weight (Operating)	kg (lbs)	By Vendor	16319 lbs
Dimensions (L x W x H)	mm	By Vendor	306" x 150" x 84"
Access Doors	-	As Specified	As specified
Drain Pan	-	N/A	N/A.
Outside Air Motorized Damper		Yes, by Vendor	Yes
*Mixing Section c/w Motorized Dampers (Three position)		Yes, By Vendor	Yes
<b>CONTROLS</b>		As specified	As specified.

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<b>AIR HANDLING UNITS</b>	<b>166549-12-SP-002</b>
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Alaska, USA	Project No. 166549

EQUIPMENT DATA SHEET ITEM NO 2			
<b>AIR HANDLING UNITS</b>			
<b>EQUIPMENT NUMBER: DC-1-81-HVA-108, 119, 233, 234, 257, DC-1-81-HVA-231, 253.</b>			
DESCRIPTION	UNITS	SPECIFIED	VENDOR
Service		Pebble Crushing, Repair Shop, Truck Wash Bay, Tailing Pump House, WTP	↔ Same
Quantity		Seven (7)	7
Manufacture / Model		By Vendor	Brosgre / HDG(H)-200
Noise Level (Max)	dBA @ 1 m	≤80	≤80
<b>FAN SECTION</b>			
Air Flow Rate	m3 / hr (cfm)	34,000 (20,000)	20000 CFM
External Static Pressure	Pa (in. WG)	250 (1")	1"
Wheel Size / Blade Type	-	By Vendor	Twin 22" / BI / AF
Drive Type	-	Belt with guard per OSHA	Belt w/guard per OSHA
Bearings Type / Life, L 10 Rating	hr	As Specified	As specified.
Motor Model / Enclosure		By Vendor	Baker / TEFC IEEE 841
Motor HP	kW (HP)	15 (20)	15 HP
Fan & Motor Weight	kg (lbs)	By Vendor	TBA
<b>ELECTRICAL</b>			
Power Supply	V / Ph / Hz	480 / 3 / 60	480/3/60
Control Voltage	V / Ph / Hz	120 / 1 / 60 or by Vendor	120/1/60
Electrical /Control Panel		NEMA 4	nema 4
<b>GAS BURNER &amp; HEAT EXCHANGER</b>			
Gas Burner Type / Model		By Vendor	HDG(H)-200
Burner and HEX Material		Stainless Steel	304L SS
Heating Output capacity	kW (MBH)	565 (1,930)	2,000 MBH
Gas Supply Pressure	kPa (psi)	35 - 70 (5 - 10)	1/2 psig
Burner Control		By Vendor	Yes, as specified

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## TECHNICAL SPECIFICATION

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EQUIPMENT DATA SHEET ITEM NO 2			
<b>AIR HANDLING UNITS</b>			
<b>EQUIPMENT NUMBER: DC-1-81-HVA-108, 119, 233, 234, 257, DC-1-81-HVA-231, 253.</b>			
DESCRIPTION	UNITS	SPECIFIED	VENDOR
Burner Turndown Ratio		Min. 1:8	25:1
<b>FILTERS</b>			
Arrangement	-	MERV 7 pre-filter only	MERV 7
Air Friction: Clean / Dirty (average)	Pa W.G.	37.5 /250	73.7 / 250
Face Velocity	m/s	By Vendor	2.032
<b>CONSTRUCTION</b>			
Casing	-	Galvanized steel: Wall min 18Ga.; floor min 14Ga.	6-90 lbg exterior floor: 14ga checker plate
Insulation	-	50 mm (2") thick, 24 kg/m <sup>3</sup> (1.5 lb/ft <sup>3</sup> ) fiberglass	2"; 1.5 lb/ft <sup>3</sup> reinforced fiberglass
Weight (Operating)	kg (lbs)	By Vendor	9411 lbs
Dimensions (L x W x H)	mm	By Vendor	182" x 108" x 76"
Access Doors	-	As Specified	As specified
Drain Pan	-	N/A	N/A
Outside Air Motorized Damper		Yes, by Vendor	Yes
*Mixing Section c/w Motorized Dampers (Three position)		Yes, by Vendor	Yes
<b>CONTROLS</b>		As specified	As specified

### Note:

- Outdoor air damper opens 50% during winter operation, when outdoor air temperature is less than 10 deg C (adjustable).
- Outdoor air temperature sensor to be installed at air handling air intake.  
Outdoor air damper opens 100% during summer operation, when outdoor air temperature is above 10 deg C (Adjustable).

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## Hydronic Air Heater

### Pureheat

# PURE HEAT

#### Bringing clean, dry heat to the job site

» The Pureheat hydronic air heater provides temporary heat for large buildings, removes excess moisture from the workspace, and saves up to 50% of the fuel over traditional methods. With accessories, such as hose handling systems, this portable unit can also be used to cure concrete, thaw frozen ground and prevent frost. The Pureheat offers simple operation. «



#### ADDITIONAL ADVANTAGES:

- **The Pureheat has no open flame** for added safety in the work space and dependable with no flame blowout in high wind conditions.
- **Unit features 83% heater efficiency** with 860,000 BTU/hr input.
- **Flexible fuel choice.** Burners available in three options: diesel, natural gas or propane.
- **The on-board hose connection manifolds are conveniently located** for easy access on the trailer. Connect and disconnect hoses with ease using Pureheat's simple, heavy-duty quick-connect fittings.
- **Powerful liquid-to-air heat exchangers** bring clean, dry heat to your workspace. Three models are available: HX50 (50,000 BTU/hr), HX100 (100,000 BTU/hr), and HX200 (200,000 BTU/hr).
- **Store and transport all system hoses inside the trailer** on the heavy-duty self-contained hose reel with electric rewind, clutch and brake.



## Technical Data

## Pureheat

Dimensions (L x W x H)	in (mm)	172 x 93 x 93 (4400 x 2400 x 2400)
Ground Clearance	in (mm)	9 (229)
Weight w/o fuel tank	lbs (kg)	7155 (3245)
Weight w/o fuel*	lbs (kg)	8185 (3713)
Weight with fuel*	lbs (kg)	11,230 (5094)
Optional diesel fuel capacities	gal (l)	175 or 435 (662 or 1647)
Heat transfer fluid	gal (l)	145 (549)
Pump	hp (kW)	1.5 (1.1) centrifugal
Hose	ft (m)	1000 (300) total = 4 x 50 (15) + 8 x 100 (30)
Hose reel		1
Hose rewind		120V AC, with DC clutch
Circulation loops		up to 20
Tires		LT235/85R16
Hitch		pintle
Loading Ramp		1
Lifting bar		standard
HX-Series Heat Xchangers (choose one set)	HX50 (50,000 BTU/hr, 710 cfm)	qty 16
or	HX100 (100,000 BTU/hr, 1315 cfm)	qty 8
or	HX200 (200,000 BTU/hr, 2400 cfm)	qty 4

## Performance

Fuel options	diesel, natural gas or propane		
Fuel, input	BTU (kW) / hr	860,000 (252)	
Fuel, output	BTU (kW) / hr	714,000 (209)	
Run time (at full load)	hr	up to 71	
Heater efficiency	%	83	
Temperature controller		digital	
Fuel consumption at full load:	Propane	gph (l/hr)	9.4 (35.6)
	Natural Gas	cfh (l/min)	860 (406)
	Diesel	gph (l/hr)	6.1 (23.2)
Electrical requirement	1 - 15amp, 1 - 20amp x 120v AC		
Normal operating temperature	F (C)	100° - 180° (37.8° - 82.2°)	
HTF flow rate	gph (l/hr)	2700 (10,221)	

\*with optional 435-gallon fuel tank

## Standard Package

Hydronic Air Heater  
Pureheat

Includes base unit, hoses, burner, ramp,  
manifold, brackets and operator's manual.



Please refer to our Price List and Ordering Guide for  
complete accessory information.



Specifications may change due to continuous product development. Users are advised to consult Wacker Neuson's Operator's Manual and website for specific information regarding the engine power rating. Actual power output may vary due to conditions of specific use.



**WACKER  
NEUSON**



## DATA SHEETS

### FOR

### FULLER-TRAYLOR® 1600 x 2300 (63" x 91") TYPE "TSU" TOP SERVICE ULTRA DUTY PRIMARY GYRATORY CRUSHERS WITH BELL HEAD FITTINGS, SPIRAL BEVEL GEARING, OPEN BOTTOM DISCHARGE AND HYDRAULIC SUPPORT

Crusher Size	1600 x 2300 (63" x 91")
Feed Opening - Radial Width	63" (1600 mm)
Crusher Setting - Open Setting	
Minimum	7" (178 mm)
Maximum	10" (254 mm)
Shaft Adjustment	2" (51 mm) Minimum Relief
	12" (305 mm) Total Travel
Main Shaft Dimensions:	
Under Head	41" (1040 mm) Diameter
In Spider	24" (600 mm) Diameter
In Eccentric	34" (860 mm) Diameter
Mantle Dimensions:	
Top	38" (975 mm) Diameter
Bottom	91" (2300 mm) Diameter
Concaves:	
Material	Cast Manganese Steel
Number of Rows	Three (3)
Backing Material	Epoxy
Outer Eccentric Bearing	44.5" (1130 mm) Diameter
Inner Eccentric Bearing	34" (860 mm) Diameter
Bevel Gear – Forged Alloy Steel - Cut Teeth	





## Bevel Pinion - Forged Alloy Steel - Cut Teeth

### Countershaft Diameter

Nominal	11" (283 mm)
In Anti-Friction Bearings	10" (246 mm)
Bearing L10 Service Life	100,000 Hours
Eccentric Throw	1-3/4" (45.0 mm) or 1-1/2" (38.1 mm)
Countershaft Speed	590 RPM Nominal
Shaft Gyration	132 Per Minute
Countershaft Extension (Option)	7" (178 mm) Diameter x Approximately 67" (1700 mm) Long
Crusher Coupling (Option)	Polymeric Flexible Type
Countershaft Extension Coupling (Option)	Polymeric Flexible Type with Controlled Torque Type
Crusher Drive Motor (Option)	1000 HP (750 kW), 600 RPM Direct
Lubrication Pump	100 GPM (378 L/Min), Standby Standard
Lubrication Pump Motor	30 HP (22 kW), Standby Standard
Lubrication System Sump Tank Capacity	900 Gallons (3400 Liters)
Lubrication System Cooling Water Required	N/A – Air Cooled System
Lubrication Cooling Pump (Option)	N/A – Air Cooled System
Lubrication Cooling Pump Motor (Option)	N/A – Air Cooled System
Hydraulic System Pump	4.75 GPM (18 L/Min)
Hydraulic System Pump Motor	7.5 HP (5.6 kW)
Hydraulic System Sump Tank Capacity	150 Gallons (567 Liters)
Spider Lubrication Pump Motor (Option)	0.75 HP Integral Motor



**QUOTATION #M-071307-02-REV3**

9-Mar-11

Amec Americas  
Suite 400, 111 Dunsmuir Street  
Vancouver, BC V6B 5W3

Attention: Rob Kerr  
Reference: Donlin Creek Gold Project Feasibility Study  
Project #: 155096-12-SP-004, DUST COLLECTORS

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Dear Sir,

Thank you for the opportunity to refresh this budget quote. Following is our revised proposal with up-to-date pricing held firm through June 2011.

Please take note of the following soft product release, with official product launch to follow at end of May, 2011:

**NEW PRODUCT ANNOUNCEMENT SOFT LAUNCH: PowerCore® VH Series dust collector from Donaldson® Torit®**

Please see the VH Series product bulletin on the end of this proposal. Although pricing is not yet available, we will be in position to offer pricing on this product in June 2011. We anticipate this product will be able to offer savings in the range of 15-20%, significant space savings, and no compromise in performance. Following is a comparison chart of the tag numbers, models quoted, and comparable VH Series unit we would offer as alternate:

TAG	UNIT SIZE QUOTED	VH SERIES EQUIVALENT
DC-1-81-DCL-100	DFT 4-96	VH 3-18
DC-1-14-DCL-200, 300, 400, 500	DFT 3-24	VH 1-4
DC-1-16-DCL-600	DFT 3-54	VH 2-12

Please feel free to contact us at our office with any questions.

Mike Meade  
General Manager  
mike@etpbc.ca

## EQUIPMENT #DC-1-81-DCL-100

**Donaldson Torit®** offers its Downflo® II series dust collector, **Model DFT 4-96**, as described below:

<b>Model:</b>	DFT 4-96		
<b>Quantity:</b>	1		
<b>Filter Area:</b>	24,384 ft²	<b>Air-to-Media Ratio:</b>	1.03 : 1
<b>Filter Cartridge Material:</b>	Endura Tek 80/20 blend		
<b>Filter Quantity:</b>	96		
<b>Design Condition:</b>	25,015 ACFM		
<b>Application:</b>	Crusher dust control		

### HOUSING

Bolted and welded ledgeless housing construction is 3/16", 10, and 12 gauge steel and is rated for + 15 /-20" wg, and designed in compliance with IBC2003 International Building Codes.

### FINISH

Exterior surfaces are painted with a blue acrylic urethane finish over an alkyd enamel primer. Coating passes a 350-hour salt spray corrosion performance test. Interior surfaces are primed with blue.

### DISCHARGE HOPPER

**Standard** ledgeless discharge hopper is fabricated of 12-gauge steel. Collector has one hopper per module, 6 total. Top and bottom flange is square with a 10" discharge opening. The design features no internal ledges.

### SCREW CONVEYOR & "AN" ROTARY AIRLOCK WITH COMMON DRIVE

20'-10 3/16" screw conveyor fixed to hopper discharge points. Class B, 9-inch flared trough screw conveyor construction includes 3/16-inch half pitch screw, 10 gauge troughs and 14 gauge covers, hardened coupling shafts, hard iron hanger bearings, Grade 2 coupling bolts, and a common drive with guard for the screw and rotary airlock. Conveyor discharge is modified to a flush discharge to accommodate the Torit "AN" rotary airlock.

General specifications for screw conveyor:

- All units to be shop assembled, test run, quality control approved and crated for shipment.
- All interior surfaces to be hand cleaned and primed. All exterior surfaces to be acid etched, primed, and painted one coat of Torit blue enamel.
- Components:
  - 3 HP TEFC motor and drive
  - 9H412R-HP helicoid screws
  - Grade 2 coupling bolts with locknuts
  - 2" common drive shaft for airlock
  - 2" hardened coupling shafts



- 9" x 2" style #226 hangers with hard iron bearings (required on all conveyors longer than 10'-0")
- (1) 9" x 2" flush end trough end with (1) 2" waste pack seal with lip seal or felt seal
- (1) 2" flanged ball bearing (all mounted at discharge end)
- (1) 9" x 2" trough end with foot, punched for screw conveyor drive (mounted at intake end)
- 9" x 10ga form top U-troughs with top flange punched for trough hopper collector and with
- (1) flush end discharge
- Silicone flange gaskets
- 1/8"TK neoprene blend top flange gasket
- 9" x 14ga flanged and bolted covers (where required)
- 9" trough support feet at trough joints
- Pricing includes a common drive (20 RPM drive) for a screw conveyor and rotary airlock. Combination drive includes the chain, sprockets, guards, and larger screw conveyor drive as specified above.

### ROTARY AIRLOCK DISCHARGE VALVE

Single rotary valve discharge valve supplied at end of screw conveyor

- **HOUSING**- Valve body and rotor are constructed of mild steel rated at +/- 17"wg and painted with an exterior color of blue. AN valve body, end plate, and rotor are fabricated (not machined). A **12" square** inlet and outlet are provided.
- **ROTOR**- Rotor includes six blades. Each is equipped with flexible **neoprene** wipers.
- **DISCHARGE CAPACITY**- 2.46 ft<sup>3</sup> / rev., sized at 20 RPM.

### SUPPORT LEG STRUCTURE

Support leg structures for collectors with standard hoppers provide 48" clearance below the hopper discharge flange and are designed for seismic zone 4, 100-mph wind load, and 30 lbs. per square foot roof load.

### DUST LADEN AIR INLET

A high inlet creates a general downward airflow pattern in the filter section to optimize filter performance. Top and front inlet locations are standard on each module. Each filter column is protected from direct dust impingement by an internal baffle plate.

### FILTERS PER SPECIFICATION

Donaldson Endura-Tek™ Cartridge. Composition of Media:

- Proprietary blend of cellulose and synthetic fibers.
- Fractional Efficiency: 99.99% on 0.5 µm dust particles.
- Standard Construction
  - Galvanized expanded metal liners with 72% open area.
  - Galvanized steel end caps.
- Structural Integrity
  - Donaldson's Pleatloc™ design maintains uniform pleat spacing throughout filter life.
  - Adhesive spiral beading inside the filter secures pleats and reduces pleat tip abrasion.

- Top Gasket
  - Molded one-piece urethane gaskets provide a positive, airtight seal.
- Operating Temperature
  - 150°F / 65°C maximum.
- Special media treatment allows filters to maintain low airflow restriction in humid operating conditions, resulting in reduced energy requirements and lower operating costs.
- Each filter contains 254 ft<sup>2</sup> media area.

#### **FILTER ACCESS**

Filter cartridges are accessed from outside the collector through round access ports on the front of the unit. Each port provides access to two filter cartridges. No tools are required for filter removal/installation.

#### **FILTER CLEANING**

Periodic pulses of compressed air, using sequential opening/closing of provided solenoid and diaphragm valves, automatically clean cartridges. Pulsed air backflushes in the opposite direction of normal airflow. The proprietary ExtraLife™ cleaning system delivers maximum cleaning energy and provides uniform pulse pressure for superior cleaning effectiveness. Solenoid enclosures are NEMA 4 and factory mounted.

#### **CLEANING CONTROLS**

A solid-state timer enclosure enclosed in integrated control panel (shown below) controls the pulse timing. Standard Dwyer Photohelic® gauge is provided and controls the filter cleaning by measuring and controlling between high- and low-pressure set points. A plastic enclosure protects electronic components, electrical connections, and a glass-epoxy printed circuit board. Phototransistor signal actuates relay, which activates the filter cleaning cycle. CE, UL, SA rated.

#### **INTERGRATED CONTROL PANEL**

Control panels include: IEC through-the-door disconnect switch, manual motor protector with magnetic contactor, control power transformer with 100 VA extra capacity, pulse control using the pulse timer with Photohelic, one set of start-stop push buttons for all motors (fan, airlocks, screw conveyor, etc.) and one pilot light per motor in the panel door, all fuses and terminal blocks as required, all components prewired and mounted in a Type 12 electrical enclosure with ASA-61 gray enamel finish exterior, and white sub panel. Includes UL label.

#### **REQUIRED SERVICES**

The collector requires 20 scfm of maximum 90-100 psig, clean, dry compressed air based on a 10 second pulse interval. Timer requires 110 VAC.

#### **REMOTE FAN**

New York Blower Backward Inclined SWSI, Size 36, PLR Wheel, Class 3, Arrangement 1, Discharge UB, Motor Position W  
 Operating/Design Capacity- 25,015 CFM, 10.0"w.g. Fan SP at 1495 RPM, 54.1 BHP; at 70°F and mean sea level, 0.075 lbs/cubic foot

Motor (Provided and mounted by NYB)  
 Integral, High Efficiency, 60 HP, 1800 RPM, TE, 364T, 3-60-460V

Accessories/Modifications

- Constant V-Belt Drive
- Cleanout Door: Quick Opening
- Drain
- Drain Plug
- Flanged Inlet
- Flanged Outlet
- Belt Guard Position W,Z
- Shaft and Bearing Guard
- Paint all surfaces Torit blue

**UNIT PRICE (EXW: Baldwin, Wisconsin & LaPorte, IN):        \$137,120.00 USD**

Motor & drive breakout prices:

- Fan motor & drive: \$6,027.75 USD
- Rotary Valve motor & drive assembly: \$1,665.00 USD
- Screw Conveyor motor & drive assembly: \$1,800.00 USD

## EQUIPMENT # DC-1-14-DCL-200, 300, 400, & 500

**Donaldson Torit®** offers its Downflo® II series dust collector, **Model DFT 3-24**, as described below:

**Model:** DFT 3-24

**Quantity:** 4

**Filter Area:** 6,096 ft<sup>2</sup>      **Air-to-Media Ratio:** .917 : 1

**Filter Cartridge Material:** Endura Tek 80/20 blend

**Filter Quantity:** 24

**Design Condition:** 5,592 ACFM

**Application:** Reclaim feed dust control

### HOUSING

Bolted and welded ledgeless housing construction is 3/16", 10, and 12 gauge steel and is rated for + 15 /-20" wg, and designed in compliance with IBC2003 International Building Codes.

### FINISH

Exterior surfaces are painted with a blue acrylic urethane finish over an alkyd enamel primer. Coating passes a 350-hour salt spray corrosion performance test. Interior surfaces are primed with blue.

### DISCHARGE HOPPER

**Standard** ledgeless discharge hopper is fabricated of 12-gauge steel. Collector has one common hopper for two (2) modules. Top and bottom flange is square with a 10" discharge opening. The design features no internal ledges.

### SINGLE ROTARY AIRLOCK DISCHARGE VALVE

Single rotary valve discharge valve supplied

- **HOUSING**- Valve body and rotor are constructed of mild steel rated at +/- 17"wg and painted with an exterior color of blue. AN valve body, end plate, and rotor are fabricated (not machined). A **10" square** inlet and outlet are provided.
- **ROTOR**- Rotor includes six blades. Each is equipped with flexible **neoprene** wipers.
- **DISCHARGE CAPACITY**- 1.34 ft<sup>3</sup> / rev., sized at 22 RPM.

### SUPPORT LEG STRUCTURE

Support leg structures for collectors with standard hoppers provide 48" clearance below the hopper discharge flange and are designed for seismic zone 4, 100-mph wind load, and 30 lbs. per square foot roof load.

## **DUST LADEN AIR INLET**

A high inlet creates a general downward airflow pattern in the filter section to optimize filter performance. Top and front inlet locations are standard on each module. Each filter column is protected from direct dust impingement by an internal baffle plate.

## **FILTERS PER SPECIFICATION**

Donaldson Endura-Tek™ Cartridge. Composition of Media:

- Proprietary blend of cellulose and synthetic fibers.
- Fractional Efficiency: 99.99% on 0.5 µm dust particles.
- Standard Construction
  - Galvanized expanded metal liners with 72% open area.
  - Galvanized steel end caps.
- Structural Integrity
  - Donaldson's Pleatloc™ design maintains uniform pleat spacing throughout filter life.
  - Adhesive spiral beading inside the filter secures pleats and reduces pleat tip abrasion.
- Top Gasket
  - Molded one-piece urethane gaskets provide a positive, airtight seal.
- Operating Temperature
  - 150°F / 65°C maximum.
- Special media treatment allows filters to maintain low airflow restriction in humid operating conditions, resulting in reduced energy requirements and lower operating costs.
- Each filter contains 254 ft² media area.

## **FILTER ACCESS**

Filter cartridges are accessed from outside the collector through round access ports on the front of the unit. Each port provides access to two filter cartridges. No tools are required for filter removal/installation.

## **FILTER CLEANING**

Periodic pulses of compressed air, using sequential opening/closing of provided solenoid and diaphragm valves, automatically clean cartridges. Pulsed air backflushes in the opposite direction of normal airflow. The proprietary ExtraLife™ cleaning system delivers maximum cleaning energy and provides uniform pulse pressure for superior cleaning effectiveness. Solenoid enclosures are NEMA 4 and factory mounted.

## **CLEANING CONTROLS**

A solid-state timer enclosure enclosed in integrated control panel (shown below) controls the pulse timing. Standard Dwyer Photohelic® gauge is provided and controls the filter cleaning by measuring and controlling between high- and low-pressure set points. A plastic enclosure protects electronic components, electrical connections, and a glass-epoxy printed circuit board. Phototransistor signal actuates relay, which activates the filter cleaning cycle. CE, UL, SA rated.

## INTERGRATED CONTROL PANEL

Control panels include: IEC through-the-door disconnect switch, manual motor protector with magnetic contactor, control power transformer with 100 VA extra capacity, pulse control using the pulse timer with Photohelic, one set of start-stop push buttons for all motors (fan, airlocks, screw conveyor, etc.) and one pilot light per motor in the panel door, all fuses and terminal blocks as required, all components prewired and mounted in a Type 12 electrical enclosure with ASA-61 gray enamel finish exterior, and white sub panel. Includes UL label.

## REQUIRED SERVICES

The collector requires 20 scfm of maximum 90-100 psig, clean, dry compressed air based on a 10 second pulse interval. Timer requires 110 VAC.

## REMOTE FAN

New York Blower Backward Inclined SWSI, Size 18, PLR Wheel, Class 3, Arrangement 9, Discharge UB, Motor Position L  
Operating/Design Capacity- 5,592 CFM, 10.0"w.g. Fan SP at 2912 RPM, 12. BHP; at 70°F and mean sea level, 0.075 lbs/cubic foot

Motor (Provided and mounted by NYB)  
Integral, High Efficiency, 15 HP, 1800 RPM, TE, 254T, 3-60-460V

### Accessories/Modifications

- Constant V-Belt Drive
- Cleanout Door: Quick Opening
- Drain
- Drain Plug
- Flanged Inlet
- Flanged Outlet
- Belt Guard Position W,Z
- Shaft and Bearing Guard
- Paint all surfaces Torit blue

UNIT PRICE (EXW: Baldwin, Wisconsin & LaPorte, IN): \$44,803.00 USD  
**FOUR (4) UNITS (EXW: Baldwin, Wisconsin & LaPorte, IN): \$179,212.00 USD**

Motor & drive breakout prices:

- Fan motor & drive: \$1,536.30 USD each
- Rotary Valve motor & drive assembly: \$1,385 USD each

## EQUIPMENT #DC-1-16-DCL-600

**Donaldson Torit®** offers its Downflo® II series dust collector, **Model DFT 3-54**, as described below:

**Model:** DFT 3-54

**Quantity:** 1

**Filter Area:** 13,716 ft<sup>2</sup>      **Air-to-Media Ratio:** 1.09 : 1

**Filter Cartridge Material:** Endura Tek 80/20 blend

**Filter Quantity:** 54

**Design Condition:** 15,009 ACFM      **CORRECTION: 15,009 ACFM per crusher;  
30,017 ACFM for both crushers**

**Application:** Pebble crusher dust control

### HOUSING

Bolted and welded ledgeless housing construction is 3/16", 10, and 12 gauge steel and is rated for + 15 /-20" wg, and designed in compliance with IBC2003 International Building Codes.

### FINISH

Exterior surfaces are painted with a blue acrylic urethane finish over an alkyd enamel primer. Coating passes a 350-hour salt spray corrosion performance test. Interior surfaces are primed with blue.

### DISCHARGE HOPPER

**Standard** ledgeless discharge hopper is fabricated of 12-gauge steel. Collector has three (3) hoppers for three (3) modules. Top and bottom flange is square with a 10" discharge opening. The design features no internal ledges.

### ROTARY AIRLOCK DISCHARGE VALVES

Three (3) rotary valve discharge valves supplied (one per hopper)

- **HOUSING-** Valve body and rotor are constructed of mild steel rated at +/- 17"wg and painted with an exterior color of blue. AN valve body, end plate, and rotor are fabricated (not machined). A **10" square** inlet and outlet are provided.
- **ROTOR-** Rotor includes six blades. Each is equipped with flexible **neoprene** wipers.
- **DISCHARGE CAPACITY-** 1.34 ft<sup>3</sup> / rev., sized at 22 RPM.

### SUPPORT LEG STRUCTURE

Support leg structures for collectors with standard hoppers provide 48" clearance below the hopper discharge flange and are designed for seismic zone 4, 100-mph wind load, and 30 lbs. per square foot roof load.

### DUST LADEN AIR INLET

A high inlet creates a general downward airflow pattern in the filter section to optimize filter performance. Top and front inlet locations are standard on each module. Each filter column is protected from direct dust impingement by an internal baffle plate.

## **FILTERS PER SPECIFICATION**

Donaldson Endura-Tek™ Cartridge. Composition of Media:

- Proprietary blend of cellulose and synthetic fibers.
- Fractional Efficiency: 99.99% on 0.5 µm dust particles.
- Standard Construction
  - Galvanized expanded metal liners with 72% open area.
  - Galvanized steel end caps.
- Structural Integrity
  - Donaldson's Pleatloc™ design maintains uniform pleat spacing throughout filter life.
  - Adhesive spiral beading inside the filter secures pleats and reduces pleat tip abrasion.
- Top Gasket
  - Molded one-piece urethane gaskets provide a positive, airtight seal.
- Operating Temperature
  - 150°F / 65°C maximum.
- Special media treatment allows filters to maintain low airflow restriction in humid operating conditions, resulting in reduced energy requirements and lower operating costs.
- Each filter contains 254 ft² media area.

## **FILTER ACCESS**

Filter cartridges are accessed from outside the collector through round access ports on the front of the unit. Each port provides access to two filter cartridges. No tools are required for filter removal/installation.

## **FILTER CLEANING**

Periodic pulses of compressed air, using sequential opening/closing of provided solenoid and diaphragm valves, automatically clean cartridges. Pulsed air backflushes in the opposite direction of normal airflow. The proprietary ExtraLife™ cleaning system delivers maximum cleaning energy and provides uniform pulse pressure for superior cleaning effectiveness. Solenoid enclosures are NEMA 4 and factory mounted.

## **CLEANING CONTROLS**

A solid-state timer enclosure enclosed in integrated control panel (shown below) controls the pulse timing. Standard Dwyer Photohelic® gauge is provided and controls the filter cleaning by measuring and controlling between high- and low-pressure set points. A plastic enclosure protects electronic components, electrical connections, and a glass-epoxy printed circuit board. Phototransistor signal actuates relay, which activates the filter cleaning cycle. CE, UL, SA rated.

## **INTERGRATED CONTROL PANEL**

Control panels include: IEC through-the-door disconnect switch, manual motor protector with magnetic contactor, control power transformer with 100 VA extra capacity, pulse control using the pulse timer with Photohelic, one set of start-stop push buttons for all motors (fan, airlocks, screw conveyor, etc.) and one pilot light per motor in the panel door, all fuses and terminal blocks as required, all components prewired



and mounted in a Type 12 electrical enclosure with ASA-61 gray enamel finish exterior, and white sub panel. Includes UL label.

#### **REQUIRED SERVICES**

The collector requires 20 scfm of maximum 90-100 psig, clean, dry compressed air based on a 10 second pulse interval. Timer requires 110 VAC.

#### **REMOTE FAN**

New York Blower Backward Inclined SWSI, Size 24, PLR Wheel, Class 3, Arrangement 1, Discharge UB, Motor Position W

Operating/Design Capacity- 15,009 CFM, 10.0"w.g. Fan SP at 2522 RPM, 34.4 BHP; at 70°F and mean sea level, 0.075 lbs/cubic foot

Motor (Provided and mounted by NYB)

Integral, High Efficiency, 40 HP, 1800 RPM, TE, 324T, 3-60-575V

#### **Accessories/Modifications**

- Constant V-Belt Drive
- Cleanout Door: Quick Opening
- Drain
- Drain Plug
- Flanged Inlet
- Flanged Outlet
- Belt Guard Position W,Z
- Shaft and Bearing Guard
- Paint all surfaces Torit blue

**UNIT PRICE (EXW: Baldwin, Wisconsin & LaPorte, IN):            \$90,545.00 USD**

Motor & drive breakout prices:

- Fan motor & drive: \$3,464.10 USD
- Rotary Valve motor & drive assembly (3 required on this collector): \$1,385 USD each, \$4,155.00 USD TOTAL

**TERMS:** to be negotiated

**LEAD-TIME:** typically 10-12 weeks to build an order of this size, after approval of drawings

**EXW PLANT:** Baldwin, WI- USA

**FREIGHT REQUIREMENTS:** Collectors shipped knocked down, with hoppers / legs skidded separately from main cabinet

**QUOTE VALIDITY:** Through to end of June 2011

**FREIGHT ESTIMATE TO PORT OF VANCOUVER, BC OR TACOMA, WA:** ~\$25,000.00 USD

Freight Cost –International Shipment DDP (Incoterms 2000) Vancouver, BC or Tacoma, WA based on four (4) flatdeck truckloads full, based on current rates

**EXPORT CRATING:** ~\$7,500.00 to provide complete skeleton style export crating.

**ADDITIONAL COMMERCIAL INFORMATION REQUESTED**

Commercial information is to be provided in the format set out in the tables below.

- CONFIRMED: Budgetary price for all engineering, materials, fabrication, testing and recommended spare parts for the equipment +/- 15%. The preferred currency is US dollars.
- CONFIRMED: Budget price(s) forecast to and valid through to end of June 2011.
- Bidder shall supply a history of price fluctuations for this equipment.
  - Average of *approximately* 4% / year price increase, plus upcoming increase for rising steel costs factored in.
- If applicable, any motors and drives normally supplied with this equipment should also be priced and shown as separate items.
  - See break-out costs in proposal section.
  - See estimates on bid form. This is a fairly detailed process that will take some time to work out in order to be more precise, and final manufacturing / skidding factors into this. Estimate: approx five (5) 40' containers will be required. Block & bracing charges ~\$5,000.00. We recommend this in lieu of Export Crating.
- Point of manufacture to be defined for main equipment components.
  - Dust collectors & rotary valves: Baldwin, WI
  - Fans: LaPorte, IN
- Shipping weights and dimensions are required on main equipment components, including descriptions of largest items.
  - See bid form.
- Delivery time for equipment.
  - 10-12 weeks to build an order of this size, after approval of drawings and release for manufacture.

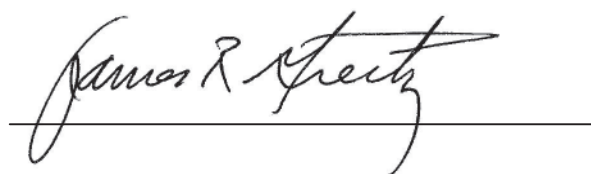
Thank you for the opportunity to quote your dust control equipment needs. Please contact this office with any questions.

Michael Meade  
Energy Technology Products  
A division of Industrial Pollution Control, Inc.  
Phone: 604-291-6851  
Fax: 604-291-6855  
E-mail: [mike@etpbc.ca](mailto:mike@etpbc.ca)

Authorized Representative: Donaldson Company IAF- Torit® Products

## Limited Warranty

Donaldson warrants to the original purchaser that the major structural components of the goods will be free from defects in materials and workmanship for ten (10) years from the date of shipment, if properly installed, maintained and operated under normal conditions. Donaldson warrants all other Donaldson-built components and accessories including Donaldson Airlocks, TBI Fans, TRB Fans, Fume Collector products, and Donaldson-built Afterfilter housings for twelve (12) months from date of shipment. Donaldson warrants Donaldson-built filter elements to be free from defects in materials and workmanship for eighteen (18) months from date of shipment. Donaldson does not warrant against damages due to corrosion, abrasion, normal wear and tear, product modification or product misapplication. Donaldson also makes no warranty whatsoever as to any goods manufactured or supplied by others including electric motors, fans and control components. After Donaldson has been given adequate opportunity to remedy any defects in material or workmanship, Donaldson retains the sole option to accept return of the goods, with freight paid by the purchaser, and to refund the purchase price for the goods after confirming the goods are returned undamaged and in usable condition. Such a refund will be the full extent of Donaldson's liability. Donaldson shall not be liable for any other costs, expenses or damages whether direct, indirect, special, incidental, consequential or otherwise. The terms of this warranty may be modified only by a special warranty document signed by a Director, General Manager or Vice President of Donaldson. Failure to use genuine Donaldson replacement parts may void this warranty. **THERE EXIST NO OTHER REPRESENTATIONS, WARRANTIES OR GUARANTEES EXCEPT AS STATED IN THIS PARAGRAPH AND ALL OTHER WARRANTIES INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHETHER EXPRESS OR IMPLIED ARE HEREBY EXPRESSLY EXCLUDED AND DISCLAIMED.**



James R. Giertz  
Senior Vice President  
Commercial & Industrial Group



**Donaldson**

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MWG

Rev. 4-1-04

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## TECHNICAL SPECIFICATION

<b>LIME HANDLING AND STORAGE SYSTEM</b>	<b>166549-16-SP-042A</b>
Donlin Creek Feasibility Study Update 2	REV. B
Alaska, USA	Project No. 166549

### 4.0 BIDDER DATA SHEETS

<b>Equipment Number</b>		<b>DC-1-15-DMP-500</b>
<b>Equipment Name</b>		<b>DUMPER/TILTER, LIME CONTAINER</b>
<b>No. Operating / Spare</b>		<b>One / None</b>
Manufacturer		Phelps/A-Ward or Equal
Model No.		
Platform Dimensions (L x W)	m	6.405 x 2440
Beam size		
Decking Thickness		9.5 mm
Materials		Carbon steel
Maximum Tilt Angle	Deg.	55 Deg.
Maximum lift capacity	kg (lbs)	27272 (60000)
Maximum Container size		6100 mm long
Platform Raise time	Minutes	83 seconds
Platform Lower time	Minutes	75 seconds
<b>Mounting</b>		
Cylinder mount type		PIT Type
Pivot pedestal bases provided	Yes / No	Yes
Pivot Pin Size / Material	mm /	50 mm 4140 Heat Treated Steel
<b>Cylinders</b>		
Cylinder description		Two (2) 3 Stage Single Acting Telescoping
No. Cylinders		Two
Operating pressure	kPa	1500 psi
Max. operating pressure	kPa	2000 psi
Cylinder Diameter	mm	120 Final Stage
<b>Hydraulic Power Unit</b>		
Fluid Reservoir capacity	L (usg)	300 usg
Pump manufacturer		Vickers
Pump Model		
Pump size	mm x mm	
<b>Motor</b>		
Rating	HP (kW) /RPM	40 (30.34) 1800
Frame / Encl. / SF / Eff.		
Volts / Phase / Freq	V / Ph / Hz	480/3/60

## TECHNICAL SPECIFICATION

<b>LIME HANDLING AND STORAGE SYSTEM</b>	<b>166549-16-SP-042A</b>
Donlin Creek Feasibility Study Update 2	REV. B
Alaska, USA	Project No. 166549

VFD	Yes / No	No
<b>Coatings</b>		
Exterior Primer	Type/ DFT/SSPC	2 mils Red Oxide SSSP-SP6
Exterior Finish	Type/ DFT/SSPC	2 mils Industrial Enamel
Dumper platform weight	kg	3450
Total Dumper assembly weight	kg	6850
<b>Equipment Number</b>		<b>DC-1-15-HOP-535</b>
<b>Equipment Name</b>		<b>HOPPER, LIME STORAGE</b>
<b>No. Operating / Spare</b>		<b>One / None</b>
Manufacturer		PCE Sales & Engineering Inc.
Model No.		
Hopper Dimensions (LxW or Dia.)	m	3.0 m x 4.5 m
Hopper Height	m	8.235
Nominal bulk density	kg/m <sup>3</sup>	880
Design moisture content	% wt	Minus 1%
Design bulk density	kg/m <sup>3</sup>	965
Design Angle of Repose	Degree	40 Degrees
Hopper Capacity (weight)	tonnes	2
Hopper Capacity (volume)	m <sup>3</sup>	36
Storage Height-Straight Side	m	4
Hopper Bottom Angle (Min. 60°)	Degree	60 Degrees
Hopper Bottom Opening	mm	457mm x 4500 mm
Bottom Clearance (Flg. to grade)	m	1.6
<b>Plate Material</b>		<u>Note:</u> corrosion allowance for plates required
Type/Grade	ASTM	A 36
Hopper plate thickness	mm	6 mm
Roof plate thickness	mm	N/A
Cone plate thickness	mm	6 mm
Skirt plate thickness	mm	N/A
Hopper weight (empty)	tonnes	7.7
<b>Coatings</b>		
Interior Hopper	Type/ DFT/SSPC	N/A
Interior Skirt	Type/ DFT/SSPC	N/A
Exterior Primer	Type/ DFT/SSPC	3 mils DFT Inorganic Ethyl Zinc
Exterior Finish	Type/ DFT/SSPC	2-3 mils Epoxy
<b>Level Measuring System</b>		

## TECHNICAL SPECIFICATION

<b>LIME HANDLING AND STORAGE SYSTEM</b>	<b>166549-16-SP-042A</b>
Donlin Creek Feasibility Study Update 2	REV. B
Alaska, USA	Project No. 166549

Type		
Manufacturer		
Description		
<b>Equipment Number</b>		<b>DC-1-15-FEE-800</b>
<b>Equipment Name</b>		<b>LIME SCREW FEEDER NO 1</b>
<b>No. Operating / Spare</b>		<b>One / None</b>
Make/Model		18" - SF-6100
CEMA level		CEMA Standard
Design bulk density	kg/m <sup>3</sup>	880
Rated Capacity	kg/h m <sup>3</sup> /h	27000 30.68
% Motor Speed at Rated Capacity	%	75 %
Feed Connection	mm	457 mm x 4500 mm
Discharge Connection	mm	457 mm x 457 mm
Trough shape / covers		"U" Trough
Trough material		Carbon Steel
Trough thickness	mm	6 mm
Screw diameter	mm	457
Screw length	m	6100
Screw incline	Degree	0 Degrees
Screw flights (description)		Variable pitch
Screw Flights Material		AR 400
Screw Thickness	mm	9.5
Screw load % at design capacity	%	100%
Screw speed	RPM	30
Screw BHP for maximum flow		20
<b>Drive</b>		
Drive manufacturer		Dodge
<b>Motor</b>		
Rating	HP (kW) /RPM	20 (14.8) 1800
Frame / Encl. / SF / Eff.		
Volts / Phase / Freq	V / Ph / Hz	480/3/60
VFD	Yes / No	Yes (by others)
Gear reducer type		Shaft Mount
Gear reducer make/model		Dodge TA Series

## TECHNICAL SPECIFICATION

<b>LIME HANDLING AND STORAGE SYSTEM</b>	<b>166549-16-SP-042A</b>
Donlin Creek Feasibility Study Update 2	REV. B
Alaska, USA	Project No. 166549

Gear ratio / service factor		25: 1 – 1.15
V-belt type / service factor		1.5
Bearing L-10 life	hours	
Sheave diameter (Driver/Driven)	mm / mm	
Guards included (Shaft & Belt)	Yes/No	Yes
<b>Coatings</b>		
Interior	Type/ DFT/SSPC	Shop Primer
Exterior Primer	Type/ DFT/SSPC	2 mils Red Oxide SSSP-SP6
Exterior Finish	Type/ DFT/SSPC	2 mils Industrial Enamel
<b>Equipment Number</b>		<b>DC-1-15-BLO-810</b>
<b>Equipment Name</b>		<b>BLOWER, LIME CONVEYING</b>
<b>No. Operating / Spare</b>		<b>One / None</b>
Manufacturer		Blower Engineering.
Model No.		TL100V
Blower Type		Tri Lobe Positive Displacement
Size (Suction x Discharge)	mm x mm	150 mm x 150 mm
Design Capacity	m <sup>3</sup> /h / ACFM	2550 / 1500
Design Pressure	kPa	48.26
BHP at design point	HP(kW)	67.4 (49.8)
<b>Blower Materials</b>		
Blade		Cast Iron
Casing		Cast Iron
Shaft		
<b>Blower Motor</b>		
Rating	HP (kW) /RPM	75 (55.5) 1800 RPM
Frame / Encl. / SF / Eff.		
Volts / Phase / Freq	V / Ph / Hz	480/3/60
VFD	Yes / No	No
<b>Equipment Number</b>		<b>DC-1-15-BIN-800</b>
<b>Equipment Name</b>		<b>SILO, LIME STORAGE</b>
<b>No. Operating / Spare</b>		<b>One / None</b>
Manufacturer		CST Storage
Model No.		15.385
Silo Diameter	m	4.689
Silo Height	m	14.630



## TECHNICAL SPECIFICATION

<b>LIME HANDLING AND STORAGE SYSTEM</b>	<b>166549-16-SP-042A</b>
Donlin Creek Feasibility Study Update 2	REV. B
Alaska, USA	Project No. 166549

Nominal bulk density	kg/m <sup>3</sup>	880
Design moisture content	% wt	0.5%
Design bulk density	kg/m <sup>3</sup>	965
Design Angle of Repose	Degree	40
<b>Silo Capacity (weight)</b>	<b>tonnes</b>	<b>122</b>
Silo Capacity (volume)	m <sup>3</sup>	139
Storage Height-Straight Side	m	11.44
Cone Bottom Angle (Min. 60°)	Degree	60
Cone Bottom Opening	mm	2133
Bottom Clearance (Flg. to grade)	m	4.267
<b>Plate Material</b>		<u>Note:</u> corrosion allowance for plates required
Type/Grade	ASTM	A 36
Silo plate thickness	mm	Min 10GA
Roof plate thickness	mm	Min 10GA
Cone plate thickness	mm	Min 10GA
Skirt plate thickness	mm	Min 10GA
Silo weight (empty)	tonnes	
Silo vacuum valve setting		0.502
Silo relief valve setting	kPa	0.4502
<b>Coatings</b>		
Interior Silo	Type/ DFT/SSPC	5 mils Epoxy – SSPC-SP10
Interior Skirt	Type/ DFT/SSPC	5 mils Epoxy – SSPC-SP10
Exterior Primer	Type/ DFT/SSPC	3 mils Epoxy – SSPC-SP10
Exterior Finish	Type/ DFT/SSPC	1.5 mils Urethane
<b>Silo Measuring System</b>		
Type		Guided Level Radar
Manufacturer		Endress & Hauser
Description		Model FMP 40
<b>Equipment Number</b>		<b>DC-1-15-DCL-700</b>
<b>Equipment Name</b>		<b>COLLECTOR, LIME STORAGE SILO DUST</b>
<b>No. Operating / Spare</b>		<b>One / None</b>
<b>DUST FILTER</b>		
<b>Make/Model</b>		<b>Ultra BB-36-58IIG</b>
Filter area	m <sup>2</sup>	24
Air to cloth ratio		5.79: 1

## TECHNICAL SPECIFICATION

<b>LIME HANDLING AND STORAGE SYSTEM</b>	<b>166549-16-SP-042A</b>
Donlin Creek Feasibility Study Update 2	REV. B
Alaska, USA	Project No. 166549

Filter bag type & material		16 oz Polyester Felt
Design pressure	mm / in (H <sub>2</sub> O)	20" W.G.
<b>Filter Cleaning</b>		
Type of filter cleaning		Pulse Jet
Compressed air required	m <sup>3</sup> /h	14
	kPa	620
Dry Air Required	Yes / No	Yes
<b>VENT FAN</b>		
Manufacturer		Cincinnati Fan
Model		PB 14A
Size (Suction x Discharge)	mm x mm	150 mm dia.
<b>Design Capacity</b>	<b>m<sup>3</sup>/h / ACFM</b>	<b>2540 x 1500</b>
Design Pressure	mm / in (W.C.)	6" W.G.
BHP at design point	HP(kW)	5.0 (3.7)
<b>Fan Materials</b>		
Blades		Cast Aluminum
Casing		Cast Aluminum
Shaft		Steel
<b>Fan Motor</b>		
Rating	HP (kW) /RPM	7.5 HP – 3600 RPM
Frame / Encl. / SF / Eff.		
Volts / Phase / Freq	V / Ph / Hz	480/3/60
VFD	Yes / No	No
Discharge Dampener	Yes / No	Yes
Weight of Blower Assembly	kg	110
<b>Equipment Number</b>		<b>DC-1-15-MXR-410</b>
<b>Equipment Name</b>		<b>ACTIVATOR, LIME STORAGE SILO</b>
<b>No. Operating / Spare</b>		<b>One / None</b>
Make/Model		Carman GBD-7
Type		Vibrating
Diameter	mm	2133
Height	mm	1200
Compressed air flow required	m <sup>3</sup> /h	N/A
Compressed air pressure	kPa	N/A
<b>Activator Motor</b> (if required)		

## TECHNICAL SPECIFICATION

<b>LIME HANDLING AND STORAGE SYSTEM</b>	<b>166549-16-SP-042A</b>
Donlin Creek Feasibility Study Update 2	REV. B
Alaska, USA	Project No. 166549

Rating	HP (kW) /RPM	1.5 HP 1800 RPM
Frame / Encl. / SF / Eff.		Shaker Motor
Volts / Phase / Freq	V / Ph / Hz	480/3/60
VFD	Yes / No	No
Rubber vibration isolator size		
<b>Equipment Number</b>		<b>DC-1-15-FEE-800</b>
<b>Equipment Name</b>		<b>FEEDER, LIME SCREW NO 2</b>
<b>No. Operating / Spare</b>		<b>One / None</b>
Make/Model		
CEMA level		CEMA Standard
Design bulk density	kg/m <sup>3</sup>	965
Rated Capacity	kg/h m <sup>3</sup> /h	10,000 11.36
% Motor Speed at Rated Capacity	%	75 %
Feed Connection	mm	300
Discharge Connection	mm	300
Trough shape / covers		"U" Trough
Trough material		A-36
Trough thickness	mm	6
Screw diameter	mm	355
Screw length	m	5.49
Screw incline	Degree	13
Screw flights (description)		Half & Full Pitch
Screw Flights Material		AR 400
Screw Thickness	mm	6
Screw load % at design capacity	%	50 %
Screw speed	RPM	35
Screw BHP for maximum flow		6
<b>Drive</b>		
Drive manufacturer		Dodge Reducer
<b>Motor</b>		
Rating	HP (kW) /RPM	7.5 (5.5) 1800
Frame / Encl. / SF / Eff.		
Volts / Phase / Freq	V / Ph / Hz	480/3/60
VFD	Yes / No	Yes (by others)

## TECHNICAL SPECIFICATION

<b>LIME HANDLING AND STORAGE SYSTEM</b>	<b>166549-16-SP-042A</b>
Donlin Creek Feasibility Study Update 2	REV. B
Alaska, USA	Project No. 166549

Gear reducer type		Shaft Mount
Gear reducer make/model		Dodge TA Series
Gear ratio / service factor		25: 1 1.5
V-belt type / service factor		1.5
Bearing L-10 life	hours	
Sheave diameter (Driver/Driven)	mm / mm	
Guards included (Shaft & Belt)	Yes/No	
<b>Coatings</b>		
Interior	Type/ DFT/SSPC	Shop Primer
Exterior Primer	Type/ DFT/SSPC	2 mils Red Oxide SSSP-SP6
Exterior Finish	Type/ DFT/SSPC	2 mils Industrial Enamel
<b>Equipment Number</b>		<b>DC-1-15-MIL-400</b>
<b>Equipment Name</b>		<b>MILL, LIME SLAKER BALL</b>
<b>No. Operating / Spare</b>		<b>One / None</b>
Diameter	m	2.44
Length	m	4.05 EGL
Total weight	kg	
<b>Mill Drive</b>		
Motor manufacturer		
Rating	HP (kW) /RPM	250 kW
Frame / Encl. / SF / Eff.		
Volts / Phase / Freq	V / Ph / Hz	480/3/60
VFD	Yes / No	No
<b>Shell</b>		
Shell plate material		Low Carbon Steel
Shell plate thickness	mm	
Shell flange material		
Shell flange thickness	mm	
Number of shell sections		
<b>Head</b>		
Head Material		Cast AS1831-500-7
Thickness at trunnion	mm	
Thickness at shell flange	mm	
<b>Trunnions</b>		
Material		

## TECHNICAL SPECIFICATION

<b>LIME HANDLING AND STORAGE SYSTEM</b>	<b>166549-16-SP-042A</b>
Donlin Creek Feasibility Study Update 2	REV. B
Alaska, USA	Project No. 166549

Outside diameter	m	
Overall length	mm	
<b>Mill Liners</b>		
Material / type / thickness	mm	Rubber 70-80 mm w/ 175 mm Lifter Bars
Slot width inboard/outboard	mm	
Pebble port size	mm	
Total open area of pebble ports	mm <sup>2</sup>	
Total open area of grate sections	mm <sup>2</sup>	
Thickness	mm	
<b>Feed Chute</b>		
Feed spout material		
Retractable yes/no?		
<b>Trunnion bearings</b>		
Describe type		Spherical Roller
Diameter of bearing surface	mm	
Arc of bearing surface	mm	
Length of bearing surface	mm	
Bearing surface material		
<b>Ring Gear</b>		N/A
Gear manufacturer		
Pitch diameter	mm	
Face width	mm	
Type		
Number of teeth		
Material		
<b>Pinion</b>		
Manufacturer		
Pitch diameter	mm	
Face width	mm	
Number of teeth		
Material		
Pinion speed		
Shaft integral		
<b>Mill Weights</b>		
Ball mill weight, empty	kg	

## TECHNICAL SPECIFICATION

<b>LIME HANDLING AND STORAGE SYSTEM</b>	<b>166549-16-SP-042A</b>
Donlin Creek Feasibility Study Update 2	REV. B
Alaska, USA	Project No. 166549

Ball mill weight, full	kg	
Liner weight	kg	
<b>Trommel</b>		
Feed chute size	mm	
Mill trommel size	mm	
Trommel lining		
<b>Inching Drive</b>		Included
Speed	RPM	
<b>Motor</b>		
Rating	HP (kW) /RPM	1.5 (1.11) 1800 RPM
Frame / Encl. / SF / Eff.		Shaker Motor
Volts / Phase / Freq	V / Ph / Hz	480/3/60
VFD	Yes / No	No
<b>Equipment Number</b>		<b>DC-1-15-PBX-850</b>
<b>Equipment Name</b>		<b>PUMPBOX, SLAKER CYCLONE FEED</b>
<b>No. Operating / Spare</b>		<b>One / None</b>
Length x width x depth	m x m x m	1830 mm dia. x 1058 mm high
Freeboard	mm	305
Plate thickness	mm	6
Corrosion allowance	mm	NIL
Liner material		Rubber
Liner thickness	mm	6 mm
<b>Equipment Number</b>		<b>DC-1-15-AGI-850</b>
<b>Equipment Name</b>		<b>AGITATOR, SLAKER CYCLONE FEED PUMPBOX</b>
<b>No. Operating / Spare</b>		<b>One / None</b>
Make/Model		Lightnin or Equal
Type of Impeller		A-510 Laser foil
Impeller Diameter	mm	
Shaft Length	mm	1524
Shaft Dia.	mm	
Shaft Material		Carbon Steel Rubber coated
Agitator Operating Speed	rpm	
Speed reducer type		Helical
Reduction ratio		
<b>Agitator Motor</b>		

## TECHNICAL SPECIFICATION

<b>LIME HANDLING AND STORAGE SYSTEM</b>	<b>166549-16-SP-042A</b>
Donlin Creek Feasibility Study Update 2	REV. B
Alaska, USA	Project No. 166549

Rating	HP (kW) /RPM	3.0 (2.22) 1800 RPM
Frame / Encl. / SF / Eff.		
Volts / Phase / Freq	V / Ph / Hz	480/3/60
VFD	Yes / No	No

## TECHNICAL SPECIFICATION

<b>LIME HANDLING AND STORAGE SYSTEM</b>	<b>166549-16-SP-042A</b>
Donlin Creek Feasibility Study Update 2	REV. B
Alaska, USA	Project No. 166549

Equipment Number		DC-1-15-PPP-605 & -606
Equipment Name		PUMP, LIME BALL MILL CYCLONE FEED SLURRY No1 /No2
No. Operating / Spare		One / One
Manufacturer		Wilfley
Pump model no. / size		3K
Curve no.		
Design capacity	m <sup>3</sup> /h	91
Design head	m	27
BHP at design operating point	HP (kW)	22 (16)
BHP at max. design point	HP (kW)	
Pump design speed	RPM	1400
Design operating Pt. Efficiency	%	
Suction flange	mm	125
Discharge flange	mm	75
Pump frame length	mm	
Impeller type: open/closed/recessed		
Impeller size	mm	
Impeller tip speed	m/s	
Casing material		White Iron – 400-600 HBN
Casing liner material		N/A
Casing liner hardness	R <sub>b</sub>	N/A
Casing liner thickness	mm	N/A
Impeller material		White Iron – 400-600 HBN
Impeller liner material		N/A
Impeller liner hardness	R <sub>b</sub>	N/A
Impeller liner thickness	mm	N/A
Shaft material		
Hydrostatic test pressure	kPa (ga)	
Pump weight / motor weight	kg / kg	500
Baseplate weight	kg	
Total weight	kg	800
<b>Pump Motor</b>		
Rating	HP (kW) /RPM	30 (22.2)
Frame / Encl. / SF / Eff.		



## TECHNICAL SPECIFICATION

<b>LIME HANDLING AND STORAGE SYSTEM</b>	<b>166549-16-SP-042A</b>
Donlin Creek Feasibility Study Update 2	REV. B
Alaska, USA	Project No. 166549

<b>Equipment Number</b>		<b>DC-1-15-PPP-605 &amp; -606</b>
<b>Equipment Name</b>		<b>PUMP, LIME BALL MILL CYCLONE FEED SLURRY No1 /No2</b>
<b>No. Operating / Spare</b>		<b>One / One</b>
Manufacturer		Wilfley
Volts / Phase / Freq	V / Ph / Hz	480/3/60
VFD	Yes / No	Yes
Frame Size / Efficiency		
Enclosure		
<b>Equipment Number</b>		<b>DC-1-15-CYL-400</b>
<b>Equipment Name</b>		<b>CYCLONE, LIME BALL MILL</b>
<b>No. Operating / Spare</b>		<b>One / One</b>
Cyclone Size / Model Number		gMax 10-3/39
Number of Operating Cyclones		One
Number of Standby Cyclones		Nil
Number of Spare Cyclone Connections		Nil
Cyclone Feed Connection Size	mm	100
Overflow Connection Size	mm	150
Inlet Area	mm <sup>2</sup>	
Size of Vortex Finder	mm	
Fixed or Variable Apex		Fixed
Recommended Apex Size	mm	
<b>Materials of Construction:</b>		
Cyclone Body		Carbon Steel
Liner		Rubber
Liner Thickness	mm	12 mm & 6 mm
Vortex Finders		Included
Apexes		
Feed Distributor		N/A
Feed Distributor Liner		N/A
Feed Distributor Liner Thickness	mm	N/A
Launder		By Others
Launder Plate Thickness	mm	N/A
Launder Liner		N/A
Launder Liner Thickness	mm	N/A
Vertical Feed Pipe Diameter	mm	

## TECHNICAL SPECIFICATION

<b>LIME HANDLING AND STORAGE SYSTEM</b>	<b>166549-16-SP-042A</b>
Donlin Creek Feasibility Study Update 2	REV. B
Alaska, USA	Project No. 166549

<b>Equipment Number</b>		<b>DC-1-15-PPP-605 &amp; -606</b>
<b>Equipment Name</b>		<b>PUMP, LIME BALL MILL CYCLONE FEED SLURRY No1 /No2</b>
<b>No. Operating / Spare</b>		<b>One / One</b>
Manufacturer		Wilfley
Vertical Feed Pipe Liner		Manufacturer Cyclone : FL Smidth - Rubber
Vertical Feed Pipe Liner Thickness	mm	12 mm
<b>Ancillaries</b>		
Pressure Gauge Range	kPag	
Isolation Valve Manufacturer		N/A
Isolation Valve Model No. / Type		N/A
Isolation Valve Size	mm	N/A
Actuator Manufacturer		N/A
Actuator Model No. / Type		N/A
Solenoid Valve Manufacturer		N/A
Solenoid Valve Model No. / Type		N/A
Instrument Air Pressure Required	kPag	N/A
<b>Surface Preparation &amp; Finish</b>		SSPC-SP6
Cyclone Primer Type		Carboline Epoxy
Cyclone Primer DFT	mils	1.5 – 3 mils
Cyclone Finish Type		Carboline 893 and carboline 890
Cyclone Finish DFT	mils	10-15 mils
<b>Launder Primer Type</b>		N/A
Launder Primer DFT	mils	N/A
Launder Finish Type		N/A
Launder Finish DFT	mils	N/A
<b>Weights &amp; Dimensions</b>		
Weight of Individual Cyclone	kgs	
Empty Weight of Complete Assembly	kgs	
Operating Weight of Complete Assembly	kgs	
Overall Dimensions	mm	400 mm x 1750 mm

## TECHNICAL SPECIFICATION

<b>LIME HANDLING AND STORAGE SYSTEM</b>	<b>166549-16-SP-042A</b>
Donlin Creek Feasibility Study Update 2	REV. B
Alaska, USA	Project No. 166549

<b>Equipment Number</b>		<b>DC-1-15-PPP-605 &amp; -606</b>
<b>Equipment Name</b>		<b>PUMP, LIME BALL MILL CYCLONE FEED SLURRY No1 /No2</b>
<b>No. Operating / Spare</b>		<b>One / One</b>
Manufacturer		Wilfley
<b>Equipment Number</b>		<b>DC-1-15-LUB-600</b>
<b>Equipment Name</b>		<b>SPRAY UNIT, LIME SLAKER GEAR</b>
<b>No. Operating / Spare</b>		<b>One / None</b>
Oil tank capacity	liters	
Lube type		
Air flow required	m <sup>3</sup> /h	
Air pressure required	kPa (ga)	
Pump manufacturer		
Pump model		
Pump capacity	m <sup>3</sup> /h	
<b>Motor</b>		
Motor manufacturer		
Rating	HP (kW) /RPM	
Frame / Encl. / SF / Eff.		
Volts / Phase / Freq	V / Ph / Hz	
<b>Equipment Number</b>		<b>DC-1-15-LUB-601</b>
<b>Equipment Name</b>		<b>LUBE UNIT, LIME SLAKER</b>
<b>No. Operating / Spare</b>		<b>One / None</b>
Number of pumps required		
Pump manufacturer		
Pump model		
Pump capacity	m <sup>3</sup> /h	
<b>Motor</b>		
Motor manufacturer		
Rating	HP (kW) /RPM	
Frame / Encl. / SF / Eff.		
Volts / Phase / Freq	V / Ph / Hz	
Duplex filters		
Cooler manufacturer		

## TECHNICAL SPECIFICATION

<b>LIME HANDLING AND STORAGE SYSTEM</b>	<b>166549-16-SP-042A</b>
Donlin Creek Feasibility Study Update 2	REV. B
Alaska, USA	Project No. 166549

<b>Equipment Number</b>		<b>DC-1-15-PPP-605 &amp; -606</b>
<b>Equipment Name</b>		<b>PUMP, LIME BALL MILL CYCLONE FEED SLURRY No1 /No2</b>
<b>No. Operating / Spare</b>		<b>One / One</b>
Manufacturer		Wilfley
Cooler model		
Cooler size	mm	
Tubes size / material	mm /	
Shell size / material	mm /	
<b>Equipment Number</b>		<b>DC-1-15-SBW-550</b>
<b>Equipment Name</b>		<b>SCRUBBER, LIME SLAKER VENT</b>
<b>No. Operating / Spare</b>		<b>One / None</b>
Manufacturer		Micropul or Equal
Model		42
Diameter	mm	1067
Height	mm	4070
Inlet / Discharge size	mm x mm	838 mm x 508 mm
Wall thickness	mm	11 GA
Scrubber Materials		304 Stainless Steel in Contact
<b>Water Requirements</b>		
Flow rate	m <sup>3</sup> /h	4.5
Pressure	kPa	155
Temp. (range)	°C	+ 5°C
Number of spray nozzles		5
Inlet / Outlet Size	mm	838 mm x 508 mm
Scrubber Assembly Weight	kg	1400
<b>Equipment Number</b>		<b>DC-1-15-FAN-805</b>
<b>Equipment Name</b>		<b>LIME SLAKER VENT SCRUBBER FAN</b>
<b>No. Operating / Spare</b>		<b>One / None</b>
Manufacturer		Micropul or Equal
Model		
<b>Scrubber fan flow</b>	<b>m<sup>3</sup>/h</b>	<b>1067</b>
<b>Fan Motor</b>		
Rating	HP (kW) /RPM	30 (22.2) 1800 RPM

## TECHNICAL SPECIFICATION

<b>LIME HANDLING AND STORAGE SYSTEM</b>	<b>166549-16-SP-042A</b>
Donlin Creek Feasibility Study Update 2	REV. B
Alaska, USA	Project No. 166549

<b>Equipment Number</b>		<b>DC-1-15-PPP-605 &amp; -606</b>
<b>Equipment Name</b>		<b>PUMP, LIME BALL MILL CYCLONE FEED SLURRY No1 /No2</b>
<b>No. Operating / Spare</b>		<b>One / One</b>
Manufacturer		Wilfley
Frame / Encl. / SF / Eff.		
Volts / Phase / Freq	V / Ph / Hz	480/3/60
VFD	Yes / No	No
V-Belt quantity		
V-Belt profile		
V-Belt service factor		1.15
Sheave diameter (Driver/Driven)	mm / mm	
Vent Fan Assembly Weight	kg	Included with Scrubber