NOTICE OF CONSTRUCTION PERMIT APPLICATION

twelve

Twelve Benefit Corporation / Project Rainier Modification NOC

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1. EXECUTIVE SUMMARY

Twelve Benefit Corporation (Twelve) is submitting this Notice of Construction (NOC) application for the modification of the existing Approval Order No. 23AQ-E048 for Project Rainier, a pilot scale Sustainable Aviation Fuel (SAF) and Naphtha production facility located in Moses Lake, WA (the Facility). This application covers the following changes that are being requested to be incorporated into the Approval Order for the Facility:

- Installation of a 1,502 brake horsepower (bhp), diesel-fired emergency engine;
- Modification to process off-gas operating scenarios based on refined engineering design, which will modify the flare operations; and,
- Updated storage capacity for the primary E-Jet storage tank.

This report and the associated appendices serve as the NOC application for the proposed Facility modification. This application includes the following elements:

- Section 2: Project Description
- Section 3: Emission Calculations
- Section 4: Regulatory Review
- Section 5: Best Available Control Technology
- Section 6: Dispersion Modeling Analysis
- Appendix A: NOC Forms and SEPA DNS
- Appendix B: Site Plans and Drawings
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- Appendix D: Vendor Specifications
- Appendix E: Modeling Files
- Appendix F: Approval Order No. 23AQ-E048 Redline
- Appendix G. BACT Cost Calculation and Support Documents

2. PROJECT DESCRIPTION

The Facility will be located at 13583 Wheeler Rd NE, Moses Lake, WA. The pilot plant operations will include the delivery of carbon dioxide (CO_2) via trucks and process equipment to facilitate the conversion of CO_2 and water (H_2O) to the primary product, a sustainable jet fuel (E-Jet) and naphtha. These renewable fuels will be stored in individual storage tanks prior to being loaded out to trucks for shipment offsite.

2.1 Project Description

Further engineering review of the proposed Facility has determined the need to modify the existing Approval Order to accommodate modifications to the process tail gas emission scenarios and flare operating cases. The proposed modified emission sources at the Facility discussed in this NOC application include:

- The enclosed ground flare for control of various process waste gas streams and emergency releases from process equipment;
- A 1,502 brake horsepower (bhp) emergency diesel generator; and,
- The E-Jet product storage tank (permitted at 5,000 gallons of capacity).

The following section describes these proposed emissions source modifications in further detail.

2.2 Emission Source Modification Descriptions

2.2.1 Flare Operational Scenarios

The enclosed ground flare will be used to control emissions from various process waste gas streams and equipment prior to gaseous discharge to atmosphere. Twelve proposes to include or update the following operational scenarios for the flare:

- Normal process load;
- Shutdowns;
- Start-ups following a plant shutdown;
- Plant commissioning; and,
- Catastrophic plant-wide failures.

Twelve's enclosed flare is being designed to handle the worst-case load (during catastrophic plant-wide failures) while also effectively controlling emission from other operating scenarios (e.g., normal process waste gas). This requires the flare to control gas streams across a wide range of flow rates and vent gas heating values depending on whether the process is in startup, shutdown, normal operating, or upset scenarios. Twelve's enclosed ground flare is equipped with variable air-assist to support smokeless operation in all normal, startup, shutdown, and most catastrophic failure cases. The air assist is controllable such that the air assist valves can be automatically switched on when an online calorimeter indicates assist air is required to maintain smokeless operation.

Based on further refined plant design, Twelve has determined that during periods of flare operation with air assist off, a lower gas heat content of 200 Btu/scf may be appropriate for flare operation as opposed to the previously posed 300 Btu/scf high heating value limit established in the existing Approval Order No. 23AQ-E048, as the flare can be considered "nonassisted" during these periods as required per 40 CFR 60.18(c)(3)(ii).

To facilitate proper flare operation, Twelve will install an online flare header flow meter and calorimeter that continuously monitors the flow rate and heating value of the waste gas routed to the flare. The calorimeter's heating value measurement will be used to control the need for assist air and as necessary for some gas streams (e.g., streams comprised primarily of inert gas or carbon dioxide), supplementary propane or hydrogen.

The flare manufacturer has stated that air assist will be required for gas streams with a heat content above 1,100 Btu/scf. Most process waste gas streams, including the anticipated normal tail gas, that will be routed to the flare will have a heat content below the level that would require air assist so the flare is anticipated to normally operate without air assist. During high heating value scenarios (greater than 1,100 Btu/scf as indicated by the flare vendor), assist air is necessary to support smokeless flare operation. These high heating value scenarios are only expected to occur during emergency operation.

When above this heat content level, assist air will be engaged to keep the flare in a smokeless operating regime. During low heating value scenarios, the assist air valves will be closed such that the flare will operate non-assisted. Twelve proposes operating the flare during non-assisted periods with waste gas streams of a heating value >200 Btu/scf, dosed with propane or hydrogen as required to maintain the non-assisted minimum Btu/scf set point. Hydrogen gas may be used in place of propane as the supplemental combustion gas, however propane is assumed to be used in this application as it is more conservative from an emissions standpoint. As documented in the emission calculations of Appendix C, the normal plant operations waste gas is expected to have low heating values where the flare will operate without assist air.

Both the flow meter and calorimeter readings will be recorded through the plant's control system and these readings will be maintained in the plant data historian. In Appendix F, the redlined proposed changes to flare operations regarding the maintenance of high heating value gas in accordance with regulatory requirements for assisted and non-assisted flares.

The reason for the decrease in gas stream heating value and need for supplemental gas dosing is due to the refined plant design which determined the need for purge nitrogen (effectively diluting the waste gas streams) needed for the transport of waste gases safely to the flare. This dilution resulted in determining that some operational scenarios will require propane additions to reach the minimum waste gas higher heating value (HHV) of 200 Btu/scf for non-assisted flaring, and 300 Btu/scf for assisted flaring per 40 CFR 60.18(c)(3)(ii).

Despite the flare modifications, Twelve still proposes the flare comply with the requirements of 40 CFR 60.18(b) during periods of normal operations, startup, shutdown, and most emergency operating cases. This includes the heating value requirements of 40 CFR 60.18(c)(3)(ii) and the flare tip velocity requirements of 40 CFR 60.18(c)(4) and (5) for air assisted and non-assisted flares. However, Twelve acknowledges that some of the design emergency cases are anticipated to have extremely short, on the order of seconds, evolution times after a pressure release event. In these emergency scenarios, the air assist and supplemental propane addition systems may not be able to respond quickly enough to allow the flare to operate completely in compliance with 40 CFR 60.18(b). Twelve anticipates these emergency cases would only occur in the event of a catastrophic plant failure and would be short in duration. Appendix F contains redlined proposed changes to the existing approval order regarding the modified operating scenarios and the waste gas.

2.2.2 Emergency Generator

Twelve proposes the installation of an emergency generator powered by a 1,502 bhp, Tier 2, diesel-fired engine to supply the Facility with sufficient emergency power for safe shutdown in the event of an emergency (e.g., power outage). Twelve had originally proposed an emergency diesel generator that met the criteria of WAC 173-400-930(1)(b) which exempted the new emergency engine from the requirements of WAC 173-400-110 to file a notice of construction application. This new proposed emergency generator will not meet this exemption as outlined in Section 4.1 and thus is included as a new source in this modification to the approval order.

Twelve proposes implementing a limitation on the hours of operation for the emergency generator of 160 hours per year, encompassing both maintenance and emergency hours of operation, to demonstrate compliance with the applicable regulation outlined in Section 4 of this application. Details on this limitation and the emissions from the proposed unit can be found in Section 3 and Appendix C.

2.2.3 Storage Tank

As part of plant design refinements, Twelve is proposing that the permitted normal storage capacity for the 5,000 gallon E-Jet product storage tank be increased to 5,047 gallons. This change will not impact throughput, nor the resulting emissions from the tank. Nevertheless, emissions from the tank have been included, alongside emissions from the rest of the Facility, in Appendix C. Redlined proposed changes to the existing approval order regarding the proposed change to the permitted E-Jet product storage tank capacity are included in Appendix F.

3. EMISSION CALCULATION METHODOLOGY

This section describes the methodologies and assumptions used to estimate the emissions associated with the project. A detailed emission inventory for the project is included in Appendix C.

3.1 Flare

Twelve expects the flare to operate under the same design case categories permitted in Approval Order No. 23AQ-E048, which include:

- Normal process waste gas load, expected to be continuous during operations;
- Start-ups following a plant shutdown, approximately twelve (12) events per year lasting 24 hours each; and,
- Shutdowns, approximately twelve (12) events per year lasting an hour.

This application proposes updating the waste gas composition of these operating cases based on current design flows with the added nitrogen purges and as needed propane assist gas. Updated design parameters for these scenarios are presented in Appendix C. As in line with the original air permit application for the Facility, the design cases for catastrophic emergencies, which are never intended to occur, are presented in Appendix C, but emissions from these cases are not quantified as these cases should never occur. The updated design scenarios and their associated time periods are used to estimate the potential emissions from the flare. Shutdown events are expected to occur for routine maintenance or in the unlikely scenario of an emergency event.

When determining the maximum hourly emissions, the maximum pass-through emissions released from the flare during a 1-hour period will be characterized by either the normal, start-up, or shutdown design scenario. Additionally, daily emissions are conservatively characterized at a maximum by assuming both a shutdown event and a full start-up event will occur in a single 24-hour period.

Pass through emissions from process gas constituents and stream properties specific to each operating scenario are calculated according to the methodology outlined in the Texas Commission on Environmental Quality (TCEQ) New Source Review (NSR) guidance document for flares and vapor combustors last updated March 2021.

Emission factors for thermal oxides of nitrogen (NO_x) and carbon monoxide (CO) are taken from TCEQ flare and vapor combustor NSR guidance document for non-steam assisted low Btu (<1,000 Btu/scf) gas streams. However, these emission factors are given in units of (lb/MMBtu). To incorporate these emission factors into the calculations, the Lower Heating Value (LHV) of each process gas stream was calculated based on the constituents present in the process gas stream for each design scenario. Emission factors for other criteria pollutants are calculated conservatively assuming the uncontrolled emission factors for natural gas combustion from AP-42, Section 1.4 are representative of the process gas combustion. Any propane assist will contribute to waste gas Btu content of the stream and will be accounted in estimating NO_X and CO emissions.

Emission factors for carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) are taken from 40 CFR 98 Table C-1 and C-2 for natural gas combustion and are assumed to be representative of the process gas stream. Speciation of the inlet gas streams combusted at the flare was calculated via a site-wide heat and material balance sheet. This speciation assumed no sulfur containing compounds are contained in the

process gas, as such no formation of sulfur dioxide (SO_2) is expected to occur during combustion of process gas. In addition, hazardous air pollutant (HAP) and toxic air pollutant (TAP) emissions generated from the combustion of process gas are calculated by conservatively assuming the uncontrolled emission factors for natural gas combustion from AP-42, Section 1.4 are representative of the process gas streams.

The flare still will provide a minimum control efficiency of 98% per vendor specification as attached in the original air permit application. Process waste gas constituents (including any propane addition) will have an assumed 2% slip through the flare, as the portion that is not controlled.

Finally, the flare will use propane or hydrogen gas as a supplementary combustion gas for low heating value scenarios. Emission calculations have assumed propane as the supplemental gas for conservatism. Further engineering review has determined that the previous application underestimated the quantity of nitrogen and propane assist gases needed to both effectively transport waste gas to the flare and ensure those gases reach the appropriate heating value for flaring (>200 Btu/scf for non-assisted flaring, >300 Btu/scf for air assisted flaring). Additionally, per the flare manufacturer, a select waste gas streams will require propane or hydrogen addition to 600 btu/scf (two emergency cases and the startup cases). The modification to the flaring operation proposed in this application is to account for the updated mixed waste gas compositions and the resulting change in emissions from the flare control device. Details on the updated flare case waste gas compositions and emissions can be found in Appendix C.

Propane combustion emissions from the flare pilot are estimated based on the AP-42 Chapter 1.5 Table 1.5-1, Propane Emission Factors for Industrial Boilers with Heat Input Capacities Between 0.3 and 10 MMBtu/hr. The total number of pilots for the flare was increased from 3 to 4 based on updated engineering design. The sulfur content present in propane gas is assumed to be 0.54 gr/100 ft^3 per the Environmental Protection Agency (EPA) memorandum *A National Methodology and Emission Inventory for Residential Fuel* and was used to calculate the emission factor for SO_2. It is conservatively assumed that all particulate matter (PM) generated from the combustion of propane gas is also emitted as PM_{10} and $PM_{2.5}$. Emission factors for CO_2, CH_4, and N_2O are taken from 40 CFR 98 Table C-1 and C-2 for combustion of propane gas. HAP and TAP emission factors from the combustion of propane gas at the pilot flare are conservatively assumed to be equivalent to natural gas external combustion emission factors provided in AP-42 Section 1.4.

3.2 Emergency Generator

The Facility proposes the installation of a 1 megawatt (MW) emergency generator powered by a 1,502 BHP, Tier 2, diesel fired emergency engine. As discussed in Section 4.1, the engine does not meet the NSR exemption for emergency engines and is thus included in this application as a new source for the proposed Facility. Vendor data was used, when possible, to estimate emissions from the diesel-fired engine.

The emergency generator will operate for a maximum of 160 hours a year, accounting for maintenance and potential emergency scenarios. The diesel engine will be equipped with a diesel particulate filter (DPF) to reduce diesel engine exhaust particulate (DEEP) emissions, both considered a criteria pollutant as PM and a TAP in Washington state, by 75% according to the vendor guarantee. This control device has been determined to be toxic best available control technology (tBACT) for DEEP in Section 6 to this application.

In addition to PM, the emergency generator is expected to emit volatile organic compounds (VOC), NO_x, CO, SO_2, and other greenhouse gases (GHGs) and TAP/HAP. Emission factors for NO_x, CO, VOC and PM were provided in a vendor generator specification sheet, attached in Appendix D. An emission factor for SO_2 for diesel engines was obtained from AP-42 Section 3.4 – "Large Stationary Diesel and All Dual-Fuel Engines",

and GHG emission factors were determined from 40 CFR 98 Subpart C. Maximum TAP emission factors for diesel-fired engines were taken by evaluating factors from AP-42, Ventura County Air Pollution Control District (VCAPCD), and California Air Toxics Emission Factor (CATEF) sourced for Diesel ICE for conservatism.

All post-control emissions from the generator have been estimated in Table 3-1 and speciated TAPs estimated in Table 4-1. Further emissions details can be found in Appendix C.

3.3 Storage Tanks

The Facility will have a total of seven (7) organic liquid storage tanks and various process additive storage tanks located at the Facility. Only the E-Jet product tank, the Naphtha 2,500 gallon, and the 1000 gallon off-spec naphtha tank emissions were included in the original NOC application due to exemptions for the smaller material tanks, and as such, these are the only tanks for which emissions have been reassessed in the emission calculations included in this application.

After further review of proposed operations, Twelve has proposed that the permitted storage capacity for the 5,000 gallon E-Jet product storage tank be increased to 5,047 gallons. All other assumptions used in these emission calculation for applicable tanks has been maintained from the previous application. The change in storage capacity will not impact the permitted tank throughput, nor has it resulted in a notable change to the potential emissions from the tank. However, the new tank storage capacity has been incorporated into the updated storage tank fugitive emission calculations included in Appendix C.

3.4 Truck Loading Operations

The E-Jet and naphtha product liquids are loaded into trucks, a process which generates fugitive VOC emissions. Emissions from this source are not being modified as part of this application.

3.5 Cooling Tower

$PM/PM_{10}/PM_{2.5}$ emissions are generated from a non-contact cooling tower. Emissions from this source are not being modified as part of this application.

3.6 Fugitives Leaks

Fugitive VOC emissions are generated from equipment components throughout the Facility. Emissions from this source are not being modified as part of this application.

3.7 Facility Potential to Emit

The facility-wide potential to emit (PTE) emissions for the proposed Facility modifications are summarized in Table 3-1 below. The emissions summary includes all significant emissions sources at the Facility, both modified and unmodified, to reassess regulatory applicability. Detailed supporting calculations for Table 3-1 are provided in Appendix C.

Table 3-1. Modified Facility Potential to Emit Summary

Emission Unit	CO	NO_x	SO_2	VOC	PM	PM_{10}	$PM_{2.5}$	Lead	Combined HAPs
	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
Flare	3.37	0.33	6.05E-04	6.26	7.18E-02	7.18E-02	7.18E-02	4.15E-06	0.07
Emergency Diesel Generator	0.06	1.58	1.46E-03	0.01	2.65E-03	2.65E-03	2.65E-03	4.77E-05	0.02
Oxygen Stream	0.25								
Cooling Tower	--	--	--	--	7.59E-05	3.73E-05	1.84E-05	--	--
Storage Tanks	--	--	--	0.05	--	--	--	--	3.98E-04
Loading Losses	--	--	--	1.21E-02	--	--	--	--	7.79E-04
Fugitive Emissions	7.74	--	--	8.49	--	--	--	--	5.89
Facility-Wide Total	**11.42**	**1.91**	**2.06E-03**	**14.82**	**0.07**	**0.07**	**0.07**	**5.19E-05**	**5.98**
WAC Exemption Thresholds	5.00	2.00	2.00	2.00	**--**	0.75	0.50	0.005	25
NSR Required?	*Yes*	No	No	*Yes*	No	No	No	No	No
Title V Major Source Threshold	100	100	100	100	100	100	100	100	100
Below Title V Major Source Threshold?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PSD Major Source Threshold	250	250	250	250	250	250	250	250	N/A
PSD Major Source?	No	No	No	No	No	No	No	No	N/A

4. REGULATORY REVIEW

This section identifies the regulatory requirements applicable to the proposed Facility.

4.1 NOC Applicability

An NOC permit application must be filed, and an approval order issued by Ecology prior to the construction or modification of an affected facility per WAC 173-400-110(2)(a). Ecology issued Approval Order No. 23AQ-E048 for the proposed Facility on December 27, 2023. The proposed modification to the existing approval order includes the installation of 1,502 bhp diesel generator, which is too large to qualify for NOC exemption per WAC 173-400(4)(xxxix), the modification of process waste gas streams controlled at the permitted flare, and the adjustment of the storage capacities of the E-Jet product storage tanks. Taken in aggregate, these proposed modifications to plant operations will result in an emission increase greater than the exemption thresholds under WAC 173-400-110(5), as shown in Table 31. This and the request to modify existing conditions of Approval Order No. 23AQ-E048 merit an NOC application to be filed.

4.2 PSD Applicability

Prevention of Significant Deterioration (PSD) is the major New Source Review permitting program for attainment pollutants. The Facility is located in Grant County, which is an attainment area for all criteria pollutants. Upon completion of the proposed Facility, the PTE will remain below the PSD major source thresholds, as shown in Table 3-1. Therefore, PSD review is not required for the proposed project.

4.3 Title V Operating Permits

Per 40 CFR 70.2 and 70.3, a Title V Permit is required for any major source which is defined as the potential to emit emissions greater or equal to 100 tpy for any air pollutant subject to regulation. All potential emissions from the Facility post-modification will remain below the 100 tpy threshold, as shown in Table 3-1. Therefore, a Title V operating permit will not be required.

4.4 New Source Performance Standards (NSPS)

WAC 173-400-115 adopts federal NSPS by reference. NSPS apply to certain types of equipment that are newly constructed, modified, or reconstructed after a given applicability date. A discussion of NSPS subparts potentially relevant to this project is provided below.

4.4.1 NSPS Subpart A

All affected sources subject to an NSPS are also subject to the applicable general provisions of NSPS Subpart A unless specifically excluded by the source-specific NSPS. NSPS Subpart A addresses the following for facilities subject to a source-specific NSPS:

- Initial construction/reconstruction notification
- Initial startup notification
- Performance tests
- Performance test date initial notification
- General monitoring requirements

- General recordkeeping requirements
- Semi-annual monitoring system and/or excess emission reports

This application proposes the modification of the existing Approval Order No. 23AQ-E048, and as such will only address new and modified sources for the proposed Facility. All permitted sources at the proposed Facility that are not being modified as part of this application are assumed to maintain the same NSPS applicability. The source category under NSPS for the proposed Facility is Synthetic Organic Chemical Manufacturing Industry (SOCMI). NSPS subparts for SOCMI are potentially applicable for this modification and are discussed below.

The existing flare is permitted to operate air assisted, meeting the 300 Btu/scf net heating value limit per 40 CFR 60.18(c)(3)(ii). Further engineering design for the proposed flare has indicated that monitoring and control equipment will allow the assist air to be fully closed during normal operation. As such, Twelve proposes that, the flare meet the 300 Btu/scf net heating value limit only when the flare is operating assisted with air in order to comply with 40 CFR 60.18(b). When non-assisted, as discussed in Section 2, Twelve proposes the flare meet the 200 Btu/scf net heating value limit.

Additionally, the flare tip velocity will meet the maximum flow rate (V_{max}) requirements outlined in 40 CFR 60.18(c)(4)(iii). V_{max} shall be calculated for air assisted scenarios as follows:

$$V_{max} = 8.706 + 0.7084 (H_T)$$

Where H_T is the net heating value of waste gas. For cases where the flare is operating non-assisted, the flare will comply with 40 CFR 60.18(c)(5), V_{max} shall be calculated as follows:

$$Log_{10} (V_{max}) = (H_T + 28.8)/31.7$$

The flare tip velocity will remain below the calculated V_{max} based on the waste gas net heating value and whether the flare is assisted, or 400 ft/sec, whichever is lower.

Twelve maintains the NSPS applicability determinations included in the original air permit application not included in this application. The general NSPS applicability for the flare has not changed as a result of the modifications to the Facility.

4.4.2 NSPS Subpart IIII

Subpart IIII, *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines,* is applicable to compression ignition diesel engines, used for either emergency or non-emergency use.

The proposed diesel-fired compression ignition emergency engine was manufactured after April 1st, 2006, and will be powered by a 1,502 bhp compression ignition internal combustion diesel engine with a cylinder displacement greater than 30 liters. The engine is therefore subject to the associated requirements of the subpart per 40 CFR 60.4200(a)(2)(i). The requirements for such an engine include the following general items;

- Test initially to establish parameters to be monitored continuously in accordance with 40 CFR 60.4211(d)
- Standards NO_x emission limitations and PM emissions limitations; and,
- Fuel specifications as provided in 40 CFR 60.4207.

4.5 National Emission Standards for Hazardous Air Pollutants (NESHAP)

National Emission Standards for Hazardous Air Pollutants (NESHAPs) have been established in 40 CFR Part 61 and Part 63 to control emissions of HAPs from stationary sources. The applicability of NESHAP rules often depends on a facility's major source status with respect to HAP emissions. Under 40 CFR Part 63, a major source is defined as "any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any HAP or 25 tons per year or more of any combination of HAP." The proposed Facility, post-modification, remains an area source, and not a major source, of HAP.

4.5.1 NESHAP Subpart A

All affected sources subject to a Part 63 NESHAP are also subject to the general provisions of Part 63 Subpart A unless specifically excluded by the source-specific NESHAP. Per NESHAP Subpart A, the following definitions are important when characterizing whether the affected source is new, reconstructed, or existing:

> *Affected source means the collection of equipment, activities, or both within a single contiguous area and under common control that is included in a section 112(c) source category or subcategory for which a section 112(d) standard or other relevant standard is established pursuant to section 112 of the Act. Each relevant standard will define the "affected source," as defined in this paragraph.*
>
> *New Source means any affected source the construction or reconstruction of which is commenced after the Administrator first proposes a relevant emission standard under this part establishing an emission standard applicable to such source.*

The proposed modification involves the installation of a new emergency diesel engine emission unit, as well as the operational modification of an enclosed flare and the adjustment of normal storage capacity of two NSR exempt storage tanks; All of which are reviewed against the potentially applicable subpart for the source category. All potentially applicable source and equipment categories have been reviewed based on the proposed Facility being an area source.

4.5.2 NESHAP Subpart ZZZZ

40 CFR 63 Subpart ZZZZ, *National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*, is applicable to stationary reciprocating internal combustion engines (RICE) units located at major and area sources of HAPs. Per Subpart ZZZZ, a stationary RICE is defined as:

> *"…any internal combustion engine which uses reciprocating motion to convert heat energy into mechanical work and which is not mobile."*

Given that the proposed stationary reciprocating internal combustion diesel engine will be operated for emergency purposes as defined in this subpart, the engine is subject to this subpart. Per 40 CFR 63.6590(c) of this subpart, engines that are new or reconstructed at an area source of HAP must meet the requirements of this subpart by meeting the requirements of 40 CFR 60 subpart IIII. Therefore Twelve will comply with the requirements of NSPS Subpart IIII for compression ignition engines to comply with NESHAP Subpart ZZZZ.

4.6 State and Local Regulatory Applicability

4.6.1 Washington Toxic Air Pollutant Regulations

In Washington, all new sources emitting TAPs are required to demonstrate compliance with the Washington TAP program pursuant to WAC 173-460. Ecology has established de minimis emission rates, small quantity emission rates (SQERs), and an acceptable source impact levels (ASILs) for each listed TAP. If the total project-related TAP emissions increase exceeds the de minimis level for a pollutant, then permitting and a control technology review is triggered. If the emissions increases exceed their respective SQER, further determination of compliance with the ASIL using air dispersion modeling is required.

In the original application for the Facility, per WAC 173-460-040(2), TAP review was conducted for the proposed emission units with TAP emissions (flare, truck loading, fugitives, and tank losses). This project proposes modifying some of these emission sources and therefore has reevaluated the emissions for the entire facility in Appendix C. Emission increases are determined following the calculation methodologies discussed in Section 3 above. The project TAP emissions are summarized in Table 4-1, and the detailed emissions calculations are included in Appendix D.

As shown in Table 4-1, the modified proposed Facility emissions exceed the SQER for five (5) TAPs: NO_2, acrolein, formaldehyde, mercury, and diesel engine exhaust particulate (DEEP)[1]. As such, a screening air quality analysis exercise was completed to demonstrate compliance with the appropriate ASILs for all TAPs and their associated emission sources. The results of this analysis are discussed in Section 6.

[1] This TAP analysis conservatively assumes that all NO_x formed in the flare is NO_2.

Table 4-1. Project TAP Emission Summary

Pollutant	CAS #	Averaging Period	Combined Emission Rate (lb/avg period)	TAP SQER (lb/avg period)	Exceeds SQER?
Hexane	110-54-3	24-hr	37.20	52.00	No
Nitrogen Dioxide	10102-44-0	1-hr	21.90	0.87	**Yes**
Carbon Monoxide	630-08-0	1-hr	37.07	43.00	No
3-Methylcholanthrene	56-49-5	year	3.52E-05	0.02	No
7,12-Dimethylbenz(a)anthracene	57-97-6	year	3.13E-04	0.00	No
Acetaldehyde	75-07-0	year	9.85	60.00	No
Acrolein	107-02-8	24-hr	0.06	0.03	**Yes**
Benz[a]anthracene	56-55-3	year	1.02E-03	0.89	No
Benzene	71-43-2	year	5.25	21.00	No
Benzo(a)pyrene	50-32-8	year	2.34E-05	0.16	No
Benzo(b)fluoranthene	205-99-2	year	1.80E-03	0.89	No
Benzo(k)fluoranthene	207-08-9	year	5.94E-04	0.89	No
Chrysene	218-01-9	year	2.46E-03	8.90	No
Dibenzo(a,h)anthracene	53-70-3	year	5.73E-04	0.08	No
Dichlorobenzene, 1,4- (p)	106-46-7	year	0.02	15.00	No
Ethyl benzene	100-41-4	year	28.33	65.00	No
Formaldehyde	50-00-0	year	42.69	27.00	**Yes**
Indeno(1,2,3-c,d)pyrene	193-39-5	year	6.92E-04	0.89	No
Naphthalene	91-20-3	year	0.44	4.80	No
Propylene	115-07-1	24-hr	1.04	220.00	No
Toluene	108-88-3	24-hr	0.18	370.00	No
Xylenes	1330-20-7	24-hr	0.07	16.00	No
Methanol	67-56-1	24-hr	2.21E-01	1500	No
Lead & compounds	7439-92-1	year	0.10	14.00	No
Arsenic & inorganic arsenic compounds	7440-38-2	year	0.02	0.05	No
Cadmium & compounds	7440-43-9	year	0.02	0.04	No
Chromium	7440-47-3	24-hr	1.04E-03	0.37	No
Chromium(III), soluble particulates	Cr(III)sol	24-hr	1.04E-03	0.01	No
Copper & compounds	7440-50-8	1-hr	2.95E-04	0.19	No
Mercury, elemental	7439-97-6	24-hr	3.45E-03	2.20E-03	**Yes**
Nickel & compounds	7440-02-0	year	0.04	0.62	No
Sulfur dioxide	7446-09-5	1-hr	0.02	1.20	No
1,3-Butadiene	106-99-0	year	2.50	5.40	No
Chlorobenzene	108-90-7	24-hr	3.45E-04	74.00	No
Hydrogen chloride	7647-01-0	24-hr	0.32	0.67	No
Hydrogen cyanide	74-90-8	24-hr	0.02	0.06	No
o-Xylene	95-47-6	24-hr	0.05	16.00	No
m-Xylene	108-38-3	24-hr	0.05	16.00	No
p-Xylene	106-42-3	24-hr	0.05	16.00	No
Diesel engine exhaust, particulate	DEEP	year	5.30	0.54	**Yes**

4.6.2 State Regulatory Applicability

Per review of state and local regulations, it is expected that the following requirements apply to the Facility:

- WAC 173-400-040(2): No person shall cause or allow the emission for more than three minutes, in any one hour, of an air contaminant from any emissions unit which at the emission point, or within a reasonable distance of the emission point, exceeds twenty percent opacity as determined by Ecology Method 9A.
- WAC 173-400-040(7): No person shall cause or allow the emission of a gas containing sulfur dioxide from any emissions unit in excess of one thousand ppm of sulfur dioxide on a dry basis, corrected to seven percent oxygen for combustion sources, and based on the average of any period of sixty consecutive minutes.
- WAC 173-400-050(1): No person shall cause or allow emissions of particulate matter from combustion units in excess of 0.23 gram per dry cubic meter at standard conditions (0.1 gr/dscf).
- WAC 173-400-060: No person shall cause or allow emissions of particulate matter from any general process operation in excess of 0.23 gram per dry cubic meter at standard conditions (0.1 gr/dscf) of exhaust gas.

5. BEST AVAILABLE CONTROL TECHNOLOGY

Pursuant to WAC 173-400-113, all new and modified sources must employ Best Available Control Technology (BACT) for "all pollutants not previously emitted or whose emissions would increase as a result of the new source or modification." This section includes a BACT analysis for the new emergency diesel engine that will be located at the Facility, as well as a reassessment of the flare BACT for the flare as a result of the operational modification. The proposed storage tank normal capacity change did not result in a quantifiable emissions increase, and thus, BACT was not reassessed for this emission source.

A BACT analyses is included in this report for those pollutants that exceed the emission exemption thresholds of WAC 173-400-110(5), as shown in Table 3-1 or are above the de minimis thresholds for TAP codified in WAC 173-460. This includes analysis for CO and VOC as well as toxic air pollutant BACT (tBACT) for each applicable emission unit are presented in the subsections below.

5.1 BACT Methodology

In a memorandum dated December 1, 1987, the EPA stated its preference for a "top-down" analysis for PSD applications.[2] For this minor New Source Review (NSR) BACT analysis, either a qualitative assessment or a top-down approach has been applied.

For the "top-down" analysis, the first step in this approach is to determine, for the emission unit in question, the most stringent control available for a similar or identical source or source category. If it can be shown that this level of control is technically, environmentally, or economically infeasible or inappropriate on the basis of energy concerns for the unit in question, then the next most stringent level of control is determined and similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by any substantial or unique technical, environmental, economic, or energy-related objections.

Presented below are the five basic steps of a top-down BACT review as identified by the EPA.[3]

STEP 1 – IDENTIFY ALL CONTROL TECHNOLOGIES

Available control technologies are identified for each emission unit in question.

STEP 2 – ELIMINATE TECHNICALLY INFEASIBLE OPTIONS

After the identification of control options, an analysis is conducted to eliminate technically infeasible options. A control option is eliminated from consideration if there are process-specific conditions that prohibit the implementation of the control.

STEP 3 – RANK REMAINING CONTROL TECHNOLOGIES BY CONTROL EFFECTIVENESS

Once technically infeasible options are removed from consideration, the remaining options are ranked based on their control effectiveness. If there is only one remaining option, or if all of the remaining technologies could achieve equivalent control efficiencies, ranking based on control efficiency is not required.

[2] U.S. EPA, Office of Air and Radiation. Memorandum from J.C. Potter to the Regional Administrators. Washington, D.C. December 1, 1987.

[3] U.S. EPA. Draft New Source Review Workshop Manual, Chapter B. Research Triangle Park, North Carolina. October 1990.

STEP 4 – EVALUATE MOST EFFECTIVE CONTROLS AND DOCUMENT RESULTS

Beginning with the most efficient control option in the ranking, detailed economic, energy, and environmental impact evaluations are performed. If a control option is determined to be economically feasible without adverse energy or environmental impacts, it is not necessary to evaluate the remaining options with lower control efficiencies.

The economic evaluation centers on the cost effectiveness of the control option. Costs of installing and operating control technologies are estimated and annualized following the methodologies outlined in the EPA's Control Cost Manual (CCM)[4] and other industry resources. Cost effectiveness is expressed in dollars per ton of pollutant controlled. Objective analyses of energy and environmental impacts associated with each option are also conducted.

STEP 5 – SELECT BACT

In the final step, one pollutant-specific control option is proposed as BACT for each emission unit under review based on evaluations from the previous step.

Twelve completed the BACT analysis based on cost information available in the CCM and on vendor cost estimates. Detailed cost calculations are available in Appendix C.

5.2 BACT Analysis for the Emergency Generator

A BACT analysis is presented below for each criteria pollutant exceeding the emission exemption thresholds of WAC 173-400-110(5) or TAP that are above the de minimis thresholds codified in WAC 173-460 from the proposed emergency generator diesel engine.

- Pollutants: CO, VOC, and TAP

5.2.1 BACT Analysis for CO and VOC Emissions

Available add-on control technologies for controlling CO and VOC emissions include diesel oxidation catalyst (DOC), Tier 4 Integrated Control systems, and three-way catalyst. Three-way catalyst applied for similar units are known to result in NO_x emission increases and will therefore not be considered further in this assessment. Control technologies that are not add-on controls, including combustion technology meeting EPA Tier 2 emission standards as well as the operating and maintenance requirements under 40 CFR Part 60 Subpart IIII, are considered feasible options for this project.

EPA stated that in their MACT/GACT evaluation for RICE that: "Because these engines are typically used only a few number of hours per year, the costs of emission control are not warranted when compared to the

[4] U.S. EPA, Office of Air Quality Planning and Standards. EPA Control Cost Manual, 7th edition, updating in progress. https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution

emission reductions that would be achieved."[5] Consistent with EPA's conclusions, the cost of add-on controls, including a DOC and Tier 4 integrated control systems, are considered to be not cost-effective, and thus not financially feasible.

Twelve proposes combustion technology meeting EPA Tier 2 emission standards and the operating and maintenance requirements under 40 CFR Part 60 Subpart IIII as BACT for CO and VOC emissions from the emergency generator diesel engine.

5.2.2 BACT for TAP Emissions (tBACT)

WAC 173-460-060 requires all projects with emissions exceeding the de minimis value for a TAP to employ BACT for that TAP, called tBACT. As shown in Table 4-1, there are 19 TAPs with emissions greater than the respective de minimis levels.

- Hexane
- Nitrogen Dioxide
- Carbon Monoxide
- 7,12-Dimethylbenz(a)anthracene
- Acetaldehyde
- Acrolein
- Benzene
- Ethyl benzene
- Formaldehyde
- Naphthalene
- Arsenic & inorganic arsenic compounds
- Cadmium & compounds
- Chromium(III), soluble particulates
- Mercury, elemental
- Nickel & compounds
- 1,3-Butadiene
- Hydrogen chloride
- Hydrogen cyanide
- Diesel engine exhaust, particulate (DEEP)

5.2.2.1 tBACT Analysis for NO_2 Emissions

Typical NO_2 emission control technologies for diesel engines include add-on controls, such as selective catalytic reduction (SCR), Tier 4 integrated control systems, selective non-catalytic reduction (SNCR), non-selective catalytic reduction (NSCR), and other technologies without add-on controls, such as combustion technology meeting EPA standards. Other emerging technologies, including NO_x adsorbers, water injection, ozone injection, and activated carbon adsorption, which are not commercially available for stationary diesel generators, are not discussed in this case.

SCR has higher control effectiveness than SNCR and NSCR for the following reasons:

[5] U.S. EPA, Memorandum, "Response to Public Comments on Proposed National Emission Standards for Hazardous Air Pollutants for Existing Stationary Reciprocating Internal Combustion Engines Located at Area Sources of Hazardous Air Pollutant Emissions or Have a Site Rating Less Than or Equal to 500 Brake HP Located at Major Sources of Hazardous Air Pollutant Emissions" (EPA-HQ-OAR-2008-0708).

- SNCR does not use a catalyst for the reaction between ammonia or urea with NO_2 to reduce NO_2 emissions, unlike SCR. Lack of a catalyst requires a higher temperature to achieve the chemical reaction, which makes SCR applicable to more combustion sources.

- NSCR requires that no excess air is present in the stream and requires a catalyst without a reagent. However, diesel exhaust oxygen levels vary widely depending on engine load, which does not meet the requirement of zero excess air. Therefore, NSCR is not considered technologically applicable to the proposed diesel engine.

Control technologies that are not add-on controls, including combustion technology meeting EPA Tier 2 emission standards as well as the operating and maintenance requirements under 40 CFR Part 60 Subpart IIII are deemed feasible.

A cost analysis was performed for the SCR and Tier 4 Integrated Control options for the generator in accordance with the EPA's CCM methodologies as well as the information available from vendor specification sheets and quotes. The cost analysis can be found in Appendix G, and is based on the following conservative assumptions:

- Indirect costs includes engineering costs, contractor fees, startup and performance test costs, and other contingencies for both the SCR and Tier 4 Integrated Control options are conservatively assumed to be negligible.
- A conservative 25 year lifespan was assumed for the SCR in accordance with Section 4 Chapter 2 of EPA APCCM, 7th Edition. A congruent, 25 year lifespan was also applied for the Tier 4 Integrated Control as a conservative input.
- Given the low annual operating hours, operating labor, supervisory labor, and electricity costs for the engine are assumed to be negligible.

The calculated cost to control per ton of NO_2 is $16,198 for the SCR based on the conservative assumptions listed above for cost calculations. The cost to control per ton of NO_2 for the Tier 4 Integrated Control System is $41,631. Therefore, both an SCR and Tier 4 Integrated Control are economically infeasible for the project. Twelve proposes combustion technology meeting EPA Tier 2 emission standards and the operating and maintenance requirements under 40 CFR Part 60 Subpart IIII as tBACT for NO_2 for the emergency generator diesel engine.

5.2.2.2 tBACT Analysis for PM including DEEP Emissions

Washington identifies PM emissions from diesel combustion engine exhaust as a TAP, regulated as diesel engine exhaust particulate (DEEP). Additional metal and metal compound emissions are expected to be emitted from combustion of duel in the emergency engine. Available add-on control technologies for controlling DEEP emissions include diesel particulate filters (DPF) and Tier 4 Integrated Control systems. Technologies without add-on controls, such as meeting EPA Tier 2 standards, are also considered feasible options for this project. The control efficiencies of the feasible control technologies are summarized in Table 6-1.

Review of the potential emissions from the emergency engine in Section 3 and modeling of diesel particulate details in Section 6 below has led Twelve to employ DPF as control for DEEP. EPA stated that in their MACT/GACT evaluation for RICE that: "Because these engines are typically used only a few number of hours per year, the costs of emission control are not warranted when compared to the emission reductions

that would be achieved."[6] While EPA does not expect add-on controls as BACT for emergency engines, Twelve proposes the installation of a DPF for the emergency generator diesel engine as tBACT for metal compounds emitted as PM and DEEP emissions.

5.2.2.3 tBACT Analysis for Other PM and VOC Based TAP Emissions

The remaining TAPs above the de minimis limits are either also criteria pollutants (i.e., SO_2, CO, and NO_2) or are emitted as PM or VOC. Therefore, the above BACT and tBACT determinations controlling NO_2, CO, VOC and PM as DEEP apply to all remaining TAPs.

Twelve proposes the installation of a DPF, and combustion technology meeting EPA Tier 2 emission standards and the operating and maintenance requirements under 40 CFR Part 60 Subpart IIII as tBACT for TAP emissions from the emergency generator diesel engine.

5.3 BACT Analysis for E-Jet Production Process

The following section details the BACT analysis for the electrolysis reactor and FT production process to produce the E-Jet fuel and naphtha. This BACT analysis is maintained as submitted in the original NOC application for the Facility.

- Pollutants: CO, VOC, and TAP

5.3.1 BACT Analysis for VOC and CO Emissions and tBACT for Organic TAP

VOC and CO emissions are generated from the production of E-Jet fuel at various stages during normal operation of the Facility.

Varying oxidation devices are typically used to control VOC emissions via combustion of a waste process gas stream prior to the emission to atmosphere. Two common oxidation units that could be considered include a regenerative thermal oxidizer (RTO) and an enclosed ground flare.

Twelve investigated the technical feasibility of these control technologies to determine if either would be infeasible for control of the E-Jet fuel production process. At a maximum, the given control device must be designed to control emissions from the worst-case process waste gas venting scenario which for Twelve would be during a catastrophic failure of the equipment, where the entirety of the process gas must be dumped to the control device. Details on the worst-case flare waste gas cases are presented in Appendix C. It is expected that this maximum relief case will occur over a very short period of time, likely less than an hour.

Based on this maximum relief load, Twelve solicited bids for control equipment from a RTO and flare vendor to determine what equipment could handle the designed worst-case scenario for Twelve's process. It was determined by manufacturers that were provided the design case that typical RTO units would not be able to feasibly handle this high flow rate and heat content and guarantee the control of the process gas emissions. As such, it was determined that an RTO would be infeasible for the production process design.

[6] U.S. EPA, Memorandum, "Response to Public Comments on Proposed National Emission Standards for Hazardous Air Pollutants for Existing Stationary Reciprocating Internal Combustion Engines Located at Area Sources of Hazardous Air Pollutant Emissions or Have a Site Rating Less Than or Equal to 500 Brake HP Located at Major Sources of Hazardous Air Pollutant Emissions" (EPA-HQ-OAR-2008-0708).

A manufacturer guarantee has been provided that the enclosed ground flare both will meet a minimum 98% destruction efficiency of VOC and CO in the waste process gas for the worst-case scenario. Therefore, an enclosed ground flare is selected as BACT for control of VOC (including TAP emitted as organic VOC) and CO emissions from the E-Jet production process.

5.4 BACT Analysis for Combustion Pollutants from the Flare

A reevaluation of the previously presented BACT analysis is presented below for each criteria pollutant emitted from the proposed emergency generator diesel engine. This BACT analysis is maintained as submitted in the original NOC application for the Facility.

- Pollutants: CO, VOC, and TAP

5.4.1 BACT Analysis for VOC and CO Emissions

The flare is primarily used to control emissions from the E-Jet production process. It is also a potential source of emissions through the combustion of gases during periods of controlling process waste gas streams and when it is idle (e.g. not controlling emissions but still being fired). A BACT analysis was presented in the last application for the VOC and CO combustion pollutants from the flare. Twelve maintains that the modifications proposed for the flare do not impact the BACT determination presented in the previous application and permitted in Approval Order No. 23AQ-E048. Therefore, Twelve proposes that a combination of good design and best practices be maintained as BACT for the flare.

5.4.2 tBACT for Flare

There are ten (10) TAPs for which emissions are produced when flare gas is combusted to control VOC emissions from process waste gas, and for which emission at the Facility exceed the de minimis values. These are listed below.

- Hexane
- Nitrogen Dioxide
- Carbon Monoxide
- 7,12-Dimethylbenz(a)anthracene
- Acetaldehyde
- Acrolein
- Benzene
- Ethyl benzene
- Formaldehyde
- Naphthalene

Good combustion practices remain the only available control technology for these pollutants, based on the previous BACT analysis. tBACT for all TAP is proposed to be good combustion practices.

6. DISPERSION MODELING ANALYSIS

Per WAC regulations there are several established levels for each listed TAP: a *de minimis* level; an SQER; and an ASIL.[7] An *acceptable source impact analysis* must be conducted for each TAP with an emission increase greater than the *de minimis* level.[8] If the TAP emissions rate from a source is above its respective SQER, further determination of compliance with the ASIL is required. Compliance with the ASIL is demonstrated using the AERSCREEN dispersion model.

Of the TAPs emitted by the Facility emission sources, five (5) TAPs: NO_x, acrolein, formaldehyde, mercury, and diesel engine exhaust particulate (DEEP)[9], exceeds their respective SQERs. AERSCREEN modeling was conducted to compare modeled TAP concentrations against respective ASILs for relevant emissions sources.

Please refer to Appendix C for detailed TAP emission calculations and Appendix E for AERSCREEN modeling files.

6.1 AERSCREEN Modeling

AERSCREEN is a screening dispersion model approved by EPA for evaluating ambient air impacts. Results from the AERSCREEN modeling tend to produce conservative (i.e., high) estimates of impacts from emission sources. The parameters used for the AERSCREEN model inputs for the enclosed ground flare are shown in Table 6-1 and the emergency engine in Table 6-2.

Table 6-1. Enclosed Flare AERSCREEN Modeling Inputs

Parameter	Value	Units
Source Type	Point	N/A
Stack Height	15.24	m
Stack Diameter	3.71	m
Stack Exit Temperature	589	K
Modeled Emission Rate	1	g/s
Minimum Distance to Ambient Air	38.3	m
Building Downwash		
Building Height	8.33	m
Minimum Horizontal Dimension	24.38	m
Maximum Horizontal Dimension	40.23	m

[7] De minimis levels, SQERs, and ASILs are provided for NO_2 in WAC 173-460

[8] The acceptable source impact analysis methodology is outlined in WAC 173-460-080. The definition can be found in WAC 173-460-020(1).

[9] This TAP analysis conservatively assumes that all NO_x formed in the flare is NO_2.

Table 6-2. Emergency Generator AERSCREEN Modeling Inputs

Parameter	Value	Units
Source Type	Point	N/A
Stack Height	14.02	m
Stack Diameter	0.32	m
Stack Exit Temperature	751	K
Modeled Emission Rate	1	g/s
Minimum Distance to Ambient Air	3.7	m
Building Downwash		
Building Height	8.33	m
Minimum Horizontal Dimension	24.38	M
Maximum Horizontal Dimension	40.23	M

6.2 NO_X to NO_2 Conversion

As included in the detail model files of Appendix E for the emergency engine, NO_X is formed when nitrogen in ambient air is exposed to high temperatures during the combustion process. At these temperatures, some nitrogen is converted to NO and NO_2 (collectively referred to as NO_X). This project includes NO_X emitted from the emergency engine, but also the flare. Emission factors for these units are for emissions of NO_X, while the ambient air quality objective is for NO_2. In order to estimate the amount of NO_2 concentration from the amount of emitted NO_X for the emergency engine, the following modeling approaches are applied to AERSCREEN inputs:

- Plume Volume Molar Ratio Method (PVMRM) in AERMOD;
- In-stack ratio (ISR) of 0.1 for all generators. The ISR is aligned with conservative value based on EPA's ISR data base for uncontrolled engines firing diesel or kerosene.[10]
- Ozone background concentration of 52 ppb, based on NW-AIRQUEST at the site location.[11]

6.3 Modeling Results

The AERSCREEN model was run for the emergency generator using a unit emission rate of 1 g/s to allow the modeling results to be scaled to the actual maximum emission rates for each modeled TAP calculated for each emission source and flare operating scenario. The AERSCREEN model output file for the generator can be found in Appendix E. The flare model inputs were reevaluated for the new waste gas compositions. Revised model runs are provided in Appendix E, but the only flare scenario that resulted in a change in parameters warranting a model rerun was the startup – commissioning case for which the propane supplementation substantially increased from the previous model. Results of the of all flare case scenarios were then scaled to match the newly proposed scenario pollutant profiles. The aggregated results of the air

[10] Filtered available entries in Excel file "NO_2_ISR_database.xlsx", EPA NO_2/NO_X in-stack ratio database, available at https://www.epa.gov/scram/nitrogen-dioxidenitrogen-oxide-stack-ratio-isr-database, accessed March 17, 2025. The average ISR for RICE firing diesel or kerosene is 0.07.

[11] Northwest Airquest data hosted by Idaho Department of Environmental Quality, available at https://idahodeq.maps.arcgis.com/apps/MapSeries/index.html?appid=0c8a006e11fe4ec5939804b873098dfe accessed on March 17, 2025.

toxics modeling exercise for each emission source are presented in Table 6-3 below. Individual flare operating scenario, fugitive emission, and emergency engine model results are included in Appendix C.

Table 6-3. Facility Wide AERSCREEN TAP Modeling Results

Pollutant	ASIL (µg/m³)	Averaging Period	Maximum Aggregated Modeled Concentration (µg/m³)	Modeled Result Below ASIL?
DEEP	0.0033	Year	1.30E-03	Yes
Formaldehyde	0.17	Year	0.09	Yes
Mercury	0.03	24-hr	1.49E-04	Yes
Acrolein	0.35	24-hr	6.80E-03	Yes
Nitrogen Dioxide	470	1-hr	437.53	Yes
Carbon Monoxide	23,000	1-hr	3,485.12	Yes

As demonstrated in Table 6-3, the maximum ambient concentrations from the Facility emissions do not exceed the applicable pollutant ASILs. Therefore, further analysis is not required.

Additionally, a revised CO air dispersion modeling analysis for demonstrating compliance with the CO 1-hour and 8-hour National Ambient Air Quality Standards (NAAQS) is included in Appendix C. The significant impact level (SIL) analysis is presented alongside the 1-hour and 8-hour NAAQS demonstrations in Appendix C and facility-wide model results including the emergency engine, flare, and fugitive emissions are summarized in Table 6-4 below.

Table 6-4. CO NAAQS Model Results

Pollutant and Averaging Period	Maximum Modeled Concentration (µg/m³)	Background[12] (µg/m³)	Modeled + Background (µg/m³)	1-hr NO_2 NAAQS (µg/m³)
CO 1-hour	3,485	1,329	4,814	40,000
CO 8-hour	1,832	939	2,772	10,000

[12] Northwest Airquest data hosted by Idaho Department of Environmental Quality, available at https://idahodeq.maps.arcgis.com/apps/MapSeries/index.html?appid=0c8a006e11fe4ec5939804b873098dfe accessed on March 17, 2025.

APPENDIX A. NOC APPLICATION FORMS AND SEPA MDNS

Notice of Construction Application

A notice of construction permit is required before installing a new source of air pollution or modifying an existing source of air pollution. This application applies to facilities in Ecology's jurisdiction. Submit this application for review of your project. For general information about completing the application, refer to Ecology Forms ECY 070-410a-g, "Instructions for Ecology's Notice of Construction Application."

Ecology offers up to two hours of free pre-application assistance. We encourage you to schedule a pre-application meeting with the contact person specified for the location of your proposal, below. If you use up your two hours of free pre-application assistance, we will continue to assist you after you submit Part 1 of the application and the application fee. You may schedule a meeting with us at any point in the process.

Upon completion of the application, please enclose a check for the initial fee and mail to:

Department of Ecology
Cashiering Unit
PO Box 47611
Olympia, WA 98504-7611

For Fiscal Office Use Only: 0299-3030404-B00-216--001--000404

Check the box for the location of your proposal. For assistance, call the appropriate office listed below:

Check box	Ecology Permitting Office	Contact
☐	**Chelan, Douglas, Kittitas, Klickitat, or Okanogan County** Ecology Central Regional Office (509) 575-2490	Lynnette Haller (509) 457-7126 lynnette.haller@ecy.wa.gov
☐	**Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Stevens, Walla Walla, or Whitman County** Ecology Eastern Regional Office (509) 329-3400	Karin Baldwin (509) 329-3452 karin.baldwin@ecy.wa.gov
☐	**San Juan County** Ecology Northwest Regional Office (206) 594-0000	David Adler (425) 649-7267 david.adler@ecy.wa.gov
☐	**For actions taken at Kraft and Sulfite Paper Mills and Aluminum Smelters Only** Ecology Industrial Section (360) 407-6900	James DeMay (360) 407-6868 james.demay@ecy.wa.gov
☐	**For actions taken on the US Department of Energy Hanford Reservation Only** Ecology Nuclear Waste Program (509) 372-7950	Lilyann Murphy (509) 372-7951 lilyann.murphy@ecy.wa.gov

Check the box below for the fee that applies to your application.

New project or equipment:

- ☐ **$1,904: Basic project** initial fee covers up to 16 hours of review.
- ☐ **$12,614: Complex project** initial fee covers up to 106 hours of review.

Change to an existing permit or equipment:

- ☐ **$357: Administrative or simple change** initial fee covers up to 3 hours of review. Ecology may determine your change is complex during the completeness review of your application. If you project is complex, you must pay the additional xxx before we will continue working on your application
- ☐ **$1,190: Complex** change initial fee covers up to 10 hours of review
- ☐ **$350flat fee**: Replace or alter control technology equipment under WAC 173-400-114. Ecology will contact you if we determine your change belongs in another fee category. You must pay the fee associated with that category before we will continue working on your application.

Read each statement below, then check the box next to it to acknowledge that you agree.

- ☐ The initial fee you submitted may not cover the cost of processing your application. Ecology will track the number of hours spent on your project. If the number of hours Ecology spends exceeds the hours included in your initial fee, Ecology will bill you $119 per hour for the extra time.
- ☐ You must include all information requested by this application. Ecology may not process your application if it does not include all the information requested.
- ☐ Submittal of this application allows Ecology staff to visit and inspect your facility.

Part 1: General Information

I. Project, Facility, and Company Information

1. Project Name: E-Jet Demonstration Plant (Project Rainier) Modification
2. Facility Name: Moses Lake Site
3. Facility Street Address:

   13583 Wheeler Road NE, Moses Lake, WA 98837

4. Facility Legal Description: E-Jet Demonstration Plant (Project Rainier)
5. Company Legal Name (if different from Facility Name):

   Twelve Benefit Corporation

6. Company Mailing Address (street, city, state, zip)

   614 Bancroft Way, Suite B, Berkeley, CA 94710

II. Contact Information and Certification

1. Facility Contact Name (who will be onsite): Andre Gomes
2. Facility Contact Mailing Address (if different than Company Mailing Address:

3. Facility Contact Phone Number: 341-688-6645
4. Facility Contact E-mail: andre.gomes@twelve.co
5. Billing Contact Name (who should receive billing information):
   Andre Gomes
6. Billing Contact Mailing Address (if different Company Mailing Address):

7. Billing contact Phone Number: 341-688-6645
8. Billing Contact E-mail: andre.gomes@twelve.co
9. Consultant Name (optional – if 3rd party hired to complete application elements):
   Benjamin Hubertus
10. Consultant Organization/Company: Trinity Consultants, Inc.
11. Consultant Mailing Address (street, city, state, zip): 315 5th Ave S Suite 830 Seattle, WA 98104
12. Consultant Phone Number: 253.867.5600 x4814
13. Consultant E-mail: BHubertus@trinityconsultants.com
14. Responsible Official Name and Title (who is responsible for project policy or decision making):
    Andre Gomes, Vice President of Plant Design and Execution
15. Responsible Official Phone: 341-688-6645
16. Responsible Official E-mail: andre.gomes@twelve.co
17. Responsible Official Certification and Signature:

    I certify that the information on this application is accurate and complete.

Signature: Andre Gomes Date: 03/31/2025

VP Plant Design and Execution
Twelve Co

Part 2: Technical Information

The Technical Information may be sent with this application form to the Cashiering Unit, or may be sent directly to the Ecology regional office with jurisdiction along with a copy of this application form.

For all sections, check the box next to each item as you complete it.

III. Project Description

- [4] Written narrative describing your proposed project.
- [4] Projected construction start and completion dates.
- [4] Operating schedule and production rates.
- [4] List of all major process equipment and manufacturer and maximum rated capacity.
- [4] Process flow diagram with all emission points identified.
- [4] Plan view site map.
- [4] Manufacturer specification sheets for major process equipment components
- [4] Manufacturer specification sheets for pollution control equipment.
- [4] Fuel specifications, including type, consumption (per hour and per year) and percent sulfur.

IV. State Environmental Policy Act (SEPA) Compliance

Check the appropriate box below.

- [4] SEPA review is complete. Include a copy of the final SEPA checklist and SEPA determination (e.g., DNS, MDNS, and EIS) with your application.
- [ ] SEPA review has not been conducted:
  - [ ] If review will be conducted by another agency, list the agency. You must provide a copy of the final SEPA checklist and SEPA determination before Ecology will issue your permit. Agency reviewing SEPA: _____
  - [ ] If the review will be conducted by Ecology, fill out a SEPA checklist and submit it with your application. You can find a SEPA checklist online at https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-document-templates

V. Emissions Estimations of Criteria Pollutants

Does your project generate criteria air pollutant emissions? [4] **Yes** [ ] **No**

If yes, please proved the following information regarding your criteria emissions in the application.

- [4] The names of the criteria air pollutants emitted (i.e., NO_X, SO_2, CO, $PM_{2.5}$, PM_{10}, TSP, VOC, and Pb)
- [4] Potential emissions of criteria air pollutants in tons per hour, tons per day, and tons per year (include calculations)
- [4] If there will be any fugitive criteria pollutant emissions, clearly identify the pollutant and quantity

VI. Emissions Estimations of Toxic Air Pollutants

Does your project generate toxic air pollutant emissions? [4] **Yes** [ ] **No**

If yes, please provide the following information regarding your toxic air pollutant emissions in your application.

[4] The names of the toxic air pollutants emitted (specified in WAC 173-460-150[1])

[4] Potential emissions of toxic air pollutants in pounds per hour, pounds per day, and pounds per year (include calculations)

[4] If there will be any fugitive toxic air pollutant emissions, clearly identify the pollutant and quantity

VII. Emission Standard Compliance

[4] Provide a list of all applicable new source performance standards, national emission standards for hazardous air pollutants, national emission standards for hazardous air pollutants for source categories, and emission standards adopted under Chapter 70A.15 RCW.

Does your project comply with all applicable standards identified? [4] **Yes** [ ] **No**

VIII. Best Available Control Technology

[4] Provide a complete evaluation of Best Available Control Technology (BACT) for your proposal.

IX. Ambient Air Impacts Analyses

Please provide the following:

[4] Ambient air impacts analyses for Criteria Air Pollutants (including fugitive emissions)

[4] Ambient air impacts analyses for Toxic Air Pollutants (including fugitive emissions)

[4] Discharge point data for each point included in air impacts analyses (include only if modeling is required)

- [4] Exhaust height
- [4] Exhaust inside dimensions (ex. diameter or length and width)
- [4] Exhaust gas velocity or volumetric flow rate
- [4] Exhaust gas exit temperature
- [4] The volumetric flow rate
- [4] Description of the discharges (i.e., vertically or horizontally) and whether there are any obstructions (ex., raincap)
- [4] Identification of the emission unit(s) discharging from the point
- [4] The distance from the stack to the nearest property line
- [4] Emission unit building height, width, and length
- [4] Height of tallest building on-site or in the vicinity and the nearest distance of that building to the exhaust
- [4] Whether the facility is in an urban or rural location

Does your project cause or contribute to a violation of any ambient air quality standard or acceptable source impact level? [ ] **Yes** [4] **No**

To request ADA accommodation, call Ecology at (360) 407-6800, 711 (relay service), or (877) 833-6341 (TTY)

[1] http://apps.leg.wa.gov/WAC/default.aspx?cite=173-460-150

SEPA ENVIRONMENTAL POLICY ACT
REVISED MITIGATED DETERMINATION OF NONSIGNIFICANCE
TWELVE RAINIER AVIATION FUEL MANUFACTURING PLANT

The City of Moses Lake previously issued the following SEPA Determinations for the Twelve Ranier Aviation Fuel Manufacturing Plant:

- Amendment/addendum to the Mitigated Determination of Non-Significance on August 3, 2023;
- Final Phased – Mitigated Determination of Non-Significance on July 11, 2023; and
- Phase One - Determination of Non-Significance on April 25, 2023.

Each used the Optional DNS process and WAC 197-11-060 (5)(b). The City is now issuing a Revision pursuant to WAC 197-11-340(3)(c).

Twelve Rainier Aviation and Department of Ecology Air Quality have outlined a process change which involves process streams, composed almost entirely of oxygen. The revision to the MDNS allows Ecology and Twelve the flexibility to proceed with the air permitting and confirm Best Available Control Technology review is completed appropriately for the source. The mitigation measures of the previously-issued MDNS, as described in Measures 8.b. and 27.a. require a thermal oxidizer to destroy process waste gases. Twelve Rainier Aviation and Department of Ecology Air Quality have agreed that a aflare will be used instead of the thermal oxidizer. As such, the following language is hereby incorporated into the MDNS and measures 8.b. and 27.a will be modified to read as follows:

> 8.b
> "Emission controls shall include a flare to destroy process waste gas streams prior to release to the atmosphere to comply with the Best Available Control Technology (BACT) requirements for these process waste gas streams. A BACT analysis for process waste gas streams is included in the notice of construction application submitted to WA Department of Ecology."
>
> 27.a
> "A flare will be installed to destroy potential air toxic pollutants in process waste gas prior to release to the atmosphere to comply with the Best Available Control Technology (BACT) requirements for these process waste gas streams. A BACT analysis for process waste gas streams is included in the notice of construction application submitted to WA Department of Ecology."

A copy of the full Revised SEPA MDNS can be obtained from the City of Moses Lake at 321. S. Balsam Street Moses Lake, WA 98837.

File Number: PLN2023-0021 Twelve Rainier Aviation Fuel.

Project Location: Section 20, Township 19 North, Range 29 East, W.M. Grant County, Washington and identified as Assessor's Parcel No. 091121630, 091121640, and 091121641. The facility address is 13583 Wheeler Road NE, Moses Lake, WA 98837.

Proponent: Twelve Benefit Corporation (Greg DiCosola), 614 Bancroft Way, Suite B, Berkeley, CA 94710 & Mackenzie (Michael Chen), Logan Building, 500 Union Street, Suite 410, Seattle, Washington 98101.

Lead Agency: City of Moses Lake

Contact Information: Nathan Pate AICP, Senior Planner - Community Development

CONCLUSIONS OF THE RESPONSIBLE OFFICIAL: The Responsible Official has determined, with the mitigation measures listed above, that the proposal will not have a probable significant adverse impact on the environment, and an Environmental Impact Statement is not required under RCW 43.21c.030(2). The mitigation measures described are recommended as conditions of project approval. This decision is made after review of a completed environmental checklist, other information on file with the City, and existing regulations.

Issue Date: Revised November 6, 2023

This phased MDNS (WAC 197-11-060 (5) Phased review) is issued under WAC 197-11-350 and processed under WAC 197-11-355, the optional DNS process and there is no further comment period.

Responsible Official: Kirsten Peterson
Title: Community Development Director
Address: City of Moses Lake
Community Development Dept.
321. S. Balsam Street
P.O. Box 1579
Moses Lake, WA 98837
Phone: (509) 764-3751

Signature Kirsten Peterson Date 11/6/23
Kirsten Peterson

Appeals:

This phased MDNS may be appealed pursuant to the requirements of the Moses Lake Municipal Code Chapter 14.06. The 14-day appeal period commences on the date following the issuance of this MDNS. Any appeal must be addressed to the Hearing Examiner, accompanied by a filing fee pursuant to the adopted fee schedule, and be filed in writing at the Community Development Department, 321 S. Balsam Street, PO Box 1579, Moses Lake, WA. The appeal must contain the items set forth in Moses Lake Municipal Code section 14.06.070(C).

Please note that failure to file a timely and compete appeal including the required items shall constitute waiver of all rights to an administrative appeal under City code.

SEPA ENVIRONMENTAL CHECKLIST

Purpose of checklist:

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for Lead Agencies:

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals:

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements –that do not contribute meaningfully to the analysis of the proposal.

A. Background [HELP]

1. Name of proposed project, if applicable:

   E-Jet Demonstration Plant (Project Rainier)

2. Name of applicant:

Twelve Benefit Corporation (Twelve)

3. Address and phone number of applicant and contact person:

614 Bancroft Way, Suite B
Berkeley, CA 94710
Contact Person: Greg DiCosola
Phone number for the Contact Person: 708-699-8493

4. Date checklist prepared: 2/3/2023

5. Agency requesting checklist: City of Moses Lake, Community Development

6. Proposed timing or schedule (including phasing, if applicable):

Site work to begin Q1 2023, plant operation Q4 2023

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

Not at this time.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

Geotechnical Report, The Riley Group
Trip Generation Letter, Mackenzie
Phase I Environmental Site Assessment Report, Farallon Consulting

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

No.

10. List any government approvals or permits that will be needed for your proposal, if known.

The permits Twelve will request include, but are not limited to, a conditional use permit, building/engineering permits, approval/permits for compliance with local fire code, stormwater permits, a wastewater pretreatment permit from Washington State Department of Ecology (Ecology), and an air permit from Ecology (Order of Approval).

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

Twelve is proposing to install a sustainable jet fuel production facility in Moses Lake, Washington. This production facility will take carbon dioxide and water feed streams through an electrolysis process to create carbon monoxide and hydrogen. This carbon monoxide and hydrogen are then further processed into a carbon neutral jet fuel (E-jet) product. The E-Jet demonstration plant will produce 75,000 gallons/year of sustainable jet fuel and will start production by Q4 of 2023

The proposed development area is located on three (3) parcels of an approximately 14.2-acre site. There are four (4) existing buildings on the site that comprise a total building area of approximately 131,190 SF. The buildings include a 7,500 SF administration building with two (2) floors and a connected 18,890 SF maintenance building with three (3) floors (Building 3), a 59,200 SF process building with three (3) floors (Building 1), and a 45,600 SF process building with three (3) floors (Building 2).

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The facility address is 13583 Wheeler Road NE, Moses Lake, WA 98837

B. Environmental Elements [HELP]

1. *Earth* [help]

a. General description of the site:

(circle one): Flat, rolling, hilly, steep slopes, mountainous, other __Flat_____

b. What is the steepest slope on the site (approximate percent slope)?

The approximate steepest slope on site is 5%.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

USDA has the site mapped as Scoon silt loam. Geologic maps have the site mapped as Priest Rapids Member (Typ) and Wanapum Basalt (Mvw) bedrock.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

None to our knowledge.

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

Grading for site development, utilities, and building foundations will occur on this property and is expected to include approximately 3,500 cubic yards of cut and 4,200 cubic yards of fill. The eastern side of the site will be cut down to fill the western part of the site to create a somewhat balanced cut and fill site provide level building pad sites. Additional fill of base rock, asphalt, and concrete will then be added to the site at time of final grading.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

Erosion of soils could occur on-site. An approved erosion control plan utilizing adopted best management practices for erosion control will be implemented prior to commencing ground-disturbing activities. Erosion control plans will conform to the standards identified in City of Moses Lake Code.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

Approximately 65% of the site will be covered with impervious areas, consisting of building footprint, paving, and walkways.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

Erosion control plans will be prepared and submitted in accordance with the standards for erosion control identified in the City of Moses Lake Code as well as an approved SWPPP.

2. Air [help]

What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

During normal operation, Twelve will use carbon dioxide and water in an electrochemical reactor with a proprietary catalyst to electrify the carbon dioxide and water. This process creates a synthesis gas primarily composed of carbon monoxide and hydrogen which is further refined into a carbon neutral jet fuel (E-jet). Twelve will produce a maximum of 75,000 gallons/year of sustainable E-jet fuel from this proposed operation. Twelve will use various mobile construction equipment during the build out of the project site, which will be removed, prior to beginning operation.

Emission sources from the E-jet production project include fugitive emissions from various storage tanks and process equipment components such as valves, flanges, and pumps. These fugitive emissions may include carbon monoxide, carbon dioxide, and trace organic compounds classified as toxic air pollutants (TAPs) under WAC 173-460-150.

Additionally, Twelve will install a thermal oxidizer (TO) to combust waste gas streams prior to emission to the atmosphere. Combustion of the waste gas is expected to yield criteria pollutants such as oxides of nitrogen, carbon monoxide, carbon dioxide, and trace amounts of various organic compounds.

Emergency natural gas-fired engine/generators will be installed to support the operation during emergency situations, such as power outages.

Emissions from the proposed project are expected to exceed the emission exemption thresholds of WAC 173-400-110(5)(b) and, as such, an Order of Approval from Ecology will be required prior to construction and operation of the proposed project. It is expected the ambient impact of the toxic air pollutants will be less than the corresponding Acceptable Source Impact Levels in the Washington toxics rule, and the project will employ Best Available Control Technology to minimize emissions. Detailed information on the project emission sources and potential air contaminants will be included in an air permit application that will be submitted to Ecology.

The proposed project will produce a carbon-neutral “E-jet” fuel. Carbon dioxide is one of the primary inputs to the production of the E-jet. This carbon dioxide is sourced from operations that otherwise would have emitted the carbon dioxide directly to the atmosphere. This diversion of carbon dioxide from atmosphere yields carbon neutral or carbon negative jet fuel.

a. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

In general, there are no emission sources that are expected to affect this proposal; however, offsite sources of emissions and odors that may affect the proposed project include:

1. Smoke from wildfires in the summer
2. Sand from an occasional sandstorm
3. Manure odor from nearby farms in the spring
4. Smell of potato fries from the nearby food processing plant

Additionally, it was documented in the Phase I Environmental Site Assessment requested by Twelve prior to acquisition of the property that strong odors were observed at the site. These odors were detected in the vicinity of properties adjacent to the site. There was no evidence of odor originating from the property.

Twelve is actively investigating the potential impacts of odors that have been observed at the facility.

b. Proposed measures to reduce or control emissions or other impacts to air, if any:

Measures to reduce and control emissions or other impacts to air will be documented in the air permit application that will be submitted to Ecology to attain an Order of Approval for the project. Emission controls are expected to include a thermal oxidizer to destroy process waste gas streams prior to release to the atmosphere.

3. Water [help]

a. Surface Water: [help]

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

There are no surface water bodies within the immediate vicinity of the site. Surface water currently sheet flows to the south into existing drainage ditches or evaporates.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

No, the site is more than 200 feet away from all the water bodies.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

No fill or dredge material will be placed or removed.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

No withdrawals or diversions of water are anticipated since no standing water exists nor is any proposed on-site in this area.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

The site is not located in a 100-year floodplain

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No discharge of waste materials to surface waters are proposed.

b. Ground Water: [help]

1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.

No ground water will be withdrawn as the project will connect to the City of Moses Lake water system.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the

number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

The site does not have septic tanks since it is an existing industrial site.
No waste will be discharged into the ground.
New equipment will be either installed inside the existing building or on the concrete pads outside the building. The new concrete pads will have curbing to contain storm water.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

The site/storm drainage system will be designed in accordance with the City of Moses Lake's current storm drainage manual and in accordance with the Eastern Washington Stormwater Management manual.

2) Could waste materials enter ground or surface waters? If so, generally describe.

It is possible that waste materials could enter the ground or surface waters either by being spilled on pervious areas (such as grass or landscaped areas) or on streets; however, such events are expected to be of low probability as all operations will be performed within a building structure or in paved areas contained by curbs and gutters and directed to a stormwater system.

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

The proposal will not alter the existing drainage patterns in the vicinity of the site. Minor grading for parking areas and vehicle circulation is proposed. Drainage areas are planned along the southern property boundary.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

4. Plants [help]

a. Check the types of vegetation found on the site:

____deciduous tree: alder, maple, aspen, other – Not applicable; this is an industrial site

____evergreen tree: fir, cedar, pine, other – Not applicable; this is an industrial site

____shrubs – There are existing decorative shrubs along the rail tracks

____grass – Not applicable; this is an industrial site

____pasture – Not applicable; this is an industrial site

____crop or grain – Not applicable; this is an industrial site

____ Orchards, vineyards or other permanent crops. – Not applicable; this is an industrial site

____ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other – Not applicable; this is an industrial site

____water plants: water lily, eelgrass, milfoil, other– Not applicable; this is an industrial site

____other types of vegetation – There are some weeds growing along the access roads

b. What kind and amount of vegetation will be removed or altered?

There may need to be some weeds removed to enlarge access roads or to create a new access road inside the facility.

c. List threatened and endangered species known to be on or near the site.

To our knowledge, no threatened or endangered species exist within immediate vicinity of the site.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

Proposed landscaping will comply with City of Moses Lake planting requirements, including the use of native plants where appropriate.

e. List all noxious weeds and invasive species known to be on or near the site.

To our knowledge, no noxious weeds and invasive species are known to be on or near the site. The site is industrial.

5. Animals [help]

a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site.

Examples include:

birds: hawk, heron, eagle, songbirds, other: – Various other birds migrate from the wildlife refuge along this path during the winter.

mammals: deer, bear, elk, beaver, other: – None
fish: bass, salmon, trout, herring, shellfish, other ____None ____

b. List any threatened and endangered species known to be on or near the site. – None

c. Is the site part of a migration route? If so, explain.

Yes, you can observe birds migrating from the wildlife refuge during the winter; however, there are other industrial facilities in the area – right across the road – and there are no known issues with the bird migration.

d. Proposed measures to preserve or enhance wildlife, if any: – Not Applicable

e. List any invasive animal species known to be on or near the site. – Not Applicable

6. Energy and Natural Resources [help]

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

1. Electricity – will be used for manufacturing onsite.
2. Natural gas – will be used for manufacturing onsite.
3. Trucks that will deliver CO_2 to the site will be using diesel fuel.
4. Consideration will be given to sourcing the raw chemicals from the nearby plants to reduce the fuel consumption by trucks.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No, this project will not impact neighboring properties' ability to utilize solar energy.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

1. Maximize energy efficiency – use renewable energy.
2. Use of renewable energy resources – use of CO2 to make CO to make jet fuel.
3. Maximize use of process controls to avoid unnecessary temperature excursions, prevent exothermic reactions from happening.
4. Design and maintenance measures to reduce product consumption and waste.
5. Redesign facility lighting especially in the break/lunch rooms to be on motion sensors with photo cells.
6. Prohibit use of personal space heaters in the personnel occupied spaces.
7. Eliminate unnecessary hot plates, coffee pots and small appliances – use 1 common break/lunch room area.
8. Use of lower wattage bulbs in non-critical areas.
9. Preventative maintenance of equipment.
10. Use of variable frequency drives on rotating equipment will be evaluated.

7. Environmental Health [help]

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

Exposure to trace levels of toxic air pollutants emitted from air emission sources around the facility is possible. Details of these emission sources and comparisons to Acceptable Source Impact Levels (ASIL) of WAC 173-460-150 will be included in the notice of construction application submitted to Ecology.

There is a small risk of fire and explosion associated with the processing of jet fuel, hydrogen, and carbon monoxide that is produced as part of the processing, but those risk are mitigated with the emergency response plan.

Process wastewater will be pre-treated onsite as required to meet specifications for discharge from the site.

1) Describe any known or possible contamination at the site from present or past uses.

As detailed in the Phase I Environmental Site Assessment (ESA) conducted at the request of Twelve, due to the long-term industrial operations conducted at the property, there is the potential that hazardous substance releases may have occurred. No evidence of potential releases or contamination of the property were documented in the Phase I ESA conducted at the request of Twelve.

2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

No existing hazardous chemicals or conditions that would affect the project development and design were observed at the property during the Phase I ESA review at the site. Potential hazardous chemicals and conditions were not directly observed at surrounding sites during the Phase I ESA review, but operations at these facilities are potential existing hazardous chemicals and conditions that could affect this project.

3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

For the proposed project and its construction, it is expected that hazardous materials will be stored and used onsite as well as produced in the facility's normal operation. All hazardous or toxic materials stored onsite will be stored in appropriate containment, handled in accordance with their safety data sheet recommendations, and will be managed, as required, under all applicable environmental programs.

During normal operations, it is expected that trace organic compounds will be formed

in processing and during gas combustion that would meet the definition of toxic air pollutants under WAC 173-460-150.

1. Raw material – CO_2 (Carbon Dioxide)
2. Raw material – Hydrogen
3. Raw material – Solid Metal Salt (mixed with deionized water to form concentrated brine)
4. Product - Jet fuel
5. Used in the manufacturing process – proprietary catalyst – can produce Nickel Carbonyl
6. Produced in the manufacturing process – Oxygen
7. Produced in the manufacturing process – Tailgas – this will have small amounts of methane, ethane, propane, butane, pentane, ethylene, propylene
8. Produced in the manufacturing process – CO (Carbon Monoxide)
9. Produced in the manufacturing process – Wastewater with hydrocarbons (small amounts of methanol, ethanol, n-propanol) – sent to Degasifier for further treatment
10. Produced in the manufacturing process – Neutralization agents produced on the cathode of the electrolyzer
11. Produced in the manufacturing process – Water can have small amounts of formic acid

4) Describe special emergency services that might be required.

Special emergency services may include, but are not limited to, the following:

1. The facility may need township provided fire brigade to respond to fire emergency.
2. The facility has an existing Firewater Tank and existing Firewater Pumps; Firewater Pumps will be tested monthly.
3. The building processing areas will be evaluated and firewater sprinklers will be installed as required; sprinklers will be tested on a specified schedule.
4. The facility will prepare emergency response procedures to both natural disasters and manufacturing upsets/emergencies.
5. The facility will locate muster areas.
6. The facility will create personnel training programs to respond to emergencies.
7. If required, storage tanks will be equipped with foam systems.

5) Proposed measures to reduce or control environmental health hazards, if any:

Proposed measures to reduce or control environmental health hazardous include, but are not limited to, the following:

1. A thermal oxidizer will be installed to destroy potential air toxic pollutants in process waste gas prior to release to atmosphere.
2. The facility will have an emergency power generator and UPS power backup for critical equipment.
3. Process controls.
4. Personnel training.
5. Safe operating procedures.
6. Preventative maintenance.

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

No known noise in the area would have an effect on the project.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

No significant noise outside, noise inside the building will be within the allowed dBa levels, personnel will wear hearing protection, rotating equipment will have noise attenuation as much as possible to be within 85 dBa.
Truck deliveries to the site may generate some noise but the truck deliveries will be once a day.
Construction noise during construction only.
An exterior generator will also be installed, the specific of the generator are still to be determined. Any noise from the generator will meet applicable noise levels as prescribed by City code.

3) Proposed measures to reduce or control noise impacts, if any:

Hearing protection for personnel.
Noise attenuation for rotating equipment, if required.
Annual audiograms for personnel.

8. Land and Shoreline Use [help]

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

Current use of the site is industrial; adjacent properties are also industrial and a truck terminal. Nearby land uses will not be affected.

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?

No, the project site is not used as working farmlands or working forest lands.

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:

The proposal will not affect surrounding working farms normal business operations.
The surrounding working farms will not affect the proposal.

c. Describe any structures on the site.

There are four (4) existing buildings on the site that comprise a total building area of approximately 131,190 SF.

d. Will any structures be demolished? If so, what?

Two (2) building are planned to be demolished. The process building (building 1) and 3-story building just south of building 1.

e. What is the current zoning classification of the site?

The site is currently zoned Heavy Industrial (HI).

f. What is the current comprehensive plan designation of the site?

The site comprehensive plan designation is Industrial and Agriculture.

g. If applicable, what is the current shoreline master program designation of the site?

Not applicable, not shoreline master program designation for the site.

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.

Not to our knowledge.

i. Approximately how many people would reside or work in the completed project?

15-20.

j. Approximately how many people would the completed project displace?

None; the existing site is vacant as the previous business shut down approximately 5 years ago.

k. Proposed measures to avoid or reduce displacement impacts, if any:

None proposed.

L. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

The proposal is going through a Conditional Use Permit (CUP).

m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:

There will be no long-term impact to agricultural and forest land of commercial significance.

9. Housing [help]

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

Not applicable; this is an industrial facility.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

Not applicable; this is an industrial facility.

c. Proposed measures to reduce or control housing impacts, if any:

Not applicable; this is an industrial facility.

10. Aesthetics [help]

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

The height of the tallest new structure will be approximately 30'. new buildings and structures will be industrial in nature and be constructed of durable materials.

b. What views in the immediate vicinity would be altered or obstructed?

As most of the surrounding land is vacant, no views will be obstructed.

b. Proposed measures to reduce or control aesthetic impacts, if any:

The site and buildings are being designed by professional architects and landscape architects, and all design standards of the City of Moses Lake are being met or exceeded.

11. Light and Glare [help]

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

There will be lights on at night in the plant operations section for safety and security purposes. Most light fixtures will be building mounted. Light fixtures within the parking lot will have cut off shield as necessary to reduce glare. No glare issues noted at this time.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

No. All proposed lighting will meet City of Moses Lake standards for glare and lamination.

c. What existing off-site sources of light or glare may affect your proposal?

No existing sources of light or glare will affect the proposal.

d. Proposed measures to reduce or control light and glare impacts, if any:

All proposed lighting will meet City of Moses Lake standards for glare and lamination.

12. Recreation [help]

a. What designated and informal recreational opportunities are in the immediate vicinity?

There are no recreational opportunities in the immediate vicinity of the site; the area is industrial or working farms and the nearby facilities are either manufacturing plants or working farms

b. Would the proposed project displace any existing recreational uses? If so, describe.

No existing recreational uses would be displaced or affected.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

No existing recreational uses would be displaced or affected.

13. Historic and cultural preservation [help]

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers ? If so, specifically describe.

There are no nearby sites listed in the national, state, or local preservation registers.

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.

No known landmarks, features, or other evidence of Indian or historic use or occupation.

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

No known landmarks, features, or other evidence of Indian or historic use or occupation.

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

Proposed development will comply with federal, state, and local regulations regarding the disturbance of resources. In the event of inadvertent discovery of potentially significant archaeological materials (bones, stone tools, and/or human remains), all work in the immediate vicinity will stop, the area secured, and the discovery reported to DAHP and potentially affected tribes.

14. Transportation [help]

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.

The proposed access will be from one (1) existing driveway from Wheeler Road. The driveways will provide access off the future minor arterial, S 51st Avenue. The driveway access points will provide shared access to other lots within the Central Terminals Industrial Park.

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?

No public transit is currently serving the site. No public transit is within the immediate vicinity of the site.

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?

The proposed project will add approximately 25 parking spaces. No spaces will be eliminated.

c. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).

No public road improvements to Wheeler Road. Improvements to the private access road is anticipated. The exact extend of the improvements is to be determined.

e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No water or air transportation will be used as part of this proposal. There is a rail spur that currently serves the site; there are no immediate plans to utilize the existing rail spur.

f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

Trip generation estimates were made using ITE's Trip Generation Manual, 11th Edition. The site is predicted to generate 38 trips per day under ITE code 140 (Manufacturing). Peak volumes would occur during typical morning and afternoon commute times.

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

Trucks bringing in raw materials to the site might be affected by the movement of agricultural products on the common roads in the area in season.

i. Proposed measures to reduce or control transportation impacts, if any:

None proposed at this time. Applicant will pay applicable traffic impact fees as determined by the City of Moses Lake.

15. Public Services [help]

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

No increase of public services is anticipated. Proposed development will increase the tax base and pay appliable taxes to fund any required services.

b. Proposed measures to reduce or control direct impacts on public services, if any.

None anticipated; proposed development will increase the tax base and pay appliable taxes to fund any required services.

16. Utilities [help]

a. Circle utilities currently available at the site:
electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other _____

Electricity
Water
Sewer

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

Sanitary Sewer: City of Moses Lake
Water: City of Moses Lake
Refuse Service: City of Moses Lake
Natural Gas: Cascade Natural Gas Corp.
Electricity: Grant PUD
Phone and Data: Ziply Fiber, Century Link

C. Signature [HELP]

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: _____

Name of signee Greg J. DiCosola

Position and Agency/Organization Vice President of Capital Projects, Twelve

Date Submitted: 03-Feb-2023

D. Supplemental sheet for nonproject actions [HELP]

(**IT IS NOT NECESSARY** to use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

Proposed measures to avoid or reduce such increases are:

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

3. How would the proposal be likely to deplete energy or natural resources?

Proposed measures to protect or conserve energy and natural resources are:

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Proposed measures to protect such resources or to avoid or reduce impacts are:

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

Proposed measures to avoid or reduce shoreline and land use impacts are:

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

Proposed measures to reduce or respond to such demand(s) are:

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

APPENDIX B. SITE PLANS AND DRAWINGS

These records may be available upon request. To find out if there are more records for this project, contact Ecology's Public Records Office.

- Online: https://ecology.wa.gov/footer-pages/public-records-requests
- Public Records Officer email: PublicRecordsOfficer@ecy.wa.gov • Call: 360-407-6040

Para averiguar si existen más registros sobre ese proyecto, póngase en contacto con la oficina de archivos públicos del Departamento de Ecología, envíe un correo electrónico a recordsofficer@ecy.wa.gov, o llame al 360-407-6040

APPENDIX C. EMISSION CALCULATIONS

Table 1.A. Annual Criteria Pollutant Potential to Emit Summary

Emission Source	Annual Potential Emissions (tpy)									
	CO	**NO_x**	**SO_2**	**VOC**	**PM**	**PM_{10}**	**$PM_{2.5}$**	**Lead**	**HAPs**	**CO_2**
Flare[1]	3.37	0.33	6.05E-04	6.26	7.18E-02	7.18E-02	7.18E-02	4.15E-06	0.07	537
Emergency Diesel Generator	0.06	1.58	1.46E-03	0.01	2.65E-03	2.65E-03	2.65E-03	4.77E-05	0.02	137
Oxygen Stream	0.25	--	--	--	--	--	--	--	--	50
Cooling Tower	--	--	--	--	7.59E-05	3.73E-05	1.84E-05	--	--	--
Storage Tanks[2]	--	--	--	0.05	--	--	--	--	3.98E-04	--
Loading Losses	--	--	--	1.21E-02	--	--	--	--	7.79E-04	--
Fugitive Emissions	7.74	--	--	8.49	--	--	--	--	5.89	10
Facility Wide Total	**11.42**	**1.91**	**2.06E-03**	**14.82**	**0.07**	**0.07**	**0.07**	**5.19E-05**	**5.98**	**734**
WAC Exemption Thresholds[3]	**5.00**	**2.00**	**2.00**	**2.00**	**--**	**0.75**	**0.50**	**0.005**	**--**	**--**
NSR Required?	Yes	No	No	Yes	No	No	No	No	No	--
Title V Threshold (tpy)[4]	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**25**	**--**
Title V Required?	No	No	No	No	No	No	No	No	No	--
PSD Major Source Threshold (tpy)[5]	**250**	**250**	**250**	**250**	**250**	**250**	**250**	**250**	**--**	**--**
PSD Major Required?	No	No	No	No	No	No	No	No	No	--

[1] Annual emission rates for all operating scenarios except comissioning of the flare are summed and respresented as contributing to the facility's potential to emit.

[2] The product storage tanks are assumed to have neglible standing losses. Therefore, only working losses of the tanks are respresented above.

[3] Exemption thresholds as detailed in WAC 173-400-110 Table 110(5), adapted by Ecology: Eastern Regional Office.

[4] Per 40 CFR 70.2 and 70.3, a Title V Permit is required for any major source which is defined as the potential to emit emissions greater or equal to 100 tpy for any air pollutant subject to regulation, 10 tpy of an individual HAP, or 25 tpy of combined HAPs. Fugitives sources do not need to be considered in determining the potential to emit for the facility since the source is not one of the listed 28 source categories. As the Twelve facility is not categorized as a listed source category, fugitive emissions are not required to be included. However, they are included in the potential emissions summary to provide a conservative comparison to the Title V Threshold for volatile organic compounds (VOCs). The EPA definition of "fugitive emissions" is "those emissions which could not reasonable pass through a stack, chimney, vent, or other functionally-equivalent opening" per the February 10, 1999 memorandum *Interpretation of the Definition of Fugitive Emissions in Parts 70 and 71*, from Thomas C. Current, Director Information Transfer and Program Integration Division. All fugitive emissions of HAP must be included when determining major source status. Fugitive emissions in this case would include piping component leaks throughout the facility.

[5] The Twelve facility is currently considered a minor source under the Prevention of Significant Deterioration (PSD) air permitting program. PSD permitting is triggered for a minor source when a modification to an existing minor source would be major considered on its own. Major as defined in 40 CFR 52.21(b)(1)(i)(a) has the potential to emit 250 tpy of any regulated NSR pollutant for facilities that are not in one of the listed categories. Since the Twelve facility is not classified as one of the listed categories, fugitive emissions do not need to be included in the PSD applicability determinations. However, fugitives are included in the potential emissions summary to provide a conservative comparison to the PSD Major Source Threshold for volatile organic compounds (VOCs).

Table 1.B. Hourly Criteria Pollutant Potential to Emit Summary

Emission Source	Hourly Potential Emissions (lb/hr)									
	CO	**NO_x**	**SO_2**	**VOC**	**PM**	**PM_{10}**	**$PM_{2.5}$**	**Lead**	**HAPs**	**CO_2**
Flare	34.45	2.13	0.00	4.47	0.46	0.46	0.46	3.03E-05	0.61	2,833
Emergency Diesel Generator	0.79	19.77	1.82E-02	0.10	3.31E-02	3.31E-02	3.31E-02	5.97E-04	0.25	1,714
Oxygen Stream	0.06	--	--	--	--	--	--	--	--	11
Cooling Tower	--	--	--	--	1.73E-05	8.53E-06	4.19E-06	--	--	--
Storage Tanks	--	--	--	0.01	--	--	--	--	9.09E-05	--
Loading Losses	--	--	--	2.02	--	--	--	--	1.30E-01	--
Fugitive Emissions	1.77	--	--	1.94	--	--	--	--	1.35	2

Table 1.A. Annual Criteria Pollutant Potential to Emit Summary

Emission Source	Annual Potential Emissions (tpy)									
	CO	**NO_x**	**SO_2**	**VOC**	**PM**	**PM_{10}**	**$PM_{2.5}$**	**Lead**	**HAPs**	**CO_2**
Flare - Commissioning[1]	3.92	0.35	6.05E-04	6.25	7.43E-02	7.43E-02	7.43E-02	4.31E-06	0.07	570
Emergency Diesel Generator	0.06	1.58	1.46E-03	0.01	2.65E-03	2.65E-03	2.65E-03	4.77E-05	0.02	137
Oxygen Stream	0.25	--	--	--	--	--	--	--	--	50
Cooling Tower	--	--	--	--	7.59E-05	3.73E-05	1.84E-05	--	--	--
Storage Tanks[2]	--	--	--	0.05	--	--	--	--	3.98E-04	--
Loading Losses	--	--	--	1.21E-02	--	--	--	--	7.79E-04	--
Fugitive Emissions	7.74	--	--	8.49	--	--	--	--	5.89	10
Facility Wide Total	**11.97**	**1.93**	**0.00**	**14.81**	**0.08**	**0.08**	**0.08**	**5.21E-05**	**5.99**	**767**
WAC Exemption Thresholds[3]	**5.00**	**2.00**	**2.00**	**2.00**	**--**	**0.75**	**0.50**	**0.005**	**--**	**--**
NSR Required?	Yes	No	No	Yes	No	No	No	No	No	--
Title V Threshold (tpy)[4]	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**25**	**--**
Title V Required?	No	No	No	No	No	No	No	No	No	--
PSD Major Source Threshold (tpy)[5]	**250**	**250**	**250**	**250**	**250**	**250**	**250**	**250**	**--**	**--**
PSD Major Required?	No	No	No	No	No	No	No	No	No	--

[1] Annual emission rates for all operating scenarios are summed and respresented as contributing to the facility's potential to emit.

[2] The product storage tanks are assumed to have neglible standing losses. Therefore, only working losses of the tanks are respresented above.

[3] Exemption thresholds as detailed in WAC 173-400-110 Table 110(5), adapted by Ecology: Eastern Regional Office.

[4] Per 40 CFR 70.2 and 70.3, a Title V Permit is required for any major source which is defined as the potential to emit emissions greater or equal to 100 tpy for any air pollutant subject to regulation, 10 tpy of an individual HAP, or 25 tpy of combined HAPs. Fugitives sources do not need to be considered in determining the potential to emit for the facility since the source is not one of the listed 28 source categories. As the Twelve facility is not categorized as a listed source category, fugitive emissions are not required to be included. However, they are included in the potential emissions summary to provide a conservative comparison to the Title V Threshold for volatile organic compounds (VOCs). The EPA definition of "fugitive emissions" is "those emissions which could not reasonable pass through a stack, chimney, vent, or other functionally-equivalent opening" per the February 10, 1999 memorandum *Interpretation of the Definition of Fugitive Emissions in Parts 70 and 71*, from Thomas C. Current, Director Information Transfer and Program Integration Division. All fugitive emissions of HAP must be included when determining major source status. Fugitive emissions in this case would include piping component leaks throughout the facility.

[5] The Twelve facility is currently considered a minor source under the Prevention of Significant Deterioration (PSD) air permitting program. PSD permitting is triggered for a minor source when a modification to an existing minor source would be major considered on its own. Major as defined in 40 CFR 52.21(b)(1)(i)(a) has the potential to emit 250 tpy of any regulated NSR pollutant for facilities that are not in one of the listed categories. Since the Twelve facility is not classified as one of the listed categories, fugitive emissions do not need to be included in the PSD applicability determinations. However, fugitives are included in the potential emissions summary to provide a conservative comparison to the PSD Major Source Threshold for volatile organic compounds (VOCs).

Table 1.B. Hourly Criteria Pollutant Potential to Emit Summary

Emission Source	Hourly Potential Emissions (lb/hr)									
	CO	**NO_x**	**SO_2**	**VOC**	**PM**	**PM_{10}**	**$PM_{2.5}$**	**Lead**	**HAPs**	**CO_2**
Flare - Commissioning	34.45	2.13	0.00	4.47	0.46	0.46	0.46	3.03E-05	1.58	2,833
Emergency Diesel Generator	0.79	19.77	1.82E-02	0.10	3.31E-02	3.31E-02	3.31E-02	5.97E-04	0.25	1,714
Oxygen Stream	0.06	--	--	--	--	--	--	--	--	11
Cooling Tower	--	--	--	--	1.73E-05	8.53E-06	4.19E-06	--	--	--
Storage Tanks	--	--	--	0.01	--	--	--	--	9.09E-05	--
Loading Losses	--	--	--	2.02	--	--	--	--	1.30E-01	--
Fugitive Emissions	1.77	--	--	1.94	--	--	--	--	1.35	2

Table 2. Facility Speciated Emissions

Pollutant	CAS	Averaging Period	HAP?	TAP?[b]	Flare Emissions						Emergency Diesel Generator		Truck Loading				Tank Emissions						Fugitive Emissions		Total				SQER	Exceeds SQER?	De Minimis	Exceeds De Minimis?
					Flare Gas[b,c]		Flare Gas (w/ Comissioning)[b,c]		Pilot Gas		Oxygen Stream				Naphtha Tank		Jet Fuel Tank		Naphtha Tank - Product		Naphtha Tank - Off Spec		Jet Fuel Tank										
					(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(lb/day)[d]	(tpy)	(lb/Avg. Period)	(lb/Avg. Period)		(lb/Avg. Period)	
Hexane	110-54-3	24-hr	Y	Y	1.38	4.21E-02	1.38	4.13E-02	7.54E-06	3.30E-05	--	--	1.93E-03	1.55E-04	1.30E-01	7.79E-04	--	--	5.43E-05	2.38E-04	3.66E-05	1.60E-04	--	--	1.34	5.86	2.85	37.20	5.91	37.20	52.00	N	2.6	Y
Nitrogen Dioxide	10102-44-0	1-hr	N	Y	2.10	0.17	2.10	0.18	3.69E-02	1.62E-01	--	--	19.77	1.58	--	--	--	--	--	--	--	--	--	--	--	--	21.90	475.34	1.93	21.90	0.87	Y	0.46	Y
Carbon Monoxide	630-08-0	1-hr	N	Y	34.43	3.27	34.43	3.83	2.13E-02	9.33E-02	0.06	0.25	7.95E-01	6.36E-02	--	--	--	--	--	--	--	--	--	--	1.77	7.74	37.07	153.13	11.97	37.07	43.00	N	1.1	Y
3-Methylcholanthrene	56-49-5	year	Y	Y	1.09E-07	1.49E-08	1.09E-07	1.55E-08	4.68E-10	2.05E-09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.09E-07	0.00	1.76E-08	3.52E-05	0.02	N	7.80E-04	N
7,12-Dimethylbenz(a)anthracene	57-97-6	year	Y	Y	9.69E-07	1.33E-07	9.69E-07	1.38E-07	4.16E-09	1.82E-08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9.73E-07	0.00	1.56E-07	3.13E-04	0.00	N	6.90E-05	Y
Acetaldehyde	75-07-0	year	Y	Y	2.60E-03	3.57E-04	2.60E-03	3.71E-04	1.12E-05	4.90E-05	--	--	5.63E-02	4.51E-03	--	--	--	--	--	--	--	--	--	--	--	--	5.89E-02	1.35	4.93E-03	9.85	60.00	N	3.0	Y
Acrolein	107-02-8	24-hr	Y	Y	6.05E-04	8.30E-05	6.05E-04	8.63E-05	2.60E-06	1.14E-05	--	--	2.44E-03	1.95E-04	--	--	--	--	--	--	--	--	--	--	--	--	3.05E-03	0.06	2.93E-04	0.06	0.03	Y	1.30E-03	Y
Benz[a]anthracene	56-55-3	year	Y	Y	1.09E-07	1.49E-08	1.09E-07	1.55E-08	4.68E-10	2.05E-09	--	--	6.17E-06	4.94E-07	--	--	--	--	--	--	--	--	--	--	--	--	6.28E-06	0.00	5.11E-07	1.02E-03	0.89	N	0.045	N
Benzene	71-43-2	year	Y	Y	9.63E-03	1.32E-03	9.63E-03	1.37E-03	4.13E-05	1.81E-04	--	--	1.34E-02	1.07E-03	--	--	--	--	--	--	--	--	--	--	--	--	2.31E-02	0.32	2.62E-03	5.25	21.00	N	1	Y
Benzo(a)pyrene	50-32-8	year	Y	Y	7.26E-08	9.96E-09	7.26E-08	1.04E-08	3.12E-10	1.37E-09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7.30E-08	0.00	1.17E-08	2.34E-05	0.16	N	8.20E-03	N
Benzo(b)fluoranthene	205-99-2	year	Y	Y	1.09E-07	1.49E-08	1.09E-07	1.55E-08	4.68E-10	2.05E-09	--	--	1.10E-05	8.81E-07	--	--	--	--	--	--	--	--	--	--	--	--	1.11E-05	0.00	8.99E-07	1.80E-03	0.89	N	0.045	N
Benzo(k)fluoranthene	207-08-9	year	Y	Y	1.09E-07	1.49E-08	1.09E-07	1.55E-08	4.68E-10	2.05E-09	--	--	3.49E-06	2.79E-07	--	--	--	--	--	--	--	--	--	--	--	--	3.60E-06	0.00	2.97E-07	5.94E-04	0.89	N	0.045	N
Chrysene	218-01-9	year	Y	Y	1.09E-07	1.49E-08	1.09E-07	1.55E-08	4.68E-10	2.05E-09	--	--	1.52E-05	1.21E-06	--	--	--	--	--	--	--	--	--	--	--	--	1.53E-05	0.00	1.23E-06	2.46E-03	8.90	N	0.45	N
Dibenzo(a,h)anthracene	53-70-3	year	Y	Y	7.26E-08	9.96E-09	7.26E-08	1.04E-08	3.12E-10	1.37E-09	--	--	3.43E-06	2.75E-07	--	--	--	--	--	--	--	--	--	--	--	--	3.51E-06	0.00	2.86E-07	5.73E-04	0.08	N	4.10E-03	N
Dichlorobenzene, 1,4- (p)	106-46-7	year	Y	Y	7.26E-05	9.96E-06	7.26E-05	1.04E-05	3.12E-07	1.37E-06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7.30E-05	0.00	1.17E-05	0.02	15.00	N	0.74	N
Ethyl benzene	100-41-4	year	Y	Y	8.74E-02	1.20E-02	8.74E-02	1.25E-02	3.75E-04	1.64E-03	--	--	7.84E-04	6.27E-05	--	--	--	--	--	--	--	--	--	--	--	--	8.86E-02	0.03	1.42E-02	28.33	65.00	N	3.2	Y
Formaldehyde	50-00-0	year	Y	Y	7.08E-02	9.71E-03	7.08E-02	1.01E-02	3.04E-04	1.33E-03	--	--	1.24E-01	9.93E-03	--	--	--	--	--	--	--	--	--	--	--	--	1.95E-01	2.99	2.13E-02	42.69	27.00	Y	1.4	Y
Indeno(1,2,3-c,d)pyrene	193-39-5	year	Y	Y	1.09E-07	1.49E-08	1.09E-07	1.55E-08	4.68E-10	2.05E-09	--	--	4.11E-06	3.29E-07	--	--	--	--	--	--	--	--	--	--	--	--	4.22E-06	0.00	3.46E-07	6.92E-04	0.89	N	0.045	N
Naphthalene	91-20-3	year	Y	Y	6.66E-04	9.13E-05	6.66E-04	9.49E-05	2.86E-06	1.25E-05	--	--	1.42E-03	1.13E-04	--	--	--	--	--	--	--	--	--	--	--	--	2.09E-03	0.03	2.21E-04	0.44	4.80	N	0.24	Y
Propylene	115-07-1	24-hr	N	Y	2.98E-01	5.51E-02	2.98E-01	5.50E-02	6.34E-04	2.78E-03	--	--	3.36E-02	2.69E-03	--	--	--	--	--	--	--	--	--	--	--	--	3.32E-01	1.04	6.06E-02	1.04	220.00	N	11	N
Toluene	108-88-3	24-hr	Y	Y	3.51E-03	4.82E-04	3.51E-03	5.00E-04	1.51E-05	6.61E-05	--	--	7.58E-03	6.06E-04	--	--	--	--	--	--	--	--	--	--	--	--	1.11E-02	0.18	1.17E-03	0.18	370.00	N	19	N
Xylenes	1330-20-7	24-hr	Y	Y	1.76E-03	2.41E-04	1.76E-03	2.50E-04	7.54E-06	3.30E-05	--	--	3.05E-03	2.44E-04	--	--	--	--	--	--	--	--	--	--	--	--	4.81E-03	0.07	5.27E-04	0.07	16.00	N	0.82	N
Methanol	67-56-1	24-hr	Y	Y	7.30E-03	7.98E-04	7.30E-03	1.19E-03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01	0.03	1.39E-02	0.22	3.00E-02	2.21E-01	1500.00	N	74.00	N
Lead & compounds, NOS	7439-92-1	year	Y	Y	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	5.97E-04	4.77E-05	--	--	--	--	--	--	--	--	--	--	--	--	5.97E-04	0.01	4.77E-05	0.10	14.00	N	10.00	N
Fluorene	86-73-7	--	Y	N	1.70E-07	2.32E-08	1.70E-07	2.42E-08	0.00	0.00	--	--	1.27E-04	1.02E-05	--	--	--	--	--	--	--	--	--	--	--	--	1.27E-04	0.00	1.02E-05	--	--	N	--	N
Phenanthrene	85-01-8	--	Y	N	1.03E-06	1.41E-07	1.03E-06	1.47E-07	0.00	0.00	--	--	4.05E-04	3.24E-05	--	--	--	--	--	--	--	--	--	--	--	--	4.06E-04	0.01	3.26E-05	--	--	N	--	N
Pyrene	129-00-0	--	N	N	3.03E-07	4.15E-08	3.03E-07	4.31E-08	0.00	0.00	--	--	3.68E-05	2.94E-06	--	--	--	--	--	--	--	--	--	--	--	--	3.71E-05	0.00	2.99E-06	--	--	N	--	N
Arsenic & inorganic arsenic compounds, NOS	7440-38-2	year	Y	Y	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	1.15E-04	9.20E-06	--	--	--	--	--	--	--	--	--	--	--	--	1.15E-04	0.00	9.20E-06	0.02	0.05	N	2.50E-03	Y
Cadmium & compounds, NOS	7440-43-9	year	Y	Y	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	1.08E-04	8.63E-06	--	--	--	--	--	--	--	--	--	--	--	--	1.08E-04	0.00	8.63E-06	0.02	0.04	N	1.90E-03	Y
Chromium	7440-47-3	24-hr	Y	Y	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	4.31E-05	3.45E-06	--	--	--	--	--	--	--	--	--	--	--	--	4.31E-05	0.00	3.45E-06	1.04E-03	0.37	N	1.90E-02	N
Chromium(VI) & compounds, NOS	18540-29-9	--	Y	N	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	7.19E-06	5.75E-07	--	--	--	--	--	--	--	--	--	--	--	--	7.19E-06	0.00	5.75E-07	--	--	N	--	N
Chromium(III), soluble particulates, NOS	Cr(III)sol	24-hr	Y	Y	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	4.31E-05	3.45E-06	--	--	--	--	--	--	--	--	--	--	--	--	4.31E-05	0.00	3.45E-06	1.04E-03	0.01	N	3.70E-04	Y
Copper & compounds	7440-50-8	1-hr	N	Y	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	2.95E-04	2.36E-05	--	--	--	--	--	--	--	--	--	--	--	--	2.95E-04	0.01	2.36E-05	2.95E-04	0.19	N	9.30E-03	N
Manganese & compounds	7440-96-5	--	Y	N	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	2.23E-04	1.78E-05	--	--	--	--	--	--	--	--	--	--	--	--	2.23E-04	0.01	1.78E-05	--	--	N	--	N
Mercury, elemental	7439-97-6	24-hr	Y	Y	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	1.44E-04	1.15E-05	--	--	--	--	--	--	--	--	--	--	--	--	1.44E-04	0.00	1.15E-05	3.45E-03	2.20E-03	Y	1.10E-04	Y
Nickel & compounds, NOS	7440-02-0	year	Y	Y	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	2.80E-04	2.24E-05	--	--	--	--	--	--	--	--	--	--	--	--	2.80E-04	0.01	2.24E-05	0.04	0.62	N	0.03	Y
Selenium & selenium compounds (other than	7782-49-2	--	Y	N	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	1.58E-04	1.27E-05	--	--	--	--	--	--	--	--	--	--	--	--	1.58E-04	0.00	1.27E-05	--	--	N	--	N
Zinc	7440-66-6	--	N	N	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	1.61E-03	1.29E-04	--	--	--	--	--	--	--	--	--	--	--	--	1.61E-03	0.04	1.29E-04	--	--	N	--	N
Sulfur dioxide	7446-09-5	1-hr	N	Y	3.03E-05	4.15E-06	3.03E-05	4.31E-06	--	--	--	--	1.82E-02	1.46E-03	--	--	--	--	--	--	--	--	--	--	--	--	1.83E-02	0.44	1.46E-03	0.02	1.20	N	0.46	N
Acenaphthylene	208-96-8	--	Y	N	1.09E-07	1.49E-08	1.09E-07	1.55E-08	0.00	0.00	--	--	9.16E-05	7.33E-06	--	--	--	--	--	--	--	--	--	--	--	--	9.17E-05	0.00	7.34E-06	--	--	N	--	N
1,3-Butadiene	106-99-0	year	Y	Y	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	1.56E-02	1.25E-03	--	--	--	--	--	--	--	--	--	--	--	--	1.56E-02	0.38	1.25E-03	2.50	5.40	N	0.27	Y
Chlorobenzene	108-90-7	24-hr	Y	Y	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	1.44E-05	1.15E-06	--	--	--	--	--	--	--	--	--	--	--	--	1.44E-05	0.00	1.15E-06	3.45E-04	74.00	N	3.70	N
Hydrogen chloride	7647-01-0	24-hr	Y	Y	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	1.34E-02	1.07E-03	--	--	--	--	--	--	--	--	--	--	--	--	1.34E-02	0.32	1.07E-03	0.32	0.67	N	0.03	Y
Hydrogen Cyanide	74-90-8	24-hr	Y	Y	1.57E-02	9.40E-05	1.57E-02	9.40E-05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.57E-02	0.02	9.40E-05	0.02	0.06	N	0.00	Y
Acenaphthene	83-32-9	--	Y	N	1.09E-07	1.49E-08	1.09E-07	1.55E-08	0.00	0.00	--	--	4.64E-05	3.71E-06	--	--	--	--	--	--	--	--	--	--	--	--	4.65E-05	0.00	3.73E-06	--	--	N	--	N
Anthracene	120-12-7	--	Y	N	1.45E-07	1.99E-08	1.45E-07	2.07E-08	0.00	0.00	--	--	1.22E-05	9.76E-07	--	--	--	--	--	--	--	--	--	--	--	--	1.24E-05	0.00	1.00E-06	--	--	N	--	N
Benzo(g,h,i)perylene	191-24-2	--	Y	N	7.26E-08	9.96E-09	7.26E-08	1.04E-08	0.00	0.00	--	--	5.52E-06	4.41E-07	--	--	--	--	--	--	--	--	--	--	--	--	5.59E-06	0.00	4.53E-07	--	--	N	--	N
o-Xylene	95-47-6	24-hr	Y	Y	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	1.91E-03	1.53E-04	--	--	--	--	--	--	--	--	--	--	--	--	1.91E-03	0.05	1.53E-04	0.05	16.00	N	0.82	N
m-Xylene	108-38-3	24-hr	Y	Y	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	1.91E-03	1.53E-04	--	--	--	--	--	--	--	--	--	--	--	--	1.91E-03	0.05	1.53E-04	0.05	16.00	N	0.82	N
p-Xylene	106-42-3	24-hr	Y	Y	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	1.91E-03	1.53E-04	--	--	--	--	--	--	--	--	--	--	--	--	1.91E-03	0.05	1.53E-04	0.05	16.00	N	0.82	N
Polyaromatic Hydrocarbons / Polycyclic Organ	POM	--	Y	N	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	4.02E-03	3.22E-04	--	--	--	--	--	--	--	--	--	--	--	--	4.02E-03	0.10	3.22E-04	--	--	N	--	N
Fluoranthene	206-44-0	--	Y	N	3.05E-05	4.18E-06	3.05E-05	4.34E-06	0.00	0.00	--	--	4.00E-05	3.20E-06	--	--	--	--	--	--	--	--	--	--	--	--	7.04E-05	0.00	7.54E-06	--	--	N	--	N
Diesel engine exhaust, particulate	DEEP	year	N	Y	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	3.31E-02	2.65E-03	--	--	--	--	--	--	--	--	--	--	--	--	3.31E-02	0.79	2.65E-03	5.30	0.54	Y	2.70E-02	Y
																										Total HAP:	**3.31**		**43.47**	**5.99**				
																										Maximum Individual HAP (Hexane):	**2.85**		**37.20**	**5.91**				

[a] TAPs as defined in WAC 173-460.

[b] The approximate emission rates for the Maximum Case of flare combustion are conservatively assumed to represent the maximum lb/hr emission rate of TAPs emitted from the flare.

[c] The sum of the estimated annual emission rates for all operating scenarios is conservatively assumed to represent the maximum tpy emission rate of TAPs emitted from the flare.

[d] The lb/day TAP emissions for flares based on worst case daily emissions, which have been calculated to be 1 hr of shutdown and 23 hr of startup after shutdown.

Table 3. Facility-Wide CO_2e Emissions

Pollutant	GWP[1]	Flare (tpy)	Flare (w/ Commissioning) (tpy)	Emergency Diesel Generator (tpy)	Oxygen Stream (tpy)	Fugitives (tpy)	Total Pollutant Emissions (tpy)	CO_2e Emissions (tpy)	CO_2e Emissions (Metric Tonnes/yr)
CO_2	1	537	570	137	50	10	1,304	1,304	1,183
N_2O	298	0.002	0.002	0.001	--	--	0	1.6	1.44
CH_4	25	0.487	0.479	0.006	--	--	1	24.30	22.04
							Total CO_2e	**1,330**	**1,207**

[1] The emission factors for each GHG are obtained from 40 CFR 98 Subpart C, Tables C-1 and C-2 for other biomass gaseous fuels, and converted to values in lb/MMBtu. The GHGs emissions are calculated based on the Global Warming Potentials (GWP) provided in Table A-1 of 40 CFR 98. These emission estimates do not include plant comissioning operation.

Table 4.A. Process Conditions - Flare Inlet Properties

Parameter	Operating Case																
	Emergency Cases											Normal Case	Start-Up (Commissioning)	Start-Up (Restart After Shutdown)	Shutdown	Main Fractionator Reflux Failure [3]	Units
	Case 1: FT Area Fire	Case 2: Tank 80-T-11 Fire	Case 3 : Tank 8--T-04 Fire	Case 4: FT Reactor Tube Rupture	Case 5: CO Compressor Package Rupture	Case 6: Ft Recycle Compressor Package Rupture	Case 7: HC Recycle Compressor Package Rupture	Case 8: CO2 Surge Drum Fire	Case 9: Syng Gas Surge Drum Fire	Case 10: Ft Reactor Tube Inlet Fire	Case 11: S0-E-10 + S0-E-11 _ S0-PSV-041 Fire						
Molecular Weight	51.74	84.56	165.00	18.30	25.70	20.40	4.52	41.80	36.90	16.78	16.80	19.80	36.90	41.80	16.10	98.9	lb/lb-mol
Temperature	550	228	514	337	95	95	95	421	639	755	496	119			100.00	245.9	F
Waste Gas Lower Heating Value (LHV)	1,584	4,351	7,836	233	315	397	332	600	600	351	351	251	600	600	276	4,971	BTU/scf
Flow Rate	8,286	2,456	1,524	17,109	2,548	3,114	1,123	783	2,399	225	97	86	440	351	2,871.73	707	lb/hr
MMBtu/hr to Flare	165	55	45	133	11	21	30	8	32	4	1	0.39	1.99	5.83	16.68	15.20	MMBtu/hr
Process Gas Flowrate	104,386	12,549	5,793	570,232	33,836	52,095	90,609	12,797	52,948	10,616	3,551	1,546	3,323	9,711	60,541	3,058	scfh
	0	0	0	0	0	0	0	0	0	0	0	13.08	0.00	2.80	0.73	5.10E-04	MMscf/yr
Annual Operating Hours (Normal Year)	0	0	0	0	0	0	0	0	0	0	0	8460	0	288	12	0.17	hrs/yr
Annual Operating Hours (Commissioning)	0	0	0	0	0	0	0	0	0	0	0	8094	366	288	12	0.17	hrs/yr
Assist Gas (Propane) Flow Rate	0.00	0.00	0.00	96747.77	0.00	0.00	5818.21	2236.79	6622.11	0.00	0.00	0.00	1214.56	1001.55	0.00	0.00	scfh

[1] Operating parameters for nomial and emergency maximum design case expected were obtained from by Twelve on 04/27/2023. Operation parameters for start-ups and shutdowns taken from data provided by Twelve on 4/19/2023

[2] Assuming ideal gas conditions at the following specifications the following characteristic parameters apply:

10.731 ft3 psi / lb-mol R
3 psig
100 F

[3] The main fractionator reflux failure case is assumed to last up to a maximum of 10 minutes in a given hour.

[4] Assist gas blended with process gases to reach minimum HHV of 300

Table 4.B. Flare Design Case - Normal Operation

Constituent	CAS	Molecular Weight	Flow Rate			
		(lb/lb-mol)	(lb/hr)	(lb/day)	Normal Year (tpy)	Commissioning Year (tpy)
Water	7732-18-5	18.02	1.84E-01	4.43E+00	7.80E-01	7.46E-01
Hydrogen	1333-74-0	2.02	3.15E+00	7.55E+01	1.33E+01	1.27E+01
Nitrogen	7727-37-9	28.01	3.93E+01	9.44E+02	1.66E+02	1.59E+02
Carbon Monoxide	630-08-0	28.01	1.55E+01	3.73E+02	6.58E+01	6.29E+01
Oxygen	7782-44-7	32.00	1.21E-03	2.91E-02	5.13E-03	4.91E-03
Argon	7440-37-1	39.95	1.89E-04	4.53E-03	7.98E-04	7.63E-04
Carbon Dioxide	124-38-9	44.01	1.72E-01	4.19E+02	7.39E+01	7.07E+01
Methane	74-82-8	16.04	5.14E+00	1.23E+02	2.17E+01	2.08E+01
Ethane	74-84-0	30.07	1.19E-01	2.87E+00	5.05E-01	4.83E-01
Propane	74-98-6	44.10	8.52E-01	2.05E+01	3.61E+00	3.45E+00
N-Butane	106-97-8	58.12	9.20E-01	2.21E+01	3.89E+00	3.72E+00
N-Pentane	109-66-0	72.15	6.41E-01	1.54E+01	2.71E+00	2.60E+00
N-Hexane	110-54-3	86.18	4.50E-01	1.08E+01	1.90E+00	1.82E+00
N-Heptane	142-82-5	100.21	2.18E-01	5.24E+00	9.24E-01	8.84E-01
n-OCTANE	111-65-9	114.23	9.67E-02	2.32E+00	4.09E-01	3.91E-01
n-NONANE	111-84-2	128.26	3.45E-02	8.27E-01	1.46E-01	1.39E-01
n-DECANE	124-18-5	142.28	8.55E-03	2.05E-01	3.62E-02	3.46E-02
n-UNDECANE	1120-21-4	156.31	1.25E-03	2.99E-02	5.28E-03	5.05E-03
n-DODECANE	112-40-3	170.33	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-TRIDECANE	629-50-5	184.36	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-TETRADECANE	629-59-4	198.39	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-PENTADECANE	629-62-9	212.41	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-HEXADECANE	544-76-3	226.44	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-HEPTADECANE	629-78-7	240.47	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-OCTADECANE	593-45-3	254.49	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-NONADECANE	629-92-5	268.52	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-EICOSANE	112-95-8	282.50	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-HENEICOSANE	629-94-7	296.60	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-DOCOSANE	629-97-0	310.60	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-TRICOSANE	638-67-5	324.60	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-TETRACOSANE	646-31-1	338.65	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-PENTACOSANE	629-99-2	352.70	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-HEXACOSANE	630-01-3	366.71	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-HEPTACOSANE	593-49-7	380.73	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-OCTACOSANE	630-02-4	394.77	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-NONACOSANE	630-03-5	408.79	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-TRIACONTANE	638-68-6	422.80	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NBP[0]883_1*	NBP883	888.50	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NBP[0]977_1*	NBP977	888.50	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NBP[0]1066_1*	NBP1066	888.50	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NBP[0]1173_1*	NBP1173	888.50	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Methanol	67-56-1	32.04	4.95E-03	1.19E-01	2.09E-02	2.00E-02
Ethanol	64-17-5	46.07	5.16E-05	1.24E-03	2.18E-04	2.09E-04
N-Propanol	71-23-8	60.09	4.70E-03	1.13E-01	1.99E-02	1.90E-02
N-Butanol Plus	71-36-3	74.12	1.36E-02	3.27E-01	5.77E-02	5.52E-02
1-Butene	106-98-9	56.11	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Pentanol	71-41-0	88.15	1.42E-02	3.41E-01	6.01E-02	5.75E-02
1-Hexanol	111-27-3	102.18	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Heptanol	111-70-6	116.20	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Octanol	111-87-5	130.23	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nonanol	143-08-8	144.25	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Decanol	112-30-1	158.28	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Undecanol	112-42-5	172.31	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Dodecanol	112-53-8	186.33	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Tridecanol	112-70-9	200.36	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Tetradecanol	112-72-1	214.39	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Pentadecanol	629-76-5	228.41	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Hexadecanol	36653-82-4	242.44	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Heptadecanol	1454-85-9	256.47	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Octadecanol	112-92-5	270.49	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nonadecanol	1454-84-8	284.52	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylene	74-85-1	28.05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Propylene	115-07-1	42.08	3.97E-01	9.52E+00	1.68E+00	1.61E+00
1-Pentene	109-67-1	70.13	2.48E-01	5.95E+00	1.05E+00	1.00E+00
1-Hexene Plus	592-41-6	84.16	1.36E-01	3.26E+00	5.74E-01	5.49E-01
1-HEPTENE	592-76-7	98.19	6.94E-02	1.66E+00	2.93E-01	2.81E-01
1-OCTENE	111-66-0	112.21	2.73E-02	6.54E-01	1.15E-01	1.10E-01
1-NONENE	124-11-8	126.24	8.36E-03	2.01E-01	3.54E-02	3.38E-02
1-DECENE	872-05-9	140.27	3.10E-03	7.43E-02	1.31E-02	1.25E-02
1-Undecene	821-95-4	154.29	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Dodecene	112-41-4	168.32	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Tridecene	2437-56-1	182.35	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Tetradecene	1120-36-1	196.37	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Pentadecene	13360-61-7	210.40	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Hexadecene	629-73-2	224.43	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Heptadecene	6765-39-5	238.45	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Octadecene	112-88-9	252.48	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nonadecene	18435-45-5	266.50	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isobutane	75-28-5	58.12	3.34E-01	8.03E+00	1.41E+00	1.35E+00
Isopentane	78-78-4	72.15	1.28E-01	3.07E+00	5.41E-01	5.17E-01
2-METHYLPENTANE	107-83-5	86.18	2.06E-02	4.95E-01	8.73E-02	8.33E-02
2-METHYLHEXANE	591-76-4	100.20	1.28E-02	3.07E-01	5.41E-02	5.18E-02
2-METHYLHEPTANE	592-27-8	114.23	5.47E-03	1.31E-01	2.31E-02	2.21E-02
2-METHYLOCTANE	3221-61-2	128.26	2.05E-03	4.91E-02	8.66E-03	8.28E-03
2-METHYLNONANE	871-83-0	142.28	1.14E-03	2.72E-02	4.80E-03	4.59E-03
Hydrogen Sulfide	7783-06-4	34.08	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ammonia	7664-41-7	17.03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hydrogen Cyanide	74-90-8	27.03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Totals	85.60	2054.40	362.09	346.42

[5] The total hours of operation in a normal year are assumed to be 8460
The total hours of operation commissioning year are assumed to be 8094

Table 4.C. Flare Design Case - Start-up After Shutdown

Constituent	CAS	Molecular Weight	Flow Rate		
		(lb/lb-mol)	(lb/hr)	(lb/day)	(tpy)
Water	7732-18-5	18.02	2.17E+01	1.90E+02	1.14E+00
Hydrogen	1333-74-0	2.02	2.28E+01	4.87E+02	2.92E+00
Nitrogen	7727-37-9	28.01	4.71E+00	4.22E+01	2.53E-01
Carbon Monoxide	630-08-0	28.01	1.53E+02	3.23E+03	1.94E+01
Oxygen	7782-44-7	32.00	1.51E-98	1.21E-97	7.26E-100
Carbon Dioxide	124-38-9	44.01	3.12E+01	2.59E+02	1.56E+00
Methane	74-82-8	16.04	9.18E+00	7.34E+01	4.41E-01
Ethane	74-84-0	30.07	1.37E-01	1.10E+00	6.60E-03
Propane	74-98-6	44.1	1.25E+00	1.00E+01	6.01E-02
N-Butane	106-97-8	58.12	1.43E+00	1.15E+01	6.88E-02
N-Pentane	109-66-0	72.15	1.07E+00	8.56E+00	5.14E-02
N-Hexane	110-54-3	86.18	7.17E-01	5.89E+00	3.54E-02
N-Heptane	142-82-5	100.21	3.68E-01	2.94E+00	1.77E-02
n-OCTANE	111-65-9	114.23	2.20E-01	1.76E+00	1.05E-02
n-NONANE	111-84-2	128.26	2.90E-08	2.32E-07	1.39E-09
n-DECANE	124-18-5	142.28	1.62E+00	1.30E+01	7.78E-02
n-UNDECANE	1120-21-4	156.31	1.28E+00	1.02E+01	6.13E-02
n-DODECANE	112-40-3	170.33	3.09E-01	2.47E+00	1.48E-02
n-TRIDECANE	*629-50-5*	184.36	2.30E-01	1.84E+00	1.10E-02
n-TETRADECANE	*629-59-4*	198.39	1.75E-04	1.40E-03	8.39E-06
n-PENTADECANE	629-62-9	212.41	2.23E+00	1.78E+01	1.07E-01
n-HEXADECANE	544-76-3	226.44	1.46E+00	1.17E+01	7.02E-02
n-HEPTADECANE	*629-78-7*	240.47	1.53E+00	1.22E+01	7.34E-02
n-OCTADECANE	593-45-3	254.49	1.21E+00	9.70E+00	5.82E-02
n-NONADECANE	629-92-5	268.52	5.16E-01	4.13E+00	2.48E-02
Methanol	67-56-1	32.04	3.65E-01	2.92E+00	1.75E-02
Ethanol	64-17-5	46.07	3.77E-01	3.01E+00	1.81E-02
N-Propanol	71-23-8	60.09	1.09E-01	8.72E-01	5.23E-03
N-Butanol Plus	71-36-3	74.12	9.24E-02	7.39E-01	4.43E-03
Propylene	115-07-1	42.08	4.42E-01	3.53E+00	2.12E-02
1-Butene	106-98-9	56.11	3.63E-01	2.90E+00	1.74E-02
1-Pentene	109-67-1	70.13	4.46E-01	3.57E+00	2.14E-02
1-Hexene Plus	592-41-6	84.16	4.01E-01	3.21E+00	1.93E-02
1-HEPTENE	592-76-7	98.19	3.34E-01	2.67E+00	1.60E-02
1-OCTENE	111-66-0	112.21	1.02E-01	8.14E-01	4.88E-03
1-NONENE	124-11-8	126.24	2.47E+03	4.80E+04	2.88E+02
1-DECENE	872-05-9	140.27	0.00E+00	0.00E+00	0.00E+00
Isobutane	75-28-5	58.12	0.00E+00	0.00E+00	0.00E+00
Isopentane	78-78-4	72.15	0.00E+00	0.00E+00	0.00E+00
2-METHYLPENTANE	107-83-5	86.18	0.00E+00	0.00E+00	0.00E+00
2-METHYLHEXANE	591-76-4	100.2	0.00E+00	0.00E+00	0.00E+00
2-METHYLHEPTANE	592-27-8	114.23	0.00E+00	0.00E+00	0.00E+00
2-METHYLOCTANE	3221-61-2	128.26	0.00E+00	0.00E+00	0.00E+00
2-METHYLNONANE	871-83-0	142.28	0.00E+00	0.00E+00	0.00E+00
1-PENTANOL	**71-41-0**	88.15	0.00E+00	0.00E+00	0.00E+00
1-HEXANOL	**111-27-3**	102.18	0.00E+00	0.00E+00	0.00E+00
		Totals	2727.10	52415.38	314.49

[1] The total hours attributed to start-ups after a shutdown in a Normal year are estimated at 288 hours per year

Table 4.D. Flare Design Case - Shutdown

Constituent	CAS	Molecular Weight	Flow Rate		
		(lb/lb-mol)	(lb/hr)	(lb/day)	(tpy)
Water	7732-18-5	18.02	1.0E+01	1.0E+01	6.2E-02
Hydrogen	1333-74-0	2.02	1.8E+02	1.8E+02	1.1E+00
Nitrogen	7727-37-9	28.01	1.2E+02	1.2E+02	7.4E-01
Carbon Monoxide	630-08-0	28.01	1.3E+03	1.3E+03	7.6E+00
Oxygen	7782-44-7	32	3.6E-97	3.6E-97	2.2E-99
Argon	7440-37-1	39.948	3.4E-03	3.4E-03	2.0E-05
Carbon Dioxide	124-38-9	44.01	8.5E+02	8.5E+02	5.1E+00
Methane	74-82-8	16.04	2.5E+02	2.5E+02	1.5E+00
Ethane	74-84-0	30.07	3.8E+00	3.8E+00	2.3E-02
Propane	74-98-6	44.1	3.5E+01	3.5E+01	2.1E-01
N-Butane	106-97-8	58.12	4.0E+01	4.0E+01	2.4E-01
N-Pentane	109-66-0	72.15	3.0E+01	3.0E+01	1.8E-01
N-Hexane	110-54-3	86.18	2.0E+01	2.0E+01	1.2E-01
N-Heptane	142-82-5	100.21	1.0E+01	1.0E+01	6.1E-02
n-OCTANE	111-65-9	114.23	0.0E+00	0.0E+00	0.0E+00
n-NONANE	111-84-2	128.26	0.0E+00	0.0E+00	0.0E+00
n-DECANE	124-18-5	142.28	0.0E+00	0.0E+00	0.0E+00
n-UNDECANE	1120-21-4	156.31	0.0E+00	0.0E+00	0.0E+00
n-DODECANE	112-40-3	170.33	0.0E+00	0.0E+00	0.0E+00
n-TRIDECANE	629-50-5	184.36	0.0E+00	0.0E+00	0.0E+00
n-TETRADECANE	629-59-4	198.39	0.0E+00	0.0E+00	0.0E+00
n-PENTADECANE	629-62-9	212.41	0.0E+00	0.0E+00	0.0E+00
n-HEXADECANE	544-76-3	226.44	0.0E+00	0.0E+00	0.0E+00
n-HEPTADECANE	629-78-7	240.47	0.0E+00	0.0E+00	0.0E+00
n-OCTADECANE	593-45-3	254.49	0.0E+00	0.0E+00	0.0E+00
n-NONADECANE	629-92-5	268.52	0.0E+00	0.0E+00	0.0E+00
n-EICOSANE	112-95-8	282.5	0.0E+00	0.0E+00	0.0E+00
n-HENEICOSANE	629-94-7	296.6	0.0E+00	0.0E+00	0.0E+00
n-DOCOSANE	629-97-0	310.601	0.0E+00	0.0E+00	0.0E+00
n-TRICOSANE	638-67-5	324.6	0.0E+00	0.0E+00	0.0E+00
n-TETRACOSANE	646-31-1	338.6538	0.0E+00	0.0E+00	0.0E+00
n-PENTACOSANE	629-99-2	352.7	0.0E+00	0.0E+00	0.0E+00
n-HEXACOSANE	630-01-3	366.707	0.0E+00	0.0E+00	0.0E+00
n-HEPTACOSANE	593-49-7	380.734	0.0E+00	0.0E+00	0.0E+00
n-OCTACOSANE	630-02-4	394.77	0.0E+00	0.0E+00	0.0E+00
n-NONACOSANE	630-03-5	408.787	0.0E+00	0.0E+00	0.0E+00
n-TRIACONTANE	638-68-6	422.8	0.0E+00	0.0E+00	0.0E+00
NBP[0]983_1*	NBP983	888.5	0.0E+00	0.0E+00	0.0E+00
NBP[0]977_1*	NBP977	888.5	0.0E+00	0.0E+00	0.0E+00
NBP[0]1066_1*	NBP1066	888.5	0.0E+00	0.0E+00	0.0E+00
NBP[0]1173_1*	NBP1173	888.5	0.0E+00	0.0E+00	0.0E+00
Methanol	67-56-1	32.04	2.4E-01	2.4E-01	1.4E-03
Ethanol	64-17-5	46.07	0.0E+00	0.0E+00	0.0E+00
N-Propanol	71-23-8	60.09	1.7E-01	1.7E-01	1.0E-03
N-Butanol Plus	71-36-3	74.12	1.1E-01	1.1E-01	6.5E-04
1-Butene	106-98-9	56.11	0.0E+00	0.0E+00	0.0E+00
1-Pentanol	71-41-0	88.15	0.0E+00	0.0E+00	0.0E+00
1-Hexanol	111-27-3	102.18	0.0E+00	0.0E+00	0.0E+00
1-Heptanol	111-70-6	116.2	0.0E+00	0.0E+00	0.0E+00
1-Octanol	111-87-5	130.231	0.0E+00	0.0E+00	0.0E+00
1-Nonanol	143-08-8	144.25	0.0E+00	0.0E+00	0.0E+00
1-Decanol	112-30-1	158.28	0.0E+00	0.0E+00	0.0E+00
1-Undecanol	112-42-5	172.31	0.0E+00	0.0E+00	0.0E+00
1-Dodecanol	112-53-8	186.33	0.0E+00	0.0E+00	0.0E+00
1-Tridecanol	112-70-9	200.36	0.0E+00	0.0E+00	0.0E+00
1-Tetradecanol	112-72-1	214.39	0.0E+00	0.0E+00	0.0E+00
1-Pentadecanol	629-76-5	228.41	0.0E+00	0.0E+00	0.0E+00
1-Hexadecanol	36653-82-4	242.44	0.0E+00	0.0E+00	0.0E+00
1-Heptadecanol	1454-85-9	256.47	0.0E+00	0.0E+00	0.0E+00
1-Octadecanol	112-92-5	270.49	0.0E+00	0.0E+00	0.0E+00
1-Nonadecanol	1454-84-8	284.52	6.9E-03	6.9E-03	4.1E-05
Ethylene	74-85-1	28.054	8.1E+00	8.1E+00	4.9E-02
Propylene	115-07-1	42.08	7.5E+00	7.5E+00	4.5E-02
1-Pentene	109-67-1	70.13	1.2E+01	1.2E+01	7.4E-02
1-Hexene Plus	592-41-6	84.16	0.0E+00	0.0E+00	0.0E+00
1-HEPTENE	592-76-7	98.19	0.0E+00	0.0E+00	0.0E+00
1-OCTENE	111-66-0	112.21	0.0E+00	0.0E+00	0.0E+00
1-NONENE	124-11-8	126.24	0.0E+00	0.0E+00	0.0E+00
1-DECENE	872-05-9	140.27	0.0E+00	0.0E+00	0.0E+00
1-Undecene	821-95-4	154.29	0.0E+00	0.0E+00	0.0E+00
1-Dodecene	112-41-4	168.32	0.0E+00	0.0E+00	0.0E+00
1-Tridecene	2437-56-1	182.35	0.0E+00	0.0E+00	0.0E+00
1-Tetradecene	1120-36-1	196.37	0.0E+00	0.0E+00	0.0E+00
1-Pentadecene	13360-61-7	210.4	0.0E+00	0.0E+00	0.0E+00
1-Hexadecene	629-73-2	224.43	0.0E+00	0.0E+00	0.0E+00
1-Heptadecene	6765-39-5	238.45	0.0E+00	0.0E+00	0.0E+00
1-Octadecene	112-88-9	252.48	0.0E+00	0.0E+00	0.0E+00
1-Nonadecene	18435-45-5	266.5	3.5E+01	3.5E+01	2.1E-01
Isobutane	75-28-5	58.12	6.2E+00	6.2E+00	3.7E-02
Isopentane	78-78-4	72.15	2.1E+00	2.1E+00	1.3E-02
2-METHYLPENTANE	107-83-5	86.18	0.0E+00	0.0E+00	0.0E+00
2-METHYLHEXANE	591-76-4	100.2	0.0E+00	0.0E+00	0.0E+00
2-METHYLHEPTANE	592-27-8	114.23	0.0E+00	0.0E+00	0.0E+00
2-METHYLOCTANE	3221-61-2	128.26	0.0E+00	0.0E+00	0.0E+00
2-METHYLNONANE	871-83-0	142.28	0.0E+00	0.0E+00	0.0E+00
Hydrogen Sulfide	7783-06-4	34.081	0.0E+00	0.0E+00	0.0E+00
Ammonia	7664-41-7	17.03	0.0E+00	0.0E+00	0.0E+00
Hydrogen Cyanide	74-90-8	27.0253	7.8E-01	7.8E-01	4.7E-03
		Totals	2889.20	2889.20	17.34

* The total hours attributed to shutdowns in a Normal year are estimated at 12 hours per year

Table 4.E. Flare Design Case - Commissioning

Constituent	CAS	Molecular Weight	Flow Rate		
		(lb/lb-mol)	(lb/hr)	(lb/day)	(tpy)
Water	7732-18-5	18.02	2.17E+01	5.22E+02	1.33E+00
Hydrogen	1333-74-0	2.02	1.25E+01	3.00E+02	3.41E+00
Nitrogen	7727-37-9	28.01	3.69E+00	8.85E+01	2.95E-01
Carbon Monoxide	630-08-0	28.01	8.47E+01	2.03E+03	2.26E+01
Oxygen	7782-44-7	32	1.21E-98	2.90E-97	8.47E-100
Argon	7440-37-1	40	9.69E-05	2.32E-03	6.78E-06
Carbon Dioxide	124-38-9	44.01	2.48E+01	5.95E+02	1.82E+00
Methane	74-82-8	16.04	7.34E+00	1.76E+02	5.14E-01
Ethane	74-84-0	30.07	1.10E-01	2.64E+00	7.70E-03
Propane	74-98-6	44.1	1.00E+00	2.40E+01	7.01E-02
N-Butane	106-97-8	58.12	1.15E+00	2.75E+01	8.03E-02
N-Pentane	109-66-0	72.15	8.56E-01	2.05E+01	5.99E-02
N-Hexane	110-54-3	86.18	5.89E-01	1.41E+01	4.12E-02
N-Heptane	142-82-5	100.21	2.94E-01	7.06E+00	2.06E-02
N-C8-N-C20	111-65-9	114.23	1.76E-01	4.21E+00	1.23E-02
N-C21-N-C30	629-94-7	296.57	5.37E-08	1.29E-06	3.76E-09
Methanol	67-56-1	32.04	2.92E-01	7.01E+00	2.04E-02
Ethanol	64-17-5	46.07	3.01E-01	7.23E+00	2.11E-02
N-Propanol	71-23-8	60.09	8.72E-02	2.09E+00	6.10E-03
N-Butanol Plus	71-36-3	74.12	7.39E-02	1.77E+00	5.17E-03
Ethylene	74-85-1	28.05	1.98E-05	4.75E-04	1.38E-06
Propylene	115-07-1	42.08	3.53E-01	8.48E+00	2.47E-02
1-Butene	106-98-9	56.11	2.90E-01	6.96E+00	2.03E-02
1-Pentene	109-67-1	70.13	3.57E-01	8.56E+00	2.50E-02
1-Hexene Plus	592-41-6	84.16	3.21E-01	7.70E+00	2.25E-02
Isobutane	75-28-5	58.12	1.58E-01	3.80E+00	1.11E-02
Isopentane	78-78-4	72.15	5.23E-02	1.26E+00	3.66E-03
		Totals	161.23	3869.47	30.40

[1] The total hours for commission during the first year of operation are estimated to be

Table 4.G. Flare Design Case - Main Fractionator Reflux Failure

Constituent	CAS	Molecular Weight	Flowrate for Single Emergency Scenario		
		(lb/lb-mol)	(lb/hr)	(lb/day)	(tpy)
Water	7732-18-5	18.02	0.07	0.07	0.00
Hydrogen	1333-74-0	2.02	0.14	0.14	0.00
Nitrogen	7727-37-9	28.01	0.02	0.02	0.00
Carbon Monoxide	630-08-0	28.01	0.21	0.21	0.00
Oxygen	7782-44-7	32	0.00	0.00	0.00
Carbon Dioxide	124-38-9	44.01	1.70	1.70	0.00
Methane	74-82-8	16.04	0.13	0.13	0.00
Ethane	74-84-0	30.07	0.04	0.04	0.00
Propane	74-98-6	44.1	1.40	1.40	0.00
N-Butane	106-97-8	58.12	3.33	3.33	0.00
N-Pentane	109-66-0	72.15	6.87	6.87	0.00
N-Hexane	110-54-3	86.18	68.78	68.78	0.03
N-Heptane	142-82-5	100.21	267.21	267.21	0.13
n-OCTANE	111-65-9	114.23	103.42	103.42	0.05
n-NONANE	111-84-2	128.26	0.09	0.09	0.00
n-DECANE	124-18-5	142.28	0.00	0.00	0.00
n-UNDECANE	1120-21-4	156.31	0.00	0.00	0.00
n-DODECANE	112-40-3	170.33	0.00	0.00	0.00
n-TRIDECANE	629-50-5	184.36	0.00	0.00	0.00
n-TETRADECANE	629-59-4	198.39	0.00	0.00	0.00
n-PENTADECANE	629-62-9	212.41	0.00	0.00	0.00
n-HEXADECANE	544-76-3	226.44	0.00	0.00	0.00
n-HEPTADECANE	629-78-7	240.47	0.00	0.00	0.00
n-OCTADECANE	593-45-3	254.49	0.00	0.00	0.00
n-NONADECANE	629-92-5	268.52	0.00	0.00	0.00
Methanol	67-56-1	32.04	0.00	0.00	0.00
1-Propanol	71-23-8	60.09	0.53	0.53	0.00
1-Butanol	71-36-3	74.12	2.53	2.53	0.00
Propylene	115-07-1	42.08	0.07	0.07	0.00
1-Butene	106-98-9	56.11	0.16	0.16	0.00
1-Pentene	109-67-1	70.13	0.76	0.76	0.00
1-Hexene Plus	592-41-6	84.16	3.93	3.93	0.00
1-Heptene	592-76-7	98.19	30.38	30.38	0.02
1-Octene	111-66-0	112.21	31.92	31.92	0.02
1-Nonene	124-11-8	126.24	0.04	0.04	0.00
1-Decene	872-05-9	140.27	0.00	0.00	0.00
Isobutane	75-28-5	58.12	3.78	3.78	0.00
Isopentane	78-78-4	72.15	6.21	6.21	0.00
2-Mpentane	107-83-5	86.18	8.23	8.23	0.00
2-Mhexane	591-76-4	100.2	59.11	59.11	0.03
2-Mheptane	592-27-8	114.23	105.49	105.49	0.05
2-Moctane	3221-61-2	128.26	0.08	0.08	0.00
2-Mnonane	871-83-0	142.28	0.00	0.00	0.00
1-Pentanol	71-41-0	88.15	0.39	0.39	0.00
Ethanol	64-17-5	46.07	0.00	0.00	0.00
1-Hexanol	111-27-3	102.18	0.00	0.00	0.00
		Totals	707.00	707.00	0.35

[1] Representative of maximum flow rate of process gas sent to flare in a 10 minute emergency scenario. 0.1667 hours per year

Table 4.F. Flare Design Case - Emergency Maximum Case

Constituent	CAS	Molecular Weight	Flowrate for Single Emergency Scenario		
		(lb/lb-mol)	(lb/hr)	(lb/day)	(tpy)
Water	7732-18-5	18.02	67.15	67.15	0.03
Hydrogen	1333-74-0	2.02	13.04	13.04	0.01
Nitrogen	7727-37-9	28.01	7.15	7.15	0.00
Carbon Monoxide	630-08-0	28.01	89	89.05	0.04
Oxygen	7782-44-7	32	0.00	0.00	0.00
Argon	7440-37-1	39.948	0.00	0.00	0.00
Carbon Dioxide	124-38-9	44.01	76	75.55	0.04
Methane	74-82-8	16.04	14.31	14.31	0.01
Ethane	74-84-0	30.07	0.27	0.27	0.00
Propane	74-98-6	44.1	2.86	2.86	0.00
N-Butane	106-97-8	58.12	4.11	4.11	0.00
N-Pentane	109-66-0	72.15	4.70	4.70	0.00
N-Hexane	110-54-3	86.18	9.31	9.31	0.00
N-Heptane	142-82-5	100.21	9.18	9.18	0.00
n-OCTANE	111-65-9	114.23	3.16	3.16	0.00
n-NONANE	111-84-2	128.26	2.86	2.86	0.00
n-DECANE	124-18-5	142.28	3.12	3.12	0.00
n-UNDECANE	1120-21-4	156.31	3.54	3.54	0.00
n-DODECANE	112-40-3	170.33	3.67	3.67	0.00
n-TRIDECANE	629-50-5	184.36	3.80	3.80	0.00
n-TETRADECANE	629-59-4	198.39	3.97	3.97	0.00
n-PENTADECANE	629-62-9	212.41	4.06	4.06	0.00
n-HEXADECANE	544-76-3	226.44	3.66	3.66	0.00
n-HEPTADECANE	629-78-7	240.47	3.34	3.34	0.00
n-OCTADECANE	593-45-3	254.49	2.81	2.81	0.00
n-NONADECANE	629-92-5	268.52	2.38	2.38	0.00
n-EICOSANE	112-95-8	282.5	2.21	2.21	0.00
n-HENEICOSANE	629-94-7	296.6	2.04	2.04	0.00
n-DOCOSANE	629-97-0	310.601	1.73	1.73	0.00
n-TRICOSANE	638-67-5	324.6	1.57	1.57	0.00
n-TETRACOSANE	646-31-1	338.6538	1.40	1.40	0.00
n-PENTACOSANE	629-99-2	352.7	1.27	1.27	0.00
n-HEXACOSANE	630-01-3	366.707	1.16	1.16	0.00
n-HEPTACOSANE	593-49-7	380.734	1.11	1.11	0.00
n-OCTACOSANE	630-02-4	394.77	1.06	1.06	0.00
n-NONACOSANE	630-03-5	408.787	1.01	1.01	0.00
n-TRIACONTANE	638-68-6	422.8	0.96	0.96	0.00
NBP[0]883_1*	NBP883	888.5	13.85	13.85	0.01
NBP[0]977_1*	NBP977	888.5	6.37	6.37	0.00
NBP[0]1066_1*	NBP1066	888.5	2.66	2.66	0.00

NBP[0]1173_1*	NBP1173	888.5	2.13	2.13	0.00
Methanol	67-56-1	32.04	0.05	0.05	0.00
Ethanol	64-17-5	46.07	0.04	0.04	0.00
N-Propanol	71-23-8	60.09	0.07	0.07	0.00
N-Butanol Plus	71-36-3	74.12	0.09	0.09	0.00
1-Butene	106-98-9	56.11	0.00	0.00	0.00
1-Pentanol	71-41-0	88.15	0.03	0.03	0.00
1-Hexanol	111-27-3	102.18	0.02	0.02	0.00
1-Heptanol	111-70-6	116.2	0.02	0.02	0.00
1-Octanol	111-87-5	130.231	0.01	0.01	0.00
1-Nonanol	143-08-8	144.25	0.06	0.06	0.00
1-Decanol	112-30-1	158.28	0.09	0.09	0.00
1-Undecanol	112-42-5	172.31	0.06	0.06	0.00
1-Dodecanol	112-53-8	186.33	0.12	0.12	0.00
1-Tridecanol	112-70-9	200.36	0.08	0.08	0.00
1-Tetradecanol	112-72-1	214.39	0.11	0.11	0.00
1-Pentadecanol	629-76-5	228.41	0.09	0.09	0.00
1-Hexadecanol	36653-82-4	242.44	0.07	0.07	0.00
1-Heptadecanol	1454-85-9	256.47	0.04	0.04	0.00
1-Octadecanol	112-92-5	270.49	0.08	0.08	0.00
1-Nonadecanol	1454-84-8	284.52	0.09	0.09	0.00
Ethylene	74-85-1	28.054	0.00	0.00	0.00
Propylene	115-07-1	42.08	1.20	1.20	0.00
1-Pentene	109-67-1	70.13	1.10	1.10	0.00
1-Hexene Plus	592-41-6	84.16	1.10	1.10	0.00
1-HEPTENE	592-76-7	98.19	1.24	1.24	0.00
1-OCTENE	111-66-0	112.21	0.51	0.51	0.00
1-NONENE	124-11-8	126.24	0.36	0.36	0.00
1-DECENE	872-05-9	140.27	0.28	0.28	0.00
1-Undecene	821-95-4	154.29	0.25	0.25	0.00
1-Dodecene	112-41-4	168.32	0.21	0.21	0.00
1-Tridecene	2437-56-1	182.35	0.18	0.18	0.00
1-Tetradecene	1120-36-1	196.37	0.17	0.17	0.00
1-Pentadecene	13360-61-7	210.4	0.01	0.01	0.00
1-Hexadecene	629-73-2	224.43	0.07	0.07	0.00
1-Heptadecene	6765-39-5	238.45	0.13	0.13	0.00
1-Octadecene	112-88-9	252.48	0.10	0.10	0.00
1-Nonadecene	18435-45-5	266.5	0.05	0.05	0.00
Isobutane	75-28-5	58.12	2.40	2.40	0.00
Isopentane	78-78-4	72.15	3.03	3.03	0.00
2-METHYLPENTANE	107-83-5	86.18	1.46	1.46	0.00
2-METHYLHEXANE	591-76-4	100.2	2.45	2.45	0.00
2-METHYLHEPTANE	592-27-8	114.23	0.98	0.98	0.00
2-METHYLOCTANE	3221-61-2	128.26	0.34	0.34	0.00
2-METHYLNONANE	871-83-0	142.28	0.26	0.26	0.00
Hydrogen Sulfide	7783-06-4	34.081	0.00	0.00	0.00
Ammonia	7664-41-7	17.03	0.00	0.00	0.00
Hydrogen Cyanide	74-90-8	27.0253	0.00	0.00	0.00
		Totals	396.640	396.640	0.198

[1] Representative of maximum flow rate of process gas sent to flare in a 1-hour emergency scenario.

Table 4.H. Oxygen Stream Constituents

Constituent	CAS	Molecular Weight (lb/lbmol)	Molar Flow Rates (lbmol/hr)	Vent		98% Control Efficiency	
				(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
Water	7732-18-5	18.02	0.1	1.80	7.89	0.04	0.16
Hydrogen	1333-74-0	2	0	--	--	--	--
Nitrogen	7727-37-9	28	0	--	--	--	--
Carbon Monoxide	630-08-0	28	0.002	0.06	0.25	0.00	0.00
Oxygen	7782-44-7	32	2.16	69.12	302.75	1.38	6.05
Carbon Dioxide	124-38-9	44	0.26	11.44	50.11	0.23	1.00
Methane	74-82-8	16	0	--	--	--	--
Ethane	74-84-0	30	0	--	--	--	--
Propane	74-98-6	44	0	--	--	--	--
n-Butane	106-97-8	56	0	--	--	--	--
n-Pentane	109-66-0	72	0	--	--	--	--
n-Hexane	110-54-3	86	0	--	--	--	--
n-Heptane	142-82-5	100	0	--	--	--	--
n-Octane	111-65-9	114.2	0	--	--	--	--
n-Nonane	111-84-2	128.26	0	--	--	--	--
n-Decane	124-18-5	142.28	0	--	--	--	--
n-Undecane	1120-21-4	156.31	0	--	--	--	--
n-Dodecane	112-40-3	170.33	0	--	--	--	--
n-Tridecane	629-50-5	184.36	0	--	--	--	--
n-Tetradecane	629-59-4	198.39	0	--	--	--	--
n-Pentadecane	629-62-9	212.41	0	--	--	--	--
n-Hexadecane	544-76-3	226.44	0	--	--	--	--
n-Heptadecane	629-78-7	240.47	0	--	--	--	--
n-Octadecane	593-45-3	254.49	0	--	--	--	--
n-Nonadecane	629-92-5	268.52	0	--	--	--	--
Methanol	67-56-1	32	0	--	--	--	--
Ethanol	64-17-5	46	0	--	--	--	--
n-Propanol	71-23-8	60	0	--	--	--	--
n-Butanol plus	71-36-3	74	0	--	--	--	--
1-Pentanol	71-41-0	88.15	0	--	--	--	--
1-Hexanol	111-27-3	102.18	0	--	--	--	--
Propylene	115-07-1	42	0	--	--	--	--
1-Butene	106-98-9	56	0	--	--	--	--
1-Pentene	109-67-1	70	0	--	--	--	--
1-Hexene plus	592-41-6	100	0	--	--	--	--
1-Heptene	592-76-7	56	0	--	--	--	--
1-Octene	111-66-0	112.21	0	--	--	--	--
1-Nonene	124-11-8	126.24	0	--	--	--	--
1-Decene	872-05-9	140.27	0	--	--	--	--
Isobutane	75-28-5	56	0	--	--	--	--
Isopentane	78-78-4	72	0	--	--	--	--
2-Methylpentane	107-83-5	102	0	--	--	--	--
2-Methylhexane	591-76-4	100.2	0	--	--	--	--
2-Methylheptane	592-27-8	114.23	0	--	--	--	--
2-Methyloctane	3221-61-2	128.26	0	--	--	--	--
2-Methylnonane	871-83-0	142.28	0	--	--	--	--

Table 4.I. Oxygen Stream Emissions

Pollutant	Vent Scenario		98% Control Efficiency Scenario		Difference Between Uncontrolled and Controlled	
	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
Carbon Monoxide	0.06	0.25	0.001	0.005	0.055	0.240
Carbon Dioxide	11.44	50.11	0.229	1.002	11.211	49.105

Table 5A. Flare Process Gas Emissions - Pass Through Emissions

Pollutant	CAS	Normal Operation				Start-Up (Commissioning)			Start-Up (Restart After Shutdown)			Shutdown			Main Fractionator Reflux Failure			Total Potential to Emit (Normal Year)			Total Potential to Emit (Commissioning Year)			VOC?	HAP?	TAP?
		Emissions (lb/hr)	Emissions (lb/day)	Normal Year Emissions (tpy)	Comissioning Year Emissions (tpy)	Emissions (lb/hr)	Emissions (lb/day)	Emissions (tpy)	Emissions (lb/hr)	Emissions (lb/day)	Emissions (tpy)	Emissions (lb/hr)	Emissions (lb/day)	Emissions (tpy)	Emissions (lb/hr)	Emissions (lb/day)	Emissions (tpy)	Emissions (lb/hr)	Emissions (lb/day)	Emissions (tpy)	Emissions (lb/hr)	Emissions (lb/day)	Emissions (tpy)			
Water	7732-18-5	1.84E-01	4.43	7.89E-01	7.46E-01	2.17E+01	521.89	1.33E+00	21.75	189.69	1.14	10.40	10.40	0.06	0.07	0.07	0.00	21.75	200.16	1.98	21.75	521.89	3.27	N	N	N
Hydrogen	1333-74-0	6.29E-02	1.51E+00	2.66E-01	2.55E-01	2.50E-01	6.00E+00	6.82E-02	0.46	9.75	0.06	3.64	3.64	0.02	0.00	0.00	0.00	3.64	13.39	0.35	3.64	14.90	0.40	N	N	N
Nitrogen	7727-37-9	3.93E+01	9.44E+02	1.66E+02	1.59E+02	3.69E+00	8.85E+01	2.95E-01	4.71	42.20	0.25	123.31	123.31	0.74	0.02	0.02	0.00	123.31	944.16	167.40	123.31	1109.69	160.50	N	N	N
Carbon Monoxide	630-08-0	3.11E-01	7.46E+00	1.32E+00	1.26E+00	1.69E+00	4.07E+01	4.52E-01	3.06	64.52	0.39	25.26	25.26	0.15	0.00	0.00	0.00	25.26	89.78	1.85	25.26	97.24	2.25	N	N	Y
Oxygen	7782-44-7	2.43E-05	5.82E-04	1.03E-04	9.81E-05	2.42E-100	5.80E-99	1.69E-101	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N	N	N
Argon	7440-37-1	1.89E-04	4.53E-03	7.98E-04	7.63E-04	9.69E-05	2.32E-03	1.36E-07	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.01	0.00	N	N	N
Carbon Dioxide	124-38-9	1.75E+01	4.19E+02	7.39E+01	7.07E+01	2.48E+01	5.95E+02	1.82E+00	31.20	259.47	1.56	846.22	846.22	5.08	1.70	1.70	0.00	846.22	1107.39	80.54	846.22	1526.72	79.16	N	N	N
Methane	74-82-8	1.03E-01	2.47E+00	4.35E-01	4.16E-01	1.47E-01	3.53E+00	1.03E-02	0.18	1.47	0.01	5.06	5.06	0.03	0.00	0.00	0.00	5.06	6.53	0.47	5.06	9.00	0.47	N	N	N
Ethane	74-84-0	2.39E-03	5.73E-02	1.01E-02	9.66E-03	2.20E-03	5.28E-02	1.54E-04	0.00	0.02	0.00	0.08	0.08	0.00	0.00	0.00	0.00	0.08	0.10	0.01	0.08	0.16	0.01	N	N	N
Propane	74-98-6	1.70E-02	4.09E-01	7.21E-02	6.90E-02	2.00E-02	4.81E-01	1.40E-03	0.03	0.20	0.00	0.70	0.70	0.00	0.03	0.03	0.00	0.70	0.93	0.08	0.70	1.34	0.08	Y	N	N
N-Butane	106-97-8	1.84E-02	4.41E-01	7.78E-02	7.44E-02	2.29E-02	5.50E-01	1.61E-03	0.03	0.23	0.00	0.80	0.80	0.00	0.07	0.07	0.00	0.80	1.09	0.08	0.80	1.54	0.08	Y	N	N
N-Pentane	109-66-0	1.28E-02	3.08E-01	5.43E-02	5.19E-02	1.71E-02	4.11E-01	1.20E-03	0.02	0.17	0.00	0.59	0.59	0.00	0.14	0.14	0.00	0.59	0.90	0.06	0.59	1.21	0.06	Y	N	N
N-Hexane	110-54-3	8.99E-03	2.16E-01	3.80E-02	3.64E-02	1.18E-02	2.83E-01	8.25E-04	0.01	0.12	0.00	0.41	0.41	0.00	1.38	1.38	0.00	1.38	1.90	0.04	1.38	2.12	0.04	Y	Y	Y
N-Heptane	142-82-5	4.37E-03	1.05E-01	1.85E-02	1.77E-02	5.89E-03	1.41E-01	4.12E-04	0.01	0.06	0.00	0.20	0.20	0.00	5.34	5.34	0.00	5.34	5.61	0.02	5.34	5.71	0.02	Y	N	N
n-OCTANE	111-65-9	1.93E-03	4.64E-02	8.18E-03	7.83E-03	3.51E-03	8.43E-02	2.46E-04	0.00	0.04	0.00	0.00	0.00	0.00	2.07	2.07	0.00	2.07	2.10	0.01	2.07	2.15	0.01	Y	N	N
n-NONANE	111-84-2	6.89E-04	1.65E-02	2.92E-03	2.79E-03	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02	0.00	Y	N	N
n-DECANE	124-18-5	1.71E-04	4.11E-03	7.24E-04	6.92E-04	--	--	--	0.03	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.26	0.00	0.03	0.26	0.00	Y	N	N
n-UNDECANE	1120-21-4	2.49E-05	5.99E-04	1.06E-04	1.01E-04	--	--	--	0.03	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.20	0.00	0.03	0.21	0.00	Y	N	N
n-DODECANE	112-40-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.00	0.01	0.05	0.00	Y	N	N
n-TRIDECANE	629-50-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.04	0.00	Y	N	N
n-TETRADECANE	629-59-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
n-PENTADECANE	629-62-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	0.04	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.36	0.00	0.04	0.36	0.00	Y	N	N
n-HEXADECANE	544-76-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	0.03	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.23	0.00	0.03	0.23	0.00	Y	N	N
n-HEPTADECANE	629-78-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	0.03	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.24	0.00	0.03	0.24	0.00	Y	N	N
n-OCTADECANE	593-45-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	0.02	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.19	0.00	0.02	0.19	0.00	Y	N	N
n-NONADECANE	629-92-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	0.01	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.08	0.00	0.01	0.08	0.00	Y	N	N
n-EICOSANE	112-95-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
n-HENEICOSANE	629-94-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-09	2.58E-08	7.51E-11	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
n-DOCOSANE	629-97-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
n-TRICOSANE	638-67-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
n-TETRACOSANE	646-31-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
n-PENTACOSANE	629-99-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
n-HEXACOSANE	630-01-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
n-HEPTACOSANE	593-49-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
n-OCTACOSANE	630-02-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
n-NONACOSANE	630-03-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
n-TRIACONTANE	638-68-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
NBP[03883_1*	NBP883	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
NBP[03977_1*	NBP977	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
NBP[01066_1*	NBP1066	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
NBP[01173_1*	NBP1173	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
Methanol	67-56-1	9.90E-05	2.38E-03	4.19E-04	4.01E-04	5.84E-03	1.40E-01	4.09E-04	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.00	0.01	0.14	0.00	Y	Y	Y
Ethanol	64-17-5	1.03E-06	2.48E-05	4.37E-06	4.18E-06	6.03E-03	1.45E-01	4.22E-04	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.00	0.01	0.14	0.00	Y	N	N
N-Propanol	71-23-8	9.40E-05	2.26E-03	3.98E-04	3.80E-04	1.74E-03	4.19E-02	1.22E-04	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.03	0.00	0.01	0.04	0.00	Y	N	N
N-Butanol Plus	71-36-3	2.73E-04	6.54E-03	1.15E-03	1.10E-03	1.48E-03	3.55E-02	1.03E-04	0.00	0.01	0.00	0.00	0.00	0.00	0.05	0.05	0.00	0.05	0.07	0.00	0.05	0.07	0.00	Y	N	N
1-Butene	106-98-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.80E-03	1.39E-01	4.06E-04	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.00	0.01	0.14	0.00	Y	N	N
1-Pentanol	71-41-0	2.84E-04	6.82E-03	1.20E-03	1.15E-03	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	Y	N	N
1-Hexanol	111-27-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Heptanol	111-70-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Octanol	111-87-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Nonanol	143-08-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Decanol	112-30-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Undecanol	112-42-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Dodecanol	112-53-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Tridecanol	112-70-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Tetradecanol	112-72-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Pentadecanol	629-76-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Hexadecanol	36653-82-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Heptadecanol	1454-85-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Octadecanol	112-92-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Nonadecanol	1454-84-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
Ethylene	74-85-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.95E-07	9.48E-06	2.77E-08	--	--	--	0.16	0.16	0.00	--	--	--	0.16	0.16	0.00	0.16	0.16	0.00	Y	N	N
Propylene	115-07-1	7.93E-03	1.90E-01	3.36E-02	3.21E-02	7.07E-03	1.70E-01	4.95E-04	0.01	0.07	0.00	0.15	0.15	0.00	0.00	0.00	0.00	0.15	0.22	0.03	0.15	0.41	0.03	Y	N	Y
1-Pentene	109-67-1	4.95E-03	1.19E-01	2.10E-02	2.01E-02	7.13E-03	1.71E-01	4.99E-04	0.01	0.07	0.00	0.25	0.25	0.00	0.02	0.02	0.00	0.25	0.33	0.02	0.25	0.45	0.02	Y	N	N
1-Hexene Plus	592-41-6	2.71E-03	6.51E-02	1.15E-02	1.10E-02	6.42E-03	1.54E-01	4.49E-04	0.01	0.06	0.00	0.08	0.08	0.00	0.08	0.08	0.00	0.08	0.14	0.01	0.08	0.21	0.01	Y	N	N
1-HEPTENE	592-76-7	1.39E-03	3.33E-02	5.87E-03	5.62E-03	--	--	--	0.01	0.05	0.00	0.61	0.61	0.00	0.61	0.66	0.01	0.61	0.69	0.01	Y	N	N
1-OCTENE	5.45E-04	1.31E-02	2.31E-03	2.21E-03	--	--	--	0.00	0.02	0.00	0.64	0.64	0.00	0.64	0.65	0.00	0.64	0.67	0.00	Y	N	N
1-NONENE	124-11-8	1.67E-04	4.01E-03	7.07E-04	6.77E-04	--	--	--	49.32	959.76	5.76	0.00	0.00	0.00	0.00	0.00	0.00	49.32	959.76	5.76	49.32	959.77	5.76	Y	N	N
1-DECENE	872-05-9	6.19E-05	1.49E-03	2.62E-04	2.51E-04	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Undecene	821-95-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Dodecene	112-41-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Tridecene	2437-56-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Tetradecene	1120-36-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Pentadecene	13360-61-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Hexadecene	629-73-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Heptadecene	6765-39-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Octadecene	112-88-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
1-Nonadecene	18435-45-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.70	0.70	0.00	--	--	--	0.70	0.70	0.00	0.70	0.70	0.00	Y	N	N
Isobutane	75-28-5	6.69E-03	1.61E-01	2.83E-02	2.71E-02	3.16E-03	7.59E-02	2.21E-04	0.00	0.00	0.00	0.12	0.12	0.00	0.08	0.08	0.00	0.12	0.20	0.03	0.12	0.36	0.03	Y	N	N
Isopentane	78-78-4	2.56E-03	6.13E-02	1.08E-02	1.03E-02	1.05E-03	2.51E-02	7.33E-05	0.00	0.00	0.00	0.04	0.04	0.00	0.12	0.12	0.00	0.12	0.17	0.01	0.12	0.23	0.01	Y	N	N
2-METHYLPENTANE	107-83-5	4.13E-04	9.90E-03	1.75E-03	1.67E-03	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.16	0.00	0.16	0.16	0.00	0.16	0.17	0.00	Y	N	N
2-METHYLHEXANE	591-76-4	2.56E-04	6.14E-03	1.08E-03	1.04E-03	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	1.18	1.18	0.00	1.18	1.18	0.00	1.18	1.19	0.00	Y	N	N
2-METHYLHEPTANE	592-27-8	1.09E-04	2.62E-03	4.63E-04	4.43E-04	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	2.11	2.11	0.00	2.11	2.11	0.00	2.11	2.11	0.00	Y	N	N
2-METHYLOCTANE	3221-61-2	4.09E-05	9.82E-04	1.73E-04	1.66E-04	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
2-METHYLNONANE	871-83-0	2.27E-05	5.45E-04	9.60E-05	9.19E-05	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	N
Hydrogen Sulfide	7783-06-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	Y	Y
Ammonia	7664-41-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	Y	N	Y
Hydrogen Cyanide	74-90-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	--	--	--	--	--	0.02	0.02	0.00	--	--	--	0.02	0.02	0.00	0.02	0.02	0.00	N	Y	Y

[1] Potential pass through emission rates of uncombusted pollutants are estimated based on the assumption that the flare will provide a destruction efficiency of 98%, per vendor specifications.
[2] Pass through emissions from process gas constituents are calculated according to the methodology outlined in the Texas Commission on Environmental Quality (TCEQ) New Source Review (NSR) guidance document for flares and vapor combustors last updated March 2021.
[3] It is conservatively assumed that all carbon dioxide will pass through the flare directly to atmosphere.
[4] Flare Control Efficiency is assumed to be 98%
[5] Note it is assumed that the worst case emissions from a 1-hour period will be characterized by either the Normal, start-up, or shutdown design scenario. Additionally, daily emissions are conservatively characterized at a maximum by assuming both a shutdown event and a full start-up event will occur in a given 24-hour period.
[6] It is assumed that 12 total shutdowns and start-ups will occur in a Normal year. Shutdowns will account for 12 total hours, at 1 hour each, with start-ups accounting for 12 days, at 24 hours each.

Table 5B. Flare Process Gas Emissions - Criteria Pollutants from Combustion of Process Gas

Pollutant	Emission Factors[1,2,3,4,5]					Emission Rates											
	Normal Case	Start-Up (Commissioning)	Start-Up (Restart After Shutdown)	Shutdown	Main Fractionator Reflux Failure	Normal Case		Comissioning Year	Start-Up (Commissioning)		Start-Up (Restart After Shutdown)		Shutdown		Main Fractionator Reflux Failure		Total Potential to Emit (Normal Year)		Total Potential to Emit (Commissioning Year)	
	(lb/MMscf)	(lb/MMscf)	(lb/MMscf)	(lb/MMscf)	(lb/MMscf)	(lb/hr)	(tpy)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
Particulate Matter (PM)	7.6	7.6	7.6	7.6	7.6	1.18E-02	4.97E-02	4.76E-02	2.53E-02	4.62E-03	7.38E-02	1.06E-02	4.60E-01	2.76E-03	2.32E-02	1.94E-06	0.46	0.06	0.46	0.07
PM_{10}	7.6	7.6	7.6	7.6	7.6	1.18E-02	4.97E-02	4.76E-02	2.53E-02	4.62E-03	7.38E-02	1.06E-02	4.60E-01	2.76E-03	2.32E-02	1.94E-06	0.46	0.06	0.46	0.07
$PM_{2.5}$	7.6	7.6	7.6	7.6	7.6	1.18E-02	4.97E-02	4.76E-02	2.53E-02	4.62E-03	7.38E-02	1.06E-02	4.60E-01	2.76E-03	2.32E-02	1.94E-06	0.46	0.06	0.46	0.07
NO_x	16.08	38.46	38.46	17.66	686.00	2.49E-02	1.05E-01	1.01E-01	1.28E-01	2.34E-02	0.37	0.05	1.07E+00	6.42E-03	2.10E+00	1.75E-04	2.10	0.17	2.10	0.18
CO	137.9	329.8	329.8	151.5	1369.5	2.13E-01	9.02E-01	8.63E-01	1.10E+00	2.01E-01	3.20	0.46	9.17E+00	5.50E-02	4.19E+00	3.49E-04	9.17	1.42	9.17	1.58
VOC	5.5	5.5	5.5	5.5	5.5	8.50E-03	3.60E-02	3.44E-02	1.83E-02	3.34E-03	5.34E-02	7.69E-03	3.33E-01	2.00E-03	1.68E-02	1.40E-06	0.33	0.05	0.33	0.05
Lead	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	7.73E-07	3.27E-06	3.13E-06	1.66E-06	3.04E-07	4.86E-06	6.99E-07	3.03E-05	1.82E-07	1.53E-06	1.27E-10	0.00	0.00	0.00	0.00
SO_2	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	0.00	0.00
CO_2	29,346	70,186	70,186	32,235	581,494	4.54E+01	191.94	1.84E+02	2.33E+02	42.68	6.82E+02	98.15	1.95E+03	11.71	1.78E+03	0.15	1,951.56	301.95	1,951.56	336.33
CH4	0.55	1.32	1.32	0.61	10.96	8.55E-04	3.62E-03	3.46E-03	4.40E-03	8.04E-04	1.28E-02	1.85E-03	3.68E-02	2.21E-04	3.35E-02	2.79E-06	0.04	0.01	0.04	0.01
N_2O	0.06	0.13	0.13	0.06	1.10	8.55E-05	3.62E-04	3.46E-04	4.40E-04	8.04E-05	1.28E-03	1.85E-04	3.68E-03	2.21E-05	3.35E-03	2.79E-07	0.00	0.00	0.00	0.00

[1] The emissions factor for PM (where it is assumed PM=PM10=PM2.5), VOC, and lead from natural gas combustion are assumed to conservatively represent criteria pollutant emissions from process gas combustion. Taken from AP-42 Section 1.4 Table 1.4-2.
[2] Heating value of process gas stream for each operating case obtained from Zeeco E-Jet Rainier EG Flare equipment quote.

[3] Emission factors for thermal NOx and CO taken from TCEQ flare and vapor combustor NSR guidance document for non-steam assisted low Btu (<1,000 Btu/scf) gas stream

0.0641 lb/MMBtu thermal NOx
0.5496 lb/MMBtu CO

For the reflux failure, process gas is expected to be high Btu (>1,000 Btu/scf) therefore the following NOx and CO factors are used from the TCEQ flare NSR guidance.

0.138 lb/MMBtu thermal NOx
0.2755 lb/MMBtu CO

Set Btu/scf of normal waste gas to 251 Btu/scf to align with limit for LHV of waste gas in flare.

[4] Assumed no sulfur containing compounds are contained in process gas, as such no formation of SO2 is expected to occur during combustion of process gas.
[5] Emission Factors Source: CO_2, CH_4, N_2O taken from 40 CFR 98 Table C-1 and C-2 for natural gas are assumed to be representative for the process gas stream.

Table 6. Flare Pilot Design Specifications

Parameter	Value	Units
Design Heat Release[1]	0.065	MMBtu/hr
Fuel Gas MW	18	lb/lb-mol
Fuel Gas LHV	1000	Btu/scf
Fuel Gas Temperature	100	F
Fuel Gas Inlet Pressure	15	psig
Fuel Gas Flow Rate per Pilot	65	scfh
Number of Pilots	4	pilots
Total Fuel Gas Flowrate	260 scfh 2.28 MMscf/yr	

[1] Flare pilot specifications obtained from Zeeco E-Jet Rainier EG Flare equipment quote provided by Twelve on 03/02/2023.

Table 7. Flare Pilot Gas Combustion Emission Factors

Pollutant	Emission Factor[1,2,3,4]	
	lb/ 10^3 gal	lb/MMscf
PM, Filterable	0.2	2.19
PM, Condensable	0.5	5.46
PM, Total	0.7	7.65
PM_{10}	0.7	7.65
$PM_{2.5}$	0.7	7.65
SO_2[2]	0.049	0.53
NO_x	13	142.08
CO	7.5	81.97
VOC	1.0	10.93
CO_2	--	135,496
N_2O	--	1.32
CH_4	--	6.61

[1] AP-42 Chapter 1.5 Table 1.5-1, Propane Emission factors for Industrial boilers with heat input capacities between 0.3 and 10 MMBtu/hr.
[2] It is conservatively assumed that all PM is also emitted as PM_{10} and $PM_{2.5}$.
[3] S equals the sulfur content expressed in gr/100 ft^3 gas vapor. For example, propane sulfur content is approximately 0.54 gr/100 ft³ per the results of fuel
[4] The heat content of propane is approximately 91.5 x 10^3 Btu/10³ gallon per AP-42 Chapter 1.5 Table 1.5-1 Footnote a.
[4] Emission Factor Source: CO_2, CH_4, N_2O taken from 40 CFR 98 Table C-1 and C-2 for propane gas.

Table 8. Flare Pilot Gas Emissions - Criteria Pollutants from Combustion

Pollutant	Emission Rate	
	(lb/hr)	(tpy)
PM, Filterable	5.68E-04	2.49E-03
PM, Condensable	1.42E-03	6.22E-03
PM, Total	1.99E-03	8.71E-03
PM_{10}	1.99E-03	8.71E-03
$PM_{2.5}$	1.99E-03	8.71E-03
SO_2	1.38E-04	6.05E-04
NO_x	3.69E-02	1.62E-01
CO	2.13E-02	9.33E-02
VOC	2.84E-03	1.24E-02
CO_2	3.52E+01	154.30
N_2O	3.44E-04	1.51E-03
CH_4	1.72E-03	7.53E-03

Table 9.B. Hazardous and Toxic Air Pollutant Emissions from Natural Gas Combustion

Pollutant	CAS #	HAP?	TAP?	Emission Factor [1] (lb/MMscf)	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
2-Methylnaphthalene	91-57-6	Y	N	2.40E-05	6.24E-09	2.73E-08
3-Methylcholanthrene	56-49-5	Y	Y	1.80E-06	4.68E-10	2.05E-09
7,12-Dimethylbenz(a)anthracene	57-97-6	Y	Y	1.60E-05	4.16E-09	1.82E-08
Acenaphthene	83-32-9	Y	N	1.80E-06	4.68E-10	2.05E-09
Acenaphthylene	208-96-8	Y	N	1.80E-06	4.68E-10	2.05E-09
Acetaldehyde[2]	75-07-0	Y	Y	4.30E-02	1.12E-05	4.90E-05
Acrolein[2]	107-02-8	Y	Y	1.00E-02	2.60E-06	1.14E-05
Anthracene	120-12-7	Y	N	2.40E-06	6.24E-10	2.73E-09
Benz[a]anthracene	56-55-3	Y	Y	1.80E-06	4.68E-10	2.05E-09
Benzene[2]	71-43-2	Y	Y	1.59E-01	4.13E-05	1.81E-04
Benzo(a)pyrene	50-32-8	Y	Y	1.20E-06	3.12E-10	1.37E-09
Benzo(b)fluoranthene	205-99-2	Y	Y	1.80E-06	4.68E-10	2.05E-09
Benzo(g,h,i)perylene	191-24-2	Y	N	1.20E-06	3.12E-10	1.37E-09
Benzo(k)fluoranthene	207-08-9	Y	Y	1.80E-06	4.68E-10	2.05E-09
Butane	106-97-8	N	N	2.10E+00	5.46E-04	2.39E-03
Chrysene	218-01-9	Y	Y	1.80E-06	4.68E-10	2.05E-09
Dibenzo(a,h)anthracene	53-70-3	Y	Y	1.20E-06	3.12E-10	1.37E-09
Dichlorobenzene, 1,2- (o)	95-50-1	N	N	1.20E-03	3.12E-07	1.37E-06
Dichlorobenzene, 1,4- (p)	106-46-7	Y	Y	1.20E-03	3.12E-07	1.37E-06
Ethane	74-84-0	N	N	3.10E+00	8.06E-04	3.53E-03
Ethyl benzene[2]	100-41-4	Y	Y	1.44E+00	3.75E-04	1.64E-03
Fluoranthene	206-44-0	Y	N	3.00E-06	7.80E-10	3.42E-09
Fluorene	86-73-7	Y	N	2.80E-06	7.28E-10	3.19E-09
Formaldehyde[2]	50-00-0	Y	Y	1.17E+00	3.04E-04	1.33E-03
Hexane[2]	110-54-3	Y	Y	2.90E-02	7.54E-06	3.30E-05
Indeno(1,2,3-c,d)pyrene	193-39-5	Y	Y	1.80E-06	4.68E-10	2.05E-09
Naphthalene[2]	91-20-3	Y	Y	1.10E-02	2.86E-06	1.25E-05
PAHs (including naphthalene)[2]		Y	N	1.40E-02	3.64E-06	1.59E-05
Pentane	109-66-0	N	N	2.60E+00	6.76E-04	2.96E-03
Phenanthrene	85-01-8	Y	N	1.70E-05	4.42E-09	1.94E-08
Propane	74-98-6	N	N	1.60E+00	4.16E-04	1.82E-03
Propylene[2]	115-07-1	N	Y	2.44E+00	6.34E-04	2.78E-03
Pyrene	129-00-0	Y	N	5.00E-06	1.30E-09	5.69E-09
Toluene[2]	108-88-3	Y	Y	5.80E-02	1.51E-05	6.61E-05
Xylenes[2]	1330-20-7	Y	Y	2.90E-02	7.54E-06	3.30E-05
				Total HAP	**7.71E-04**	**3.38E-03**
				Maximum HAP	**3.75E-04**	**6.34E-04**

[1] The uncontrolled emission factors for natural gas combustion from AP-42, Section 1.4 - Natural Gas Combustion, Table 1.4-1, 1.4-2, 1.4-3, and 1.4-4 are conservatively used for propane combustion in the flare.

Table 9.A. Hazardous and Toxic Air Pollutant Emissions from Process Gas Combustion

Pollutant	CAS #	HAP?	TAP?	Emission Factor [1] (lb/MMscf)	Normal Case		Start-Up (Commissioning)		Start-Up (Restart After Shutdown)		Shutdown		Main Fractionator Reflux Failure		Total Emissions					
					Hourly Emissions (lb/hr)	Annual Emissions (tpy)	Hourly Emissions (lb/hr)	Annual Emissions (tpy)	Hourly Emissions (lb/hr)	Annual Emissions (tpy)	Hourly Emissions (lb/hr)	Annual Emissions (tpy)	Hourly Emissions (lb/hr)	Annual Emissions (tpy)	Hourly Emissions (lb/hr)	Daily Emissions (lb/day)	Annual Emissions (Normal Year) (tpy)	Hourly Emissions (w/ Commissioning) (lb/hr)	Daily Emissions (w/ Commissioning) (lb/day)	Annual Emissions (w/ Commissioning) (tpy)
2-Methylnaphthalene	91-57-6	Y	N	2.40E-05	3.71E-08	1.57E-07	7.98E-08	1.46E-08	2.33E-07	3.36E-08	1.45E-06	8.72E-09	7.34E-08	6.12E-12	1.45E-06	6.81E-06	1.99E-07	1.45E-06	6.81E-06	2.07E-07
3-Methylcholanthrene	56-49-5	Y	Y	1.80E-06	2.78E-09	1.18E-08	5.98E-09	1.09E-09	1.75E-08	2.52E-09	1.09E-07	6.54E-10	5.50E-09	4.59E-13	1.09E-07	5.11E-07	1.49E-08	1.09E-07	5.11E-07	1.55E-08
7,12-Dimethylbenz(a)anthracene	57-97-6	Y	Y	1.60E-05	2.47E-08	1.05E-07	5.32E-08	9.73E-09	1.55E-07	2.24E-08	9.69E-07	5.81E-09	4.89E-08	4.08E-12	9.69E-07	4.54E-06	1.33E-07	9.69E-07	4.54E-06	1.38E-07
Acenaphthene	83-32-9	Y	N	1.80E-06	2.78E-09	1.18E-08	5.98E-09	1.09E-09	1.75E-08	2.52E-09	1.09E-07	6.54E-10	5.50E-09	4.59E-13	1.09E-07	5.11E-07	1.49E-08	1.09E-07	5.11E-07	1.55E-08
Acenaphthylene	208-96-8	Y	N	1.80E-06	2.78E-09	1.18E-08	5.98E-09	1.09E-09	1.75E-08	2.52E-09	1.09E-07	6.54E-10	5.50E-09	4.59E-13	1.09E-07	5.11E-07	1.49E-08	1.09E-07	5.11E-07	1.55E-08
Acetaldehyde[2]	75-07-0	Y	Y	4.30E-02	6.65E-05	2.81E-04	1.43E-04	2.61E-05	4.18E-04	6.01E-05	2.60E-03	1.56E-05	1.31E-04	1.10E-08	2.60E-03	1.22E-02	3.57E-04	2.60E-03	1.22E-02	3.71E-04
Acrolein[2]	107-02-8	Y	Y	1.00E-02	1.55E-05	6.54E-05	3.32E-05	6.08E-06	9.71E-05	1.40E-05	6.05E-04	3.63E-06	3.06E-05	2.55E-09	6.05E-04	2.84E-03	8.30E-05	6.05E-04	2.84E-03	8.63E-05
Anthracene	120-12-7	Y	N	2.40E-06	3.71E-09	1.57E-08	7.98E-09	1.46E-09	2.33E-08	3.36E-09	1.45E-07	8.72E-10	7.34E-09	6.12E-13	1.45E-07	6.81E-07	1.99E-08	1.45E-07	6.81E-07	2.07E-08
Benz[a]anthracene	56-55-3	Y	Y	1.80E-06	2.78E-09	1.18E-08	5.98E-09	1.09E-09	1.75E-08	2.52E-09	1.09E-07	6.54E-10	5.50E-09	4.59E-13	1.09E-07	5.11E-07	1.49E-08	1.09E-07	5.11E-07	1.55E-08
Benzene[2]	71-43-2	Y	Y	1.59E-01	2.46E-04	1.04E-03	5.28E-04	9.67E-05	1.54E-03	2.22E-04	9.63E-03	5.78E-05	4.86E-04	4.05E-08	9.63E-03	4.51E-02	1.32E-03	9.63E-03	4.51E-02	1.37E-03
Benzo(a)pyrene	50-32-8	Y	Y	1.20E-06	1.86E-09	7.85E-09	3.99E-09	7.30E-10	1.17E-08	1.68E-09	7.26E-08	4.36E-10	3.67E-09	3.06E-13	7.26E-08	3.41E-07	9.96E-09	7.26E-08	3.41E-07	1.04E-08
Benzo(b)fluoranthene	205-99-2	Y	Y	1.80E-06	2.78E-09	1.18E-08	5.98E-09	1.09E-09	1.75E-08	2.52E-09	1.09E-07	6.54E-10	5.50E-09	4.59E-13	1.09E-07	5.11E-07	1.49E-08	1.09E-07	5.11E-07	1.55E-08
Benzo(g,h,i)perylene	191-24-2	Y	N	1.20E-06	1.86E-09	7.85E-09	3.99E-09	7.30E-10	1.17E-08	1.68E-09	7.26E-08	4.36E-10	3.67E-09	3.06E-13	7.26E-08	3.41E-07	9.96E-09	7.26E-08	3.41E-07	1.04E-08
Benzo(k)fluoranthene	207-08-9	Y	Y	1.80E-06	2.78E-09	1.18E-08	5.98E-09	1.09E-09	1.75E-08	2.52E-09	1.09E-07	6.54E-10	5.50E-09	4.59E-13	1.09E-07	5.11E-07	1.49E-08	1.09E-07	5.11E-07	1.55E-08
Butane	106-97-8	N	N	2.10E+00	3.25E-03	1.37E-02	6.98E-03	1.28E-03	2.04E-02	2.94E-03	1.27E-01	7.63E-04	6.42E-03	5.35E-07	1.27E-01	5.96E-01	1.74E-02	1.27E-01	5.96E-01	1.81E-02
Chrysene	218-01-9	Y	Y	1.80E-06	2.78E-09	1.18E-08	5.98E-09	1.09E-09	1.75E-08	2.52E-09	1.09E-07	6.54E-10	5.50E-09	4.59E-13	1.09E-07	5.11E-07	1.49E-08	1.09E-07	5.11E-07	1.55E-08
Dibenzo(a,h)anthracene	53-70-3	Y	Y	1.20E-06	1.86E-09	7.85E-09	3.99E-09	7.30E-10	1.17E-08	1.68E-09	7.26E-08	4.36E-10	3.67E-09	3.06E-13	7.26E-08	3.41E-07	9.96E-09	7.26E-08	3.41E-07	1.04E-08
Dichlorobenzene, 1,2- (o)	95-50-1	N	N	1.20E-03	1.86E-06	7.85E-06	3.99E-06	7.30E-07	1.17E-05	1.68E-06	7.26E-05	4.36E-07	3.67E-06	3.06E-10	7.26E-05	3.41E-04	9.96E-06	7.26E-05	3.41E-04	1.04E-05
Dichlorobenzene, 1,4- (p)	106-46-7	Y	Y	1.20E-03	1.86E-06	7.85E-06	3.99E-06	7.30E-07	1.17E-05	1.68E-06	7.26E-05	4.36E-07	3.67E-06	3.06E-10	7.26E-05	3.41E-04	9.96E-06	7.26E-05	3.41E-04	1.04E-05
Ethane	74-84-0	N	N	3.10E+00	4.79E-03	2.03E-02	1.03E-02	1.89E-03	3.01E-02	4.34E-03	1.88E-01	1.13E-03	9.48E-03	7.90E-07	1.88E-01	8.80E-01	2.57E-02	1.88E-01	8.80E-01	2.67E-02
Ethyl benzene[2]	100-41-4	Y	Y	1.44E+00	2.23E-03	9.44E-03	4.80E-03	8.78E-04	1.40E-02	2.02E-03	8.74E-02	5.25E-04	4.42E-03	3.68E-07	8.74E-02	4.10E-01	1.20E-02	8.74E-02	4.10E-01	1.25E-02
Fluoranthene	206-44-0	Y	N	3.00E-06	4.64E-09	1.96E-08	9.97E-09	1.82E-09	2.91E-08	4.20E-09	1.82E-07	1.09E-09	9.17E-09	7.64E-13	1.82E-07	8.52E-07	2.49E-08	1.82E-07	8.52E-07	2.59E-08
Fluorene	86-73-7	Y	N	2.80E-06	4.33E-09	1.83E-08	9.30E-09	1.70E-09	2.72E-08	3.92E-09	1.70E-07	1.02E-09	8.56E-09	7.14E-13	1.70E-07	7.95E-07	2.32E-08	1.70E-07	7.95E-07	2.42E-08
Formaldehyde[2]	50-00-0	Y	Y	1.17E+00	1.81E-03	7.65E-03	3.88E-03	7.11E-04	1.14E-02	1.63E-03	7.08E-02	4.25E-04	3.57E-03	2.98E-07	7.08E-02	3.32E-01	9.71E-03	7.08E-02	3.32E-01	1.01E-02
Hexane[2]	110-54-3	Y	Y	2.90E-02	4.48E-05	1.90E-04	9.64E-05	1.76E-05	2.82E-04	4.06E-05	1.76E-03	1.05E-05	8.87E-05	7.39E-09	1.76E-03	8.23E-03	2.41E-04	1.76E-03	8.23E-03	2.50E-04
Indeno(1,2,3-c,d)pyrene	193-39-5	Y	Y	1.80E-06	2.78E-09	1.18E-08	5.98E-09	1.09E-09	1.75E-08	2.52E-09	1.09E-07	6.54E-10	5.50E-09	4.59E-13	1.09E-07	5.11E-07	1.49E-08	1.09E-07	5.11E-07	1.55E-08
Naphthalene[2]	91-20-3	Y	Y	1.10E-02	1.70E-05	7.19E-05	3.66E-05	6.69E-06	1.07E-04	1.54E-05	6.66E-04	4.00E-06	3.36E-05	2.80E-09	6.66E-04	3.12E-03	9.13E-05	6.66E-04	3.12E-03	9.49E-05
PAHs (including naphthalene)[2]		Y	N	1.40E-02	2.16E-05	9.16E-05	4.65E-05	8.51E-06	1.36E-04	1.96E-05	8.48E-04	5.09E-06	4.28E-05	3.57E-09	8.48E-04	3.97E-03	1.16E-04	8.48E-04	3.97E-03	1.21E-04
Pentane	109-66-0	N	N	2.60E+00	4.02E-03	1.70E-02	8.64E-03	1.58E-03	2.52E-02	3.64E-03	1.57E-01	9.44E-04	7.95E-03	6.63E-07	1.57E-01	7.38E-01	2.16E-02	1.57E-01	7.38E-01	2.24E-02
Phenanthrene	85-01-8	Y	N	1.70E-05	2.63E-08	1.11E-07	5.65E-08	1.03E-08	1.65E-07	2.38E-08	1.03E-06	6.18E-09	5.20E-08	4.33E-12	1.03E-06	4.83E-06	1.41E-07	1.03E-06	4.83E-06	1.47E-07
Propane	74-98-6	N	N	1.60E+00	2.47E-03	1.05E-02	5.32E-03	9.73E-04	1.55E-02	2.24E-03	9.69E-02	5.81E-04	4.89E-03	4.08E-07	9.69E-02	4.54E-01	1.33E-02	9.69E-02	4.54E-01	1.38E-02
Propylene[2]	115-07-1	N	Y	2.44E+00	3.77E-03	1.60E-02	8.11E-03	1.48E-03	2.37E-02	3.41E-03	1.48E-01	8.86E-04	7.46E-03	6.22E-07	1.48E-01	6.93E-01	2.03E-02	1.48E-01	6.93E-01	2.11E-02
Pyrene	129-00-0	Y	N	5.00E-06	7.73E-09	3.27E-08	1.66E-08	3.04E-09	4.86E-08	6.99E-09	3.03E-07	1.82E-09	1.53E-08	1.27E-12	3.03E-07	1.42E-06	4.15E-08	3.03E-07	1.42E-06	4.31E-08
Toluene[2]	108-88-3	Y	Y	5.80E-02	8.97E-05	3.79E-04	1.93E-04	3.53E-05	5.63E-04	8.11E-05	3.51E-03	2.11E-05	1.77E-04	1.48E-08	3.51E-03	1.65E-02	4.82E-04	3.51E-03	1.65E-02	5.00E-04
Xylenes[2]	1330-20-7	Y	Y	2.90E-02	4.48E-05	1.90E-04	9.64E-05	1.76E-05	2.82E-04	4.06E-05	1.76E-03	1.05E-05	8.87E-05	7.39E-09	1.76E-03	8.23E-03	2.41E-04	1.76E-03	8.23E-03	2.50E-04
Total HAP					**4.59E-03**	**1.94E-02**	**9.86E-03**	**1.80E-03**	**2.88E-02**	**4.15E-03**	**1.80E-01**	**1.08E-03**	**9.07E-03**	**7.56E-07**	**0.18**	**0.84**	**2.46E-02**	**0.18**	**0.84**	**2.56E-02**
Maximum HAP					**2.23E-03**	**9.44E-03**	**4.80E-03**	**8.78E-04**	**1.40E-02**	**2.02E-03**	**8.74E-02**	**5.25E-04**	**4.42E-03**	**3.68E-07**	**0.09**	**0.41**	**1.20E-02**	**0.09**	**0.41**	**1.25E-02**

[1] The uncontrolled emission factors for natural gas combustion from AP-42, Section 1.4 - Natural Gas Combustion, Table 1.4-1, 1.4-2, 1.4-3, and 1.4-4 are conservatively used for digester gas combustion in the flare. Note, as there are no metal compounds expected in process gas, combustion products for metal compounds are not included in these estimates.

Table 10. Cooling Tower Inputs

Parameter	Value	Units
Water Volumetric Flow Rate[1]	8	gpm
Total Dissolved Solids[2]	433	ppm
Drift[2]	0.001	%
PM_{10} Fraction[3]	49.19	%
$PM_{2.5}$ Fraction[3]	0.65	%

[1] Cooling Tower water mass flow based on water demands provided by Twelve on 0425-2023

[2] Total dissolved solids (TDS) based on cooling tower test data provided by Twelve on 0317-2023 and drift estimated based on arithmetic means provided in AP-42 Section 13.4.

[3] PM_{10} and $PM_{2.5}$ factor based on PM_{10} and $PM_{2.5}$ to PM fractions, determined from data in Reisman, J. and G. Frisbie "Calculating Realistic PM_{10} Emissions from Cooling Towers," Greystone Environmental Consultants, Inc. See 'Cooling Tower Dist' tab for more information.

Table 11. Cooling Tower Emission Calculations

Pollutant	Emission Factor[1] (lb/gal)	Emission Rate[2] (lb/hr)	(tpy)
PM	3.6E-08	1.73E-05	7.59E-05
PM_{10}	1.8E-08	8.53E-06	3.73E-05
$PM_{2.5}$	8.7E-09	4.19E-06	1.84E-05

[1] Emission factor obtained from AP-42 Chapter 12.4 equation for cooling towers
Emission factor (lb/gal) = TDS (ppm) * Drift Rate (%) * Water density (lb/gal)

[2] Annual emission rate assumes continuous usage of the cooling tower operating 8760 hrs/yr.

Tank Properties

Tank Properties	**Input**
Tank Identification	T-1
CIN	N/A
Tank Contents	Naphtha
Discharging to	Flare
EPN	N/A
Location for Calculation Purposes	Yakima, WA
Tank/Roof Type	Cone
Underground?	Aboveground
Indoor?	Outdoor
Breather Vent Pressure Setting, psig	0
Breather Vent Vacuum Setting, psig	0
Pressure of Vapor Space at Normal Condition, psig	15
Tank Vapor Balanced and Flashing Occurs?	Yes
Emission Control Method	Flare
Emission Control Efficiency	98%

1

Emission Calculation - Calculation performed in accordance with AP-42, March 2020, Section 7.1.3.1.

Parameter	Symbol	Reference/Equation	Annual
Product Stored		Input	Naphtha
Type of Substance		Select One	Refined Petroleum Stocks
Throughput, gallons/yr	Q	Input	15,330
Vapor Molecular Weight, lb/lbmol	MV	Input	66.00
Vapor Pressure Coefficient A	A	Input	--
Vapor Pressure Coefficient B	B	Input	--
Vapor Pressure Coefficient C	C	Input	--
Effective Diameter, ft	DE	Equation 1-14	7
Effective Height, ft	HE	Equation 1-15	21
Maximum Liquid Height, ft	HLX	Equation 1-37	20
Minimum Liquid Height, ft	HLN	Equation 1-37	1
Average Liquid Height, ft	HL	Equation 1-16	10.5
Cone Tank Roof Slope, ft/ft	SR	Equation 1-18	0.06
Dome Tank Roof Radius, ft	RR	Equation 1-20	N/A
Dome Tank Roof Height, ft	HR	Equation 1-20	N/A
Roof Outage, ft	HRO	Equation 1-17 ~ 1-19	0.07
Vapor Space Outage, ft	HVO	Equation 1-16	10.57
Vapor Space Volume, ft3	VV	Equation 1-3	406.89
Average Daily Minimum Ambient Temperature, R	TAN	Table 7.1-7	497.17
Average Daily Maximum Ambient Temperature, R	TAX	Table 7.1-7	522.27
Average Daily Ambient Temperature Range, R	ΔTA	Equation 1-11	25.10
Average Daily Total Solar Insolation Factor, Btu/ft2-day	I	Table 7.1-7	1324.00
Average Daily Ambient Temperature, R	TAA	Equation 1-30	509.72
Tank Roof Solar Absorptance, dimensionless	αR	Table 7.1-6	0.39
Tank Shell Solar Absorptance, dimensionless	αS	Table 7.1-6	0.54
Average Daily Vapor Temperature Range, R	ΔTV	Equation 1-7, 1-8, 8-1	31.8692
Average Daily Liquid Surface Temperature, R	TLA	Equation 1-27, 1-29, 8-2	512.6271765
Average Daily Minimum Liquid Surface Temperature, R	TLN	Figure 7-1.17	504.6598765
Average Daily Maximum Liquid Surface Temperature, R	TLX	Figure 7-1.17	520.59
Liquid Bulk Temperature, R	TB	Equation 1-31, 8-2	510.87
Average Vapor Temperature, R	TV	Equation 1-32, 1-34	514.3843529
Vapor Pressure at Avg. Daily Liquid Surf. Temp., psia	PVA	Equation 1-25, 1-26	8.42
Vapor Pressure at Avg. Daily Min. Liquid Surf. Temp., psia	PVN	Equation 1-25, 1-26	7.21
Vapor Pressure at Avg. Daily Max. Liquid Surf. Temp., psia	PVX	Equation 1-25, 1-26	9.79
Vapor Density, lb/ft3	WV	Equation 1-22	1.01E-01
Daily Vapor Pressure range, psi	ΔPV	Equation 1-9	2.573036707
Breather Vent Pressure Setting, psig	PBP	N/A	0
Breather Vent Vacuum Setting, psig	PBV	N/A	0
Pressure of Vapor Space at Normal Condition, psig	PI	Equation 1-41	15
Breather Vent Pressure Setting Range, psi	ΔPB	Equation 1-10	0
Ambient Pressure, psia	PA	Table 7.1-7	14.4
Vapor Space Expansion Factor	KE	Equation 1-5, 1-12	0.05736456
Vented Vapor Saturation Factor	KS	Equation 1-21	0.17
Net Working Loss Throughput, ft3	VQ	Equation 1-39	2049.11
Sum of Increases in Liquid Level, ft	∑HQI	Equation 1-37	53.25
Annual Turnovers	N	Equation 1-36	6.13
Working Loss Turnover Factor	KN	Equation 1-35	1
Working Loss Product Factor	KP	Equation 1-35	1
Vent Setting Correction Factor	KB	Equation 1-40, 1-41	1.00
Uncontrolled Emissions			

Standing Storage Loss, lb/yr	LS	Equation 1-2	150
Working Loss, lb/yr	LW	Equation 1-35	206
Total Losses, lb/yr	LT	Equation 1-1	356
Total Losses, tpy	LT	N/A	0.18
Avg. Daily Total Losses, lb/day	LAVG	Annualized Daily Average	0.98
Avg. Hourly Total Losses, lb/hr	LAVG	Annualized Hourly Average	0.04
Controlled Emissions			
Total Annual Emissions, tpy	0.00		
Avg. Daily Emissions, lb/day	0.02		
Avg. Hourly Emissions, lb/hr	0.00		

Speciated Emissions[1,2,3]	CAS	Vapor wt%	Uncontrolled	
			lb/hr	tpy
Propane	74-98-6	0.16	0.00	0.00
n-Butane	106-97-8	0.22	0.00	0.00
n-Pentane	109-66-0	0.10	0.00	0.00
n-Hexane	110-54-3	0.07	0.00	0.00
n-Heptane	142-82-5	0.02	0.00	0.00
n-C8-n-C20	111-65-9	0.00	0.00	0.00
1-Pentene	109-67-1	0.01	0.00	0.00
1-Hexene Plus	592-41-6	0.02	0.00	0.00
Isobutane	75-28-5	0.27	0.00	0.00
Isopentane	78-78-4	0.13	0.00	0.00
Methyl-C5-Methyl-C9	15869-85-9	0.00	0.00	0.00
Total VOC		1.00	0.00	0.00

[1] Product speciation obtained from Equipment Composition and Operating Information provided by Proficio Consultancy on 2/15/2023.

[2] Assumed chemical properties of n-Octane are representative of n-C8-n-C20 based on chemical speciation provided on the material SDS for n-C8-n-C20.

[3] Assumed chemical properties of 5-Methylnonane are representative of Methyl-C5-Methyl-C9 based on chemical speciation provided on the material SDS for Methyl-C5-Methyl-C9.

Tank Properties

Tank Properties	**Input**
Tank Identification	T-3
CIN	N/A
Tank Contents	Naphtha
Discharging to	Flare
EPN	N/A
Location for Calculation Purposes	Yakima, WA
Tank/Roof Type	Cone
Underground?	Aboveground
Indoor?	Outdoor
Breather Vent Pressure Setting, psig	0
Breather Vent Vacuum Setting, psig	0
Pressure of Vapor Space at Normal Condition, psig	15
Tank Vapor Balanced and Flashing Occurs?	Yes
Emission Control Method	Flare
Emission Control Efficiency	98%

1

Emission Calculation - Calculation performed in accordance with AP-42, March 2020, Section 7.1.3.1.

Parameter	Symbol	Reference/Equation	Annual
Product Stored		Input	Naphtha
Type of Substance		Select One	Refined Petroleum
Throughput, gallons/yr	Q	Input	15,330
Vapor Molecular Weight, lb/lbmol	MV	Input	66.00
Vapor Pressure Coefficient A	A	Input	--
Vapor Pressure Coefficient B	B	Input	--
Vapor Pressure Coefficient C	C	Input	--
Effective Diameter, ft	DE	Equation 1-14	4
Effective Height, ft	HE	Equation 1-15	5.416666667
Maximum Liquid Height, ft	HLX	Equation 1-37	4.416666667
Minimum Liquid Height, ft	HLN	Equation 1-37	1
Average Liquid Height, ft	HL	Equation 1-16	2.708333333
Cone Tank Roof Slope, ft/ft	SR	Equation 1-18	0.06
Dome Tank Roof Radius, ft	RR	Equation 1-20	N/A
Dome Tank Roof Height, ft	HR	Equation 1-20	N/A
Roof Outage, ft	HRO	Equation 1-17 ~ 1-19	0.04
Vapor Space Outage, ft	HVO	Equation 1-16	2.75
Vapor Space Volume, ft3	VV	Equation 1-3	34.56
Average Daily Minimum Ambient Temperature, R	TAN	Table 7.1-7	497.17
Average Daily Maximum Ambient Temperature, R	TAX	Table 7.1-7	522.27
Average Daily Ambient Temperature Range, R	ΔTA	Equation 1-11	25.10
Average Daily Total Solar Insolation Factor, Btu/ft2-day	I	Table 7.1-7	1324.00
Average Daily Ambient Temperature, R	TAA	Equation 1-30	509.72
Tank Roof Solar Absorptance, dimensionless	αR	Table 7.1-6	0.39
Tank Shell Solar Absorptance, dimensionless	αS	Table 7.1-6	0.54
Average Daily Vapor Temperature Range, R	ΔTV	Equation 1-7, 1-8, 8-1	31.8692
Average Daily Liquid Surface Temperature, R	TLA	Equation 1-27, 1-29, 8-2	512.7902863
Average Daily Minimum Liquid Surface Temperature, R	TLN	Figure 7-1.17	504.8229863
Average Daily Maximum Liquid Surface Temperature, R	TLX	Figure 7-1.17	520.76
Liquid Bulk Temperature, R	TB	Equation 1-31, 8-2	510.87
Average Vapor Temperature, R	TV	Equation 1-32, 1-34	514.7105725
Vapor Pressure at Avg. Daily Liquid Surf. Temp., psia	PVA	Equation 1-25, 1-26	8.45

Vapor Pressure at Avg. Daily Min. Liquid Surf. Temp., psia	PVN	Equation 1-25, 1-26	7.24
Vapor Pressure at Avg. Daily Max. Liquid Surf. Temp., psia	PVX	Equation 1-25, 1-26	9.82
Vapor Density, lb/ft3	WV	Equation 1-22	1.01E-01
Daily Vapor Pressure range, psi	ΔPV	Equation 1-9	2.579426833
Breather Vent Pressure Setting, psig	PBP	N/A	0
Breather Vent Vacuum Setting, psig	PBV	N/A	0
Pressure of Vapor Space at Normal Condition, psig	PI	Equation 1-41	15
Breather Vent Pressure Setting Range, psi	ΔPB	Equation 1-10	0
Ambient Pressure, psia	PA	Table 7.1-7	14.4
Vapor Space Expansion Factor	KE	Equation 1-5, 1-12	0.05736456
Vented Vapor Saturation Factor	KS	Equation 1-21	0.45
Net Working Loss Throughput, ft3	VQ	Equation 1-39	2049.11
Sum of Increases in Liquid Level, ft	∑HQI	Equation 1-37	163.06
Annual Turnovers	N	Equation 1-36	15.33
Working Loss Turnover Factor	KN	Equation 1-35	1
Working Loss Product Factor	KP	Equation 1-35	1
Vent Setting Correction Factor	KB	Equation 1-40, 1-41	1.00
Uncontrolled Emissions			
Standing Storage Loss, lb/yr	LS	Equation 1-2	33
Working Loss, lb/yr	LW	Equation 1-35	207
Total Losses, lb/yr	LT	Equation 1-1	240
Total Losses, tpy	LT	N/A	0.12
Avg. Daily Total Losses, lb/day	LAVG	Annualized Daily Average	0.66
Avg. Hourly Total Losses, lb/hr	LAVG	Annualized Hourly Average	0.03
Controlled Emissions			
Total Annual Emissions, tpy	0.00		
Avg. Daily Emissions, lb/day	0.01		
Avg. Hourly Emissions, lb/hr	0.00		

Speciated Emissions[1,2,3]	**CAS**	**Vapor wt%**	**Uncontrolled**	
			lb/hr	**tpy**
Propane	74-98-6	0.16	8.79E-05	3.85E-04
n-Butane	106-97-8	0.22	1.20E-04	5.24E-04
n-Pentane	109-66-0	0.10	5.72E-05	2.51E-04
n-Hexane	110-54-3	0.07	3.66E-05	1.60E-04
n-Heptane	142-82-5	0.02	8.90E-06	3.90E-05
n-C8-n-C20	111-65-9	0.00	1.97E-07	8.63E-07
1-Pentene	109-67-1	0.01	6.57E-06	2.88E-05
1-Hexene Plus	592-41-6	0.02	8.79E-06	3.85E-05
Isobutane	75-28-5	0.27	1.49E-04	6.54E-04
Isopentane	78-78-4	0.13	7.18E-05	3.14E-04
Methyl-C5-Methyl-C9	15869-85-9	0.00	1.05E-07	4.59E-07
Total VOC		1.00	5.47E-04	2.40E-03

[1] Product speciation obtained from Equipment Composition and Operating Information provided by Proficio Consultancy on 2/15/2023. Conservatively assumed facility total throughput routes through this tank.

[2] Assumed chemical properties of n-Octane are representative of n-C8-n-C20 based on chemical speciation provided on the material SDS for n-C8-n-C20.

[3] Assumed chemical properties of 5-Methylnonane are representative of Methyl-C5-Methyl-C9 based on chemical speciation provided on the material SDS for Methyl-C5-Methyl-C9.

Tank Properties

Tank Properties	**Input**
Tank Identification	T-2
CIN	N/A
Tank Contents	Jet Fuel
Discharging to	Atmosphere
EPN	N/A
Location for Calculation Purposes	Yakima, WA
Tank/Roof Type	Cone
Underground?	Aboveground
Indoor?	Outdoor
Breather Vent Pressure Setting, psig	0.03
Breather Vent Vacuum Setting, psig	-0.03
Pressure of Vapor Space at Normal Condition, psig	1
Tank Vapor Balanced and Flashing Occurs?	No
Emission Control Method	No Control
Emission Control Efficiency	N/A

1

Emission Calculation - Calculation performed in accordance with AP-42, March 2020, Section 7.1.3.1.

Parameter	Symbol	Reference/Equation	Annual
Product Stored		Input	Jet Fuel
Type of Substance		Select One	Refined Petroleum Stocks
Throughput, gallons/yr	Q	Input	61,320
Vapor Molecular Weight, lb/lbmol	MV	Input	130.00
Vapor Pressure Coefficient A	A	Input	--
Vapor Pressure Coefficient B	B	Input	--
Vapor Pressure Coefficient C	C	Input	--
Effective Diameter, ft	DE	Equation 1-14	10
Effective Height, ft	HE	Equation 1-15	17
Maximum Liquid Height, ft	HLX	Equation 1-37	16
Minimum Liquid Height, ft	HLN	Equation 1-37	1
Average Liquid Height, ft	HL	Equation 1-16	8.5
Cone Tank Roof Slope, ft/ft	SR	Equation 1-18	0.06
Dome Tank Roof Radius, ft	RR	Equation 1-20	N/A
Dome Tank Roof Height, ft	HR	Equation 1-20	N/A
Roof Outage, ft	HRO	Equation 1-17 ~ 1-19	0.10
Vapor Space Outage, ft	HVO	Equation 1-16	8.60
Vapor Space Volume, ft3	VV	Equation 1-3	675.77
Average Daily Minimum Ambient Temperature, R	TAN	Table 7.1-7	497.17
Average Daily Maximum Ambient Temperature, R	TAX	Table 7.1-7	522.27
Average Daily Ambient Temperature Range, R	ΔTA	Equation 1-11	25.10
Average Daily Total Solar Insolation Factor, Btu/ft2-	I	Table 7.1-7	1324.00
Average Daily Ambient Temperature, R	TAA	Equation 1-30	509.72
Tank Roof Solar Absorptance, dimensionless	αR	Table 7.1-6	0.39
Tank Shell Solar Absorptance, dimensionless	αS	Table 7.1-6	0.54
Average Daily Vapor Temperature Range, R	ΔTV	Equation 1-7, 1-8, 8-1	31.8692
Average Daily Liquid Surface Temperature, R	TLA	Equation 1-27, 1-29, 8-2	512.7386326
Average Daily Minimum Liquid Surface Temperature	TLN	Figure 7-1.17	504.7713326
Average Daily Maximum Liquid Surface Temperature	TLX	Figure 7-1.17	520.71
Liquid Bulk Temperature, R	TB	Equation 1-31, 8-2	510.87
Average Vapor Temperature, R	TV	Equation 1-32, 1-34	514.61
Vapor Pressure at Avg. Daily Liquid Surf. Temp., psi	PVA	Equation 1-25, 1-26	1.61E-01

Vapor Pressure at Avg. Daily Min. Liquid Surf. Temp	PVN	Equation 1-25, 1-26	0.12
Vapor Pressure at Avg. Daily Max. Liquid Surf. Temp	PVX	Equation 1-25, 1-26	0.21
Vapor Density, lb/ft3	WV	Equation 1-22	3.80E-03
Daily Vapor Pressure range, psi	ΔPV	Equation 1-9	0.08316663
Breather Vent Pressure Setting, psig	PBP	N/A	0.03
Breather Vent Vacuum Setting, psig	PBV	N/A	-0.03
Pressure of Vapor Space at Normal Condition, psig	PI	Equation 1-41	1
Breather Vent Pressure Setting Range, psi	ΔPB	Equation 1-10	0.06
Ambient Pressure, psia	PA	Table 7.1-7	14.4
Vapor Space Expansion Factor	KE	Equation 1-5, 1-12	0.05736456
Vented Vapor Saturation Factor	KS	Equation 1-21	0.93
Net Working Loss Throughput, ft3	VQ	Equation 1-39	8196.44
Sum of Increases in Liquid Level, ft	∑HQI	Equation 1-37	104.36
Annual Turnovers	N	Equation 1-36	12.15
Working Loss Turnover Factor	KN	Equation 1-35	1
Working Loss Product Factor	KP	Equation 1-35	1
Vent Setting Correction Factor	KB	Equation 1-40, 1-41	1.00
Uncontrolled Emissions			
Standing Storage Loss, lb/yr	LS	Equation 1-2	50.03143041
Working Loss, lb/yr	LW	Equation 1-35	31.11
Total Losses, lb/yr	LT	Equation 1-1	81.14
Total Losses, tpy	LT	N/A	0.04
Avg. Daily Total Losses, lb/day	LAVG	Annualized Daily Average	0.22
Avg. Hourly Total Losses, lb/hr	LAVG	Annualized Hourly Averag	0.01
Controlled Emissions			
Total Annual Emissions, tpy	0.04		
Avg. Daily Emissions, lb/day	0.22		
Avg. Hourly Emissions, lb/hr	0.01		

			Uncontrolled	
Speciated Emissions	**CAS**	**Vapor wt%**	**lb/hr**	**tpy**
n-Heptane	142-82-5	0.03	0.00	0.00
n-C8-n-C20	111-65-9	0.70	0.01	0.03
1-Hexene Plus	592-41-6	0.27	0.00	0.01
Methyl-C5-Methyl-C9	15869-85-9	0.00	0.00	0.00
Total VOC		1.00	0.01	0.04

[1] Product speciation obtained from Equipment Composition and Operating Information provided by Proficio Consultancy on 2/15/2023.

[2] Assumed chemical properties of n-Octane are representative of n-C8-n-C20 based on chemical speciation provided on the material SDS for n-C8-n-C20.

[3] Assumed chemical properties of 5-Methylnonane are representative of Methyl-C5-Methyl-C9 based on chemical speciation provided on the material SDS for Methyl-C5-Methyl-C9.

Table 17. Storage Tank HAP and TAP Summary

Pollutant	CAS	HAP?	TAP?	Naphtha Tank		Naphtha Tank - Off		Jet Fuel Tank		Total	
				(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
Propane	74-98-6	N	N	1.31E-04	5.73E-04	8.79E-05	3.85E-04	--	--	2.19E-04	9.57E-04
n-Butane	106-97-8	N	N	1.78E-04	7.79E-04	1.20E-04	5.24E-04	--	--	2.98E-04	1.30E-03
n-Pentane	109-66-0	N	N	8.51E-05	3.73E-04	5.72E-05	2.51E-04	--	--	1.42E-04	6.23E-04
n-Hexane	110-54-3	Y	Y	5.43E-05	2.38E-04	3.66E-05	1.60E-04	--	--	9.09E-05	3.98E-04
n-Heptane	142-82-5	N	N	1.32E-05	5.79E-05	8.90E-06	3.90E-05	2.75E-04	1.20E-03	2.97E-04	1.30E-03
n-C8-n-C20	111-65-9	N	N	2.92E-07	1.28E-06	1.97E-07	8.63E-07	6.45E-03	2.82E-02	6.45E-03	2.82E-02
1-Pentene	109-67-1	N	N	9.77E-06	4.28E-05	6.57E-06	2.88E-05	--	--	1.63E-05	7.16E-05
1-Hexene Plus	592-41-6	N	N	1.31E-05	5.72E-05	8.79E-06	3.85E-05	2.51E-03	1.10E-02	2.53E-03	1.11E-02
Isobutane	75-28-5	N	N	2.22E-04	9.73E-04	1.49E-04	6.54E-04	--	--	3.72E-04	1.63E-03
Isopentane	78-78-4	N	N	1.07E-04	4.68E-04	7.18E-05	3.14E-04	--	--	1.79E-04	7.82E-04
Methyl-C5-Methyl-C9	15869-85-9	N	N	1.56E-07	6.81E-07	1.05E-07	4.59E-07	3.20E-05	1.40E-04	3.23E-05	1.41E-04
									Total HAP:	9.09E-05	3.98E-04
									Maximum Individual HAP:	9.09E-05	3.98E-04

Table 18. Emissions from Truck Loading

Product	Maximum Throughput[1] (gal/hr)	Liquid Density[2] (lb/gal)	Maximum Hourly Loading Rate (lb/hr)	Maximum Annual Throughput (tons/yr)	Maximum Annual Throughput (gal/yr)	Molecular Weight[2] (lb/mol)	Loading Temperature[3] (°F)	True Vapor Pressure[2] (psia)	Emission Factor[4] (lb/1000 gal)	Max Hourly Uncontrolled Emissions (lb/hr)	Max Annual Uncontrolled Emissions (tpy)
Naphtha	1,277.5	6.40	8,176	49	15,330	80	51.20	1.30	1.52	1.94	0.01
Jet Fuel	5,110.0	7.00	35,770	215	61,320	130	51.20	0.008	0.02	0.08	0.00
									Total	**2.02**	**0.01**

[1] Loading rates estimated based on the following maximum production rates:

Naphtha:	1	barrel/day (bpd)
	30.42	barrels/month
Jet Fuel:	4	barrel/day (bpd)
	121.67	barrels/month

Note it is assumed that the total volume of each fuel product produced in 1 month will be loaded into a single tanker truck in a 1 hour time period.

[2] Liquid properties of fuel products were obtained from AP-42 Chapter 7 Table 7.1-2. It was assumed that the Jet Fuel would be best represented by Jet Kerosene and Naphtha by Jet Naphtha.

[3] Temperature of the fuel products during loading operations are assumed to be identical to the bulk liquid fuel product storage tank temperatures.

[4] The loading loss emission factor is calculated based on Equation 1 from U.S. EPA AP-42, Fifth Edition, Volume I, Chapter 5: Petroleum Industry, Section 5.2, Transportation and Marketing of Petroleum Liquids, Final Section, June 2008, as follows:

Loading loss ($lb/10^3$ gal) = 12.46 × Saturation Factor × Molecular Weight of Vapors × True Vapor Pressure (psia)/Temperature of Bulk Liquid (°R).

These parameters are determined as following:

Saturation Factor	0.60	Submerged loading in dedicated normal service for truck loading, AP-42 Table 5.2-1.

Table 19. Speciated Emissions from Liquid Loading

Pollutant	CAS	HAP?	TAP?	Mass Fraction		Naphtha Loading Emissions		Jet Fuel Loading Emissions		Total Truck Loading Emissions	
				Naphtha	Jet Fuel	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
Propane	74-98-6	N	N	0.16	--	3.12E-01	1.87E-03	--	--	3.12E-01	1.87E-03
n-Butane	106-97-8	N	N	0.22	--	4.25E-01	2.55E-03	--	--	4.25E-01	2.55E-03
n-Pentane	109-66-0	N	N	0.10	--	2.03E-01	1.22E-03	--	--	2.03E-01	1.22E-03
n-Hexane	110-54-3	Y	Y	0.07	--	1.30E-01	7.79E-04	--	--	1.30E-01	7.79E-04
n-Heptane	142-82-5	N	N	0.02	0.03	3.16E-02	1.89E-04	2.31E-03	1.38E-05	3.39E-02	2.03E-04
n-C8-n-C20	111-65-9	N	N	0.00	0.70	6.98E-04	4.19E-06	5.41E-02	3.25E-04	5.48E-02	3.29E-04
1-Pentene	109-67-1	N	N	0.01	--	2.33E-02	1.40E-04	--	--	2.33E-02	1.40E-04
1-Hexene Plus	592-41-6	N	N	0.02	0.27	3.12E-02	1.87E-04	2.11E-02	1.26E-04	5.23E-02	3.14E-04
Isobutane	75-28-5	N	N	0.27	--	5.31E-01	3.19E-03	--	--	5.31E-01	3.19E-03
Isopentane	78-78-4	N	N	0.13	--	2.55E-01	1.53E-03	--	--	2.55E-01	1.53E-03
Methyl-C5-Methyl-C9	15869-85-9	N	N	0.00	0.00	3.72E-04	2.23E-06	2.69E-04	1.61E-06	6.40E-04	3.84E-06
									Total HAP:	1.30E-01	7.79E-04
									Maximum Individual HAP:	1.30E-01	7.79E-04

[1] Note it is assumed that the loadout events for Naphtha and Jet Fuel products occur simultaneously.

Table 20. Equipment Fugitive VOC Emissions

This unit should go up to row 19 instead of 18

Source	Stream Composition	Control Efficiency	Emission Factor	Unit 10			Unit 20			Unit 30			Unit 40			Unit 50			Unit 55			Unit 60			Unit 65			Unit 70			Unit 75			Unit 80			Unit 90			Total		
				VOC Emission Rate			VOC Emission Rate			VOC Emission Rate			VOC Emission Rate			VOC Emission Rate			VOC Emission Rate			VOC Emission Rate			VOC Emission Rate			VOC Emission Rate			VOC Emission Rate			VOC Emission Rate			VOC Emission Rate			VOC Emission Rate		
		(%)	(lb/hr/source)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)
Valves	Gas/Vapor	0%	0.0089	0	0	0	0	0	0	0	0	0	0	0	0	13	0.11483	0.502974609	0	0.00342	0.014990444	2	0.01556	0.06815	23	0.20166	0.88325	3	0.02465	0.10799	0	0.00014	0.0006	0	0	0	0	0	0	40	0.36	1.58
	Light Liquid	0%	0.0035	0	0	0	0	0.00084	0.00368	0	0	0	0	0	0	4	0.0143	0.062628659	0	4.3E-05	0.000186572	0	0	0	69	0.24119	1.05642	0	0	0	0	0	0	117	0.4095	1.79361	0	0	0	190	0.67	2.92
	Heavy Liquid	0%	0.0007	0	0	0	0	0	0	0	0	0	0	0	0	73	0.05088	0.222866192	0	0	0	19	0.01356	0.05938	22	0.0154	0.06745	0	0	0	0	0	0	0	0	0	0	0	0	114	0.08	0.35
Connectors	Gas/Vapor	0%	0.0029	0	0	0	0	0	0	0	0	0	0	0	0	7	0.01909	0.083615772	0	0.0006	0.00262627	2	0.00437	0.01915	17	0.04885	0.21396	2	0.00459	0.02013	0	3.6E-05	0.00016	0	0	0	0	0	0	27	0.08	0.34
	Light Liquid	0%	0.0005	0	0	0	0	0.00004	0.00018	0	0	0	0	0	0	1	0.00051	0.002243415	0	2E-06	8.88438E-06	0	0	0	38	0.01897	0.0831	0	0	0	0	0	0	118	0.059	0.25842	0	0	0	157	0.08	0.34
	Heavy Liquid	0%	0.00007	0	0	0	0	0	0	0	0	0	0	0	0	20	0.00143	0.006266348	0	0	0	8	0.00054	0.00238	15	0.00105	0.0046	0	0	0	0	0	0	0	0	0	0	0	0	43	0.00	0.01
Pumps	Light Liquid	0%	0.0386	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.07708	0.33762	0	0	0	0	0	0	6	0.2316	1.01441	0	0	0	8	0.31	1.35
	Heavy Liquid	0%	0.0161	0	0	0	0	0	0	0	0	0	0	0	0	2	0.0286	0.125246942	0	0	0	0	0	0	1	0.0161	0.07052	0	0	0	0	0	0	0	0	0	0	0	0	3	0.04	0.20
Compressors	Gas/Vapor	0%	0.5027	0	0	0	0	0	0	0	0	0	0	0	0	0	0.09077	0.397551917	0	0	0	0	0.01145	0.05016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.10	0.45
Relief Valves	Gas/Vapor	0%	0.2293	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Open-Ended Lines	All (Capped)	0%	0.004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.008	0.03504	0	0	0	2	0.01	0.04
Sampling Connections	All	0%	0.033	0	0	0	0	0	0	0	0	0	0	0	0	0	0.006	0.026267848	0	0	0	0	0.0015	0.00658	0	0	0	0	0.00418	0.01832	0	0	0	6	0.198	0.86724	0	0	0	6	0.21	0.92
Total Equipment Fugitive Emissions					0	0		0.00088	0.00385		0	0		0	0		0.32641	1.4296617		0.00407	0.01781217		0.04699	0.20582		0.6203	2.71693		0.03343	0.14644		0.00017	0.00076		0.9061	3.96872		0	0		1.94	8.49

[1] Emission factors are taken from TCEQ fugitvie emission calculations factors for SOCMI without ethylene, meaning components contain less than 11% ethylene.
[2] Assumed operation 8760 hrs/yr
[3] If a stream contained multiple phases, it was assumed that the stream was 100% composed of the phase with the hightest vapor pressure.

Table 21. Equipment Fugitive CO Emissions

Source	Stream Composition	Control Efficiency	Emission Factor	Unit 10			Unit 20			Unit 30			Unit 40			Unit 50			Unit 55			Unit 60			Unit 65			Unit 70			Unit 75			Unit 80			Unit 90			Total		
				CO Emission Rate			CO Emission Rate			CO Emission Rate			CO Emission Rate			CO Emission Rate			CO Emission Rate			CO Emission Rate			CO Emission Rate			CO Emission Rate			CO Emission Rate			CO Emission Rate			CO Emission Rate			CO Emission Rate		
		(%)	(lb/hr/source)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)
Valves	Gas/Vapor	0%	0.0089	0	0	0	14	0.1214	0.53171	0	0	0	34	0.30687	1.34409936	12	0.1111	0.486635186	0	0	0	1	0.00481	0.02106	1	0.00493	0.02159	3	0.0302	0.1323	18	0.16	0.70078	0	0	0	0	0	0	83	0.74	3.24
	Light Liquid	0%	0.0035	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	Heavy Liquid	0%	0.0007	0	0	0	0	0	0	0	0	0	0	0	0	3	0.00243	0.010634135	0	0	0	0	0.00011	0.00046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.00	0.01
Connectors	Gas/Vapor	0%	0.0029	0	0	0	8	0.0234	0.10251	0	0	0	40	0.11652	0.51036636	8	0.02462	0.107817807	0	0	0	0	0.00065	0.00286	0	0.00065	0.00283	2	0.00612	0.02681	8	0.02377	0.10413	0	0	0	0	0	0	67	0.20	0.86
	Light Liquid	0%	0.0005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	Heavy Liquid	0%	0.00007	0	0	0	0	0	0	0	0	0	0	0	0	1	6.2E-05	0.000271434	0	0	0	0	2.1E-06	9.3E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.00	0.00
Pumps	Light Liquid	0%	0.0386	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	Heavy Liquid	0%	0.0161	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00127	0.0056976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.01
Compressors	Gas/Vapor	0%	0.5027	0	0	0	0	0	0	0	0	0	0	0	0	1	0.60324	2.6421912	0	0.13465	0.589774821	0	0.00573	0.02508	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.74	3.26
Relief Valves	Gas/Vapor	0%	0.2293	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Open-Ended Lines	All (Capped)	0%	0.004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Sampling Connections	All	0%	0.033	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0194	0.084965464	0	0	0	0	0.00075	0.00329	0	0	0	0	0.00503	0.02202	2	0.05998	0.26269	0	0	0	0	0	0	3	0.09	0.37
Total Equipment Fugitive Emissions					0	0		0.1448	0.63422		0	0		1.02663	4.49665692		0.29353	1.285668607		0	0		0.01205	0.05277		0.00558	0.02442		0.04135	0.18113		0.24374	1.0676		0	0		0	0		1.77	7.74

[1] Emission factors are taken from TCEQ fugitvie emission calculations factors for SOCMI without ethylene, meaning components contain less than 11% ethylene.
[2] Assumed operation 8760 hrs/yr
[3] If a stream contained multiple phases, it was assumed that the stream was 100% composed of the phase with the hightest vapor pressure.

Table 22. Equipment Fugitive MeOH Emissions

Source	Stream Composition	Control Efficiency	Emission Factor	Unit 10			Unit 20			Unit 30			Unit 40			Unit 50			Unit 55			Unit 60			Unit 65			Unit 70			Unit 75			Unit 80			Unit 90			Total		
				MeOH Emission Rate			MeOH Emission Rate			MeOH Emission Rate			MeOH Emission Rate			MeOH Emission Rate			MeOH Emission Rate			MeOH Emission Rate			MeOH Emission Rate			MeOH Emission Rate			MeOH Emission Rate			MeOH Emission Rate			MeOH Emission Rate			MeOH Emission Rate		
		(%)	(lb/hr/source)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)
Valves	Gas/Vapor	0%	0.0089	0	0	0	0	0	0	0	0	0	0	0	0	0	3.5E-05	0.000153323	0	0.00171	0.007495222	0	0	0	0	0	0	0	0.00332	0.01454	0	0	0	0	0	0	0	0	0	0	1	0.01	0.02
	Light Liquid	0%	0.0035	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0003	0.001308659	0	2.1E-05	9.3286E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	Heavy Liquid	0%	0.0007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Connectors	Gas/Vapor	0%	0.0029	0	0	0	0	0	0	0	0	0	0	0	0	0	2.8E-05	0.000121336	0	0.0003	0.001313135	0	0	0	0	0	0	0	0.00025	0.00109	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	Light Liquid	0%	0.0005	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2E-05	5.3146E-05	0	1E-06	4.44219E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	Heavy Liquid	0%	0.00007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Pumps	Light Liquid	0%	0.0386	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	Heavy Liquid	0%	0.0161	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Compressors	Gas/Vapor	0%	0.5027	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Relief Valves	Gas/Vapor	0%	0.2293	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Open-Ended Lines	All (Capped)	0%	0.004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Sampling Connections	All	0%	0.033	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00061	0.00265	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Total Equipment Fugitive Emissions					0	0		0	0		0	0		0	0		0.00037	0.001636733		0.00203	0.008906085		0	0		0	0		0.00417	0.01828		0	0		0	0		0	0		0.01	0.03

[1] Emission factors are taken from TCEQ fugitvie emission calculations factors for SOCMI without ethylene, meaning components contain less than 11% ethylene.
[2] Assumed operation 8760 hrs/yr
[3] If a stream contained multiple phases, it was assumed that the stream was 100% composed of the phase with the hightest vapor pressure.

Table 23. Equipment Fugitive Hexane Emissions

Source	Stream Composition	Control Efficiency	Emission Factor	Unit 10			Unit 20			Unit 30			Unit 40			Unit 50			Unit 55			Unit 60			Unit 65			Unit 70			Unit 75			Unit 80			Unit 90			Total		
				Hexane Emission Rate			Hexane Emission Rate			Hexane Emission Rate			Hexane Emission Rate			Hexane Emission Rate			Hexane Emission Rate			Hexane Emission Rate			Hexane Emission Rate			Hexane Emission Rate			Hexane Emission Rate			Hexane Emission Rate			Hexane Emission Rate			Hexane Emission Rate		
		(%)	(lb/hr/source)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)
Valves	Gas/Vapor	0%	0.0089	0	0	0	0	0	0	0	0	0	0	0	0	4	0.0324	0.141917235	0	0	0	1	0.00514	0.02253	12	0.10786	0.47244	0	2.8E-05	0.00012	0	0	0	0	0	0	0	0	0	0	16	0.15	0.64
	Light Liquid	0%	0.0035	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	0.20335	0.89067	0	0	0	0	0	0	99	0.34754	1.52222	0	0	0	157	0.55	2.41
	Heavy Liquid	0%	0.0007	0	0	0	0	0	0	0	0	0	0	0	0	58	0.04029	0.176450827	0	0	0	16	0.01139	0.04989	21	0.01498	0.0656	0	0	0	0	0	0	0	0	0	0	0	0	95	0.07	0.29
Connectors	Gas/Vapor	0%	0.0029	0	0	0	0	0	0	0	0	0	0	0	0	1	0.00319	0.013992727	0	0	0	1	0.00263	0.0115	11	0.03225	0.14124	0	0.00012	0.00051	0	0	0	0	0	0	0	0	0	0	13	0.04	0.17
	Light Liquid	0%	0.0005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	0.01565	0.06856	0	0	0	0	0	0	100	0.04999	0.21894	0	0	0	131	0.07	0.29
	Heavy Liquid	0%	0.00007	0	0	0	0	0	0	0	0	0	0	0	0	16	0.0011	0.004802207	0	0	0	6	0.00044	0.00194	15	0.00102	0.00447	0	0	0	0	0	0	0	0	0	0	0	0	37	0.00	0.01
Pumps	Light Liquid	0%	0.0386	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.06291	0.27556	0	0	0	0	0	0	5	0.1937	0.84842	0	0	0	7	0.26	1.12
	Heavy Liquid	0%	0.0161	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0221	0.096816952	0	0	0	0	0	0	1	0.01566	0.06859	0	0	0	0	0	0	0	0	0	0	0	0	2	0.04	0.17
Compressors	Gas/Vapor	0%	0.5027	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0016	0.006989924	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.01
Relief Valves	Gas/Vapor	0%	0.2293	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Open-Ended Lines	All (Capped)	0%	0.004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.00797	0.03492	0	0	0	2	0.01	0.03
Sampling Connections	All	0%	0.033	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0001	0.000458857	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0.1656	0.72533	0	0	0	5	0.17	0.73
Total Equipment Fugitive Emissions					0	0		0	0		0	0		0	0		0.10078	0.441428728		0	0		0.0196	0.08586		0.45368	1.98714		0.00015	0.00064		0	0		0.7648	3.34984		0	0		1.34	5.86

[1] Emission factors are taken from TCEQ fugitvie emission calculations factors for SOCMI without ethylene, meaning components contain less than 11% ethylene.
[2] Assumed operation 8760 hrs/yr
[3] If a stream contained multiple phases, it was assumed that the stream was 100% composed of the phase with the hightest vapor pressure.

Table 24. Equipment Fugitive Propylene Emissions

Source	Stream Composition	Control Efficiency	Emission Factor	Unit 10			Unit 20			Unit 30			Unit 40			Unit 50			Unit 55			Unit 60			Unit 65			Unit 70			Unit 75			Unit 80			Unit 90			Total		
				Propylene Emission Rate			Propylene Emission Rate			Propylene Emission Rate			Propylene Emission Rate			Propylene Emission Rate			Propylene Emission Rate			Propylene Emission Rate			Propylene Emission Rate			Propylene Emission Rate			Propylene Emission Rate			Propylene Emission Rate			Propylene Emission Rate			Propylene Emission Rate		
		(%)	(lb/hr/source)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)
Valves	Gas/Vapor	0%	0.0089	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00318	0.013947026	0	0	0	0	0.00012	0.00051	2	0.01958	0.08576	0	0.00075	0.00329	0	0	0	0	0	0	0	0	0	3	0.02	0.10
	Light Liquid	0%	0.0035	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0035	0.01533	0	0	0	0	0	0	0	0	0	0	0	0	1	0.00	0.02
	Heavy Liquid	0%	0.0007	0	0	0	0	0	0	0	0	0	0	0	0	8	0.00585	0.025633529	0	0	0	0	0.00011	0.00046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0.01	0.03
Connectors	Gas/Vapor	0%	0.0029	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0009	0.003963157	0	0	0	0	4.9E-05	0.00021	1	0.00239	0.01046	0	0.00017	0.00073	0	0	0	0	0	0	0	0	0	1	0.00	0.02
	Light Liquid	0%	0.0005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0003	0.00133	0	0	0	0	0	0	0	0	0	0	0	0	1	0.00	0.00
	Heavy Liquid	0%	0.00007	0	0	0	0	0	0	0	0	0	0	0	0	3	0.00019	0.000812932	0	0	0	0	2.1E-06	9.3E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.00	0.00
Pumps	Light Liquid	0%	0.0386	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00129	0.00564	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.01
	Heavy Liquid	0%	0.0161	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0036	0.015764841	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.02
Compressors	Gas/Vapor	0%	0.5027	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00379	0.016601069	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.02
Relief Valves	Gas/Vapor	0%	0.2293	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Open-Ended Lines	All (Capped)	0%	0.004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Sampling Connections	All	0%	0.033	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00025	0.001089786	0	0	0	0	0	0	0	0	0	0	0.00014	0.00063	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Total Equipment Fugitive Emissions						0			0			0			0			0.01777	0.07781234			0			0.00027	0.0012			0.02706	0.11852			0.00106	0.00465			0			0		0.05	0.20

[1] Emission factors are taken from TCEQ fugitvie emission calculations factors for SOCMI without ethylene, meaning components contain less than 11% ethylene.
[2] Assumed operation 8760 hrs/yr
[3] If a stream contained multiple phases, it was assumed that the stream was 100% composed of the phase with the hightest vapor pressure.

Table 25. Equipment Fugitive CO2 Emissions

Source	Stream Composition	Control Efficiency	Emission Factor	Unit 10			Unit 20			Unit 30			Unit 40			Unit 50			Unit 55			Unit 60			Unit 65			Unit 70			Unit 75			Unit 80			Unit 90			Total		
				CO2 Emission Rate			CO2 Emission Rate			CO2 Emission Rate			CO2 Emission Rate			CO2 Emission Rate			CO2 Emission Rate			CO2 Emission Rate			CO2 Emission Rate			CO2 Emission Rate			CO2 Emission Rate			CO2 Emission Rate			CO2 Emission Rate			CO2 Emission Rate		
		(%)	(lb/hr/source)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)	# sources	(lb/hr)	(tpy)
Valves	Gas/Vapor	0%	0.0089	14	0.1246	0.545748	34	0.30563	1.33864	0	0	0	36	0.31969	1.40023344	10	0.08509	0.372690598	8	0.07225	0.316442118	1	0.00865	0.03791	3	0.02286	0.10015	3	0.02536	0.11106	1	0.00591	0.02589	0	0	0	0	0	0	109	0.97	4.25
	Light Liquid	0%	0.0035	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00015	0.000654329	0	2.1E-05	9.3286E-05	0	0	0	0	0.00031	0.00135	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	Heavy Liquid	0%	0.0007	0	0	0	0	0	0	0	0	0	0	0	0	4	0.00294	0.012897837	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.00	0.01
Connectors	Gas/Vapor	0%	0.0029	0	0	0	17	0.04947	0.2167	0	0	0	53	0.15289	0.66964944	6	0.01815	0.079481434	1	0.00311	0.013635971	0	0.00118	0.00515	1	0.003	0.01315	2	0.00511	0.02238	1	0.00147	0.00645	0	0	0	0	0	0	81	0.23	1.03
	Light Liquid	0%	0.0005	0	0	0	0	0	0	0	0	0	0	0	0	0	6.1E-06	2.67073E-05	0	1E-06	4.44219E-06	0	0	0	0	2.7E-05	0.00012	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	Heavy Liquid	0%	0.00007	0	0	0	0	0	0	0	0	0	0	0	0	1	8.9E-05	0.000388409	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.00	0.00
Pumps	Light Liquid	0%	0.0386	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00012	0.00051	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	Heavy Liquid	0%	0.0161	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00174	0.007628149	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.01
Compressors	Gas/Vapor	0%	0.5027	0	0	0	0	0.05027	0.22018	0	0	0	2	0.84454	3.69906768	0	0.11131	0.487547186	0	0	0	0	0.01031	0.04514	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1.02	4.45
Relief Valves	Gas/Vapor	0%	0.2293	0	0	0	0	0.06879	0.3013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.07	0.30
Open-Ended Lines	All (Capped)	0%	0.004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.004	0.01752	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.00	0.02
Sampling Connections	All	0%	0.033	1	0.033	0.14454	0	0	0	0	0	0	0	0	0	0	0.00822	0.036008456	0	0	0	0	0.00135	0.00593	0	0	0	0	0.00418	0.01833	0	0.00013	0.00059	0	0	0	0	0	0	1	0.05	0.21
Total Equipment Fugitive Emissions					0.1576	0.690288		0.47416	2.07682		0	0		1.31711	5.76895056		0.2277	0.997323106		0.07938	0.347695816		0.02149	0.09413		0.02632	0.11528		0.03465	0.15176		0.00752	0.03292		0	0		0	0		2.35	10.28

[1] Emission factors are taken from TCEQ fugitvie emission calculations factors for SOCMI without ethylene, meaning components contain less than 11% ethylene.
[2] Assumed operation 8760 hrs/yr
[3] If a stream contained multiple phases, it was assumed that the stream was 100% composed of the phase with the hightest vapor pressure.

Table 23.A. Generator Operational Parameters - Caterpillar V12 GCAG

Maximum Hours of Operation (hr/yr)[a]:	160
Maximum Engine Power Rating (kW):	1,000
Maximum Engine Rating (bhp)[b]:	1,502
Max hourly fuel consumption (gal/hr):	72
Maximum Engine Rating (MMBtu/hr)[c]:	10.51

[a] It is assumed the generator will operated for non-emergency no more than 160 hours per year.

[b] Maximum fuel use and maximum engine rating were obtained from engine specification sheets in the units of lb/hr.

[c] Maximum engine rating converted to MMBtu/hr using conversion factor: 0.0070000 MMBtu/bhp-h

Table 23.B. Criteria and GHG Emissions Summary

Pollutant	Emissions (lb/hr)	Emissions (tpy)	Emission Factor [a,c]	Emission Factor Units
Particulate Matter (PM)[b]	3.31E-02	2.65E-03	0.01	g/bhp-h
Particulate Matter <10 microns (PM_{10})	3.31E-02	2.65E-03	0.01	g/bhp-h
Particulate Matter < 2.5 microns ($PM_{2.5}$)	3.31E-02	2.65E-03	0.01	g/bhp-h
Sulfur Dioxide (SO_2)[a]	1.82E-02	1.46E-03	0.0055	g/bhp-h
Carbon Monoxide (CO)[b]	7.95E-01	6.36E-02	0.24	g/bhp-h
Nitrogen Oxides (NO_X)[b]	19.77	1.58	5.97	g/bhp-h
Volatile Organic Compounds (VOC)[b]	9.93E-02	7.95E-03	0.03	g/bhp-h
Carbon Dioxide (CO_2)	1714.3	137.15	73.96	kg CO_2/MMBtu
Methane (CH_4)	6.95E-02	5.56E-03	3.00E-03	kg CH_4/MMBtu
Nitrous Oxide (N_2O)	1.39E-02	1.11E-03	6.00E-04	kg N_2O/MMBtu
Total Carbon Dioxide Equivalent (CO_2e)	1,720.23	137.62		

[a] Emission factor for SO2 was obtained from AP-42, Section 3.4 - Large Stationary Diesel And All Dual-fuel Engines. Emission factors for GHGs were obtained from 40 CFR 98 Subpart C.

[b] Emission factors for NOx, CO, VOC and PM were obtained from vendor generator specification sheet. DPF Filter guaranteed to apply a 75% PM emission reduction.

[c] The Global Warming Potential for CO_2 is 1, CH_4 is 25 and N_2O is 298 per 40 CFR 98 Table A-1.

[d] The sulfur content of fuel is conservatively assumed to be to 15 ppm (0.0015% by weight), in accordance with maximum allowable % w/w of sulfur in ULSD (https://www.epa.gov/diesel-fuel-standards/diesel-fuel-standards-and-rulemakings). The SO2 emission factor is calculated from Table 3.4-1, AP-42 Chapter 3.4, Large Stationary Diesel and All Stationary Dual-fuel Engines.

Table 23.C. HAP and TAP Emissions Summary

Pollutant	CAS #	HAP? [a]	TAP? [b]	Averaging Period [b]	Emission Factors [c] (lb/MMbtu)			Uncontrolled Emission Rate	
					AP-42 Diesel Combustion Emission Factor	VCAPCD Diesel Combustion Emission Factor[d]	CATEF Diesel Combution Emission Factor	(lb/hr)	(tpy)
Benzene	71-43-2	Yes	Yes	year	1.07E-01	1.86E-01	2.06E-03	1.34E-02	1.07E-03
Formaldehyde	50-00-0	Yes	Yes	year	1.09E-02	1.73E+00	8.05E-03	1.24E-01	9.93E-03
Toluene	108-88-3	Yes	Yes	24-hr	3.88E-02	1.05E-01	6.16E-04	7.58E-03	6.06E-04
Acenaphthylene	208-96-8	Yes	No	--	1.27E-03	--	2.95E-05	9.16E-05	7.33E-06
Dibenz[a,h]anthracene	53-70-3	Yes	Yes	year	4.77E-05	--	2.53E-05	3.43E-06	2.75E-07
Naphthalene	91-20-3	Yes	Yes	year	1.79E-02	1.97E-02	4.08E-04	1.42E-03	1.13E-04
Acetaldehyde	75-07-0	Yes	Yes	year	3.48E-03	7.83E-01	7.73E-04	5.63E-02	4.51E-03
Acrolein	107-02-8	Yes	Yes	24-hr	1.09E-03	3.39E-02	9.43E-05	2.44E-03	1.95E-04
1,3-Butadiene	106-99-0	Yes	Yes	year	--	2.17E-01	3.92E-05	1.56E-02	1.25E-03
Chlorobenzene	108-90-7	Yes	Yes	24-hr	--	2.00E-04	--	1.44E-05	1.15E-06
Propylene	115-07-1	No	Yes	24-hr	3.85E-01	4.67E-01	2.79E-03	3.36E-02	2.69E-03
n-Hexane	110-54-3	Yes	Yes	24-hr	--	2.69E-02	1.01E-05	1.93E-03	1.55E-04
Hydrogen chloride	7647-01-0	Yes	Yes	24-hr	--	1.86E-01	--	1.34E-02	1.07E-03
Acenaphthene	83-32-9	Yes	No	--	6.46E-04	--	2.43E-05	4.64E-05	3.71E-06
Anthracene	120-12-7	Yes	No	--	1.70E-04	--	2.91E-05	1.22E-05	9.76E-07
Benz[a]anthracene	56-55-3	Yes	Yes	year	8.58E-05	--	--	6.17E-06	4.94E-07
Benzo[b]fluoranthene	205-99-2	Yes	Yes	year	1.53E-04	--	4.85E-05	1.10E-05	8.81E-07
Benzo[k]fluoranthene	207-08-9	Yes	Yes	year	3.01E-05	--	4.85E-05	3.49E-06	2.79E-07
Benzo(g,h,i)perylene	191-24-2	Yes	No	--	7.67E-05	--	2.55E-05	5.52E-06	4.41E-07
Chrysene	218-01-9	Yes	Yes	year	2.11E-04	--	2.59E-05	1.52E-05	1.21E-06
Ethyl benzene	100-41-4	Yes	Yes	year	--	1.09E-02	4.90E-05	7.84E-04	6.27E-05
o-Xylene	95-47-6	Yes	Yes	24-hr	2.66E-02	--	1.51E-04	1.91E-03	1.53E-04
m-Xylene	108-38-3	Yes	Yes	24-hr	2.66E-02	--	--	1.91E-03	1.53E-04
p-Xylene	106-42-3	Yes	Yes	24-hr	2.66E-02	--	--	1.91E-03	1.53E-04
Xylene (mixture), including m-xylene, o-xylene,	1330-20-7	Yes	Yes	24-hr	2.66E-02	4.24E-02	2.60E-04	3.05E-03	2.44E-04
Polyaromatic Hydrocarbons / Polycyclic Organic	POM	Yes	No	--	--	5.59E-02	--	4.02E-03	3.22E-04
Fluoranthene	206-44-0	Yes	No	--	5.56E-04	--	2.90E-05	4.00E-05	3.20E-06
Fluorene	86-73-7	Yes	No	--	1.77E-03	--	1.53E-04	1.27E-04	1.02E-05
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	Yes	year	5.71E-05	--	2.51E-05	4.11E-06	3.29E-07
Phenanthrene	85-01-8	Yes	No	--	5.63E-03	--	2.83E-04	4.05E-04	3.24E-05
Pyrene	129-00-0	Yes	No	--	5.12E-04	--	6.10E-05	3.68E-05	2.94E-06
Arsenic & inorganic arsenic compounds, NOS	7440-38-2	Yes	Yes	year	--	1.60E-03	--	1.15E-04	9.20E-06
Cadmium & compounds, NOS	7440-43-9	Yes	Yes	year	--	1.50E-03	--	1.08E-04	8.63E-06
Chromium	7440-47-3	Yes	No	--	--	6.00E-04	--	4.31E-05	3.45E-06
Chromium(VI) & compounds, NOS	18540-29-9	No	Yes	year	--	1.00E-04	--	7.19E-06	5.75E-07
Chromium(III), soluble particulates, NOS	Cr(III)sol	Yes	Yes	24-hr	--	6.00E-04	--	4.31E-05	3.45E-06
Copper & compounds	7440-50-8	No	Yes	1-hr	--	4.10E-03	--	2.95E-04	2.36E-05
Lead & compounds, NOS	7439-92-1	Yes	Yes	year	--	8.30E-03	--	5.97E-04	4.77E-05
Manganese & compounds	7440-96-5	Yes	No	--	--	3.10E-03	--	2.23E-04	1.78E-05
Mercury, elemental	7439-97-6	Yes	Yes	24-hr	--	2.00E-03	--	1.44E-04	1.15E-05
Nickel & compounds, NOS	7440-02-0	Yes	Yes	year	--	3.90E-03	--	2.80E-04	2.24E-05
Selenium & selenium compounds (other than hy	7782-49-2	Yes	Yes	--	--	2.20E-03	--	1.58E-04	1.27E-05
Zinc	7440-66-6	No	No	--	--	2.24E-02	--	1.61E-03	1.29E-04
Sulfur dioxide	7446-09-5	No	Yes	1-hr	--	--	--	1.82E-02	1.46E-03
NO_2 [e]	10102-44-0	No	Yes	1-hr	--	--	--	1.98E+01	1.58E+00
CO [e]	630-08-0	No	Yes	1-hr	--	--	--	7.95E-01	6.36E-02
Diesel engine exhaust, particulate [e]	DEEP	No	Yes	year	--	--	--	3.31E-02	2.65E-03
							Total HAP Emissions	**2.52E-01**	**2.02E-02**
							Maximum Individual HAP Emissions	**1.24E-01**	**9.93E-03**

[a] List of HAP established by 42 U.S.C. 7412(b)(1).

[b] Averaging Period and SQER are obtained from WAC 173-460-150.

[c] Diesel emission factors are obtained from Tables 3.4-3 and 3.4-4, AP-42; Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors, Diesel Combustion Factors; and California Air Toxics Emission Factor (CATEF) sourced for Diesel ICE. Annual uncontrolled emissions are based on 500 hours per year of operation.

[d] Diesel HHV 138 MMBtu/Mgal

[e] Emission factors for NO_x, Diesel engine exhaus particulate, HC, and CO are obtained from the worst case loading scenarios of the manufacturer specifications. It is conservatively assumed that all NO_x is emitted in the form of NO_2. Diesel particulate matter (PM) emission factor conservatively set equal to vendor filterable PM emission factor.

NO_2	5.97 g/bhp-hr
CO	0.24 g/bhp-hr
Diesel engine exhaust, particulate	0.03 lb/MMBtu

Table 24.A. AERSCREEN Results

Operating Case	AERSCREEN File	Geography	Max 1-hr ($\mu g/m^3$)	Scaled 3-hr ($\mu g/m^3$)	Scaled 8-hr ($\mu g/m^3$)	Scaled 24-hr ($\mu g/m^3$)	Scaled Annual ($\mu g/m^3$)
Emergency Generator							
Normal Case	TTB_EmerGen	Flat Terrain	171.1	171.1	154.0	102.7	17.1
Results with NO2 Conversion	TTB_EmerGen_NO2	Flat Terrain	154.0	154.0	138.6	92.4	15.4
Flare							
Normal Case	TTB_Flare_A	Flat Terrain	1459.0	1459.0	1313.0	857.7	145.9
Start-Up(Commissioning)	TTB_Flare_B	Flat Terrain	794.0	794.0	714.6	476.4	79.4
Start-Up (Restart After Shutdown)	TTB_Flare_C	Flat Terrain	567.1	567.1	510.4	340.3	56.7
Shutdown	TTB_Flare_D	Flat Terrain	387.0	387.0	348.3	232.2	38.7
Main Fractionator Reflux Failure	TTB_Flare_E	Flat Terrain	399.1	399.1	359.2	239.5	39.9
Fugitives	TTA_Volume	Flat Terrain	8029.0	8029.0	7226.0	4817.0	802.9

Table 24.B. TAP Modeling Results

Toxic Air Pollutant	CAS	Averaging Period	Operating Case[a]	Model Emissions (hourly, averaged over period) (g/s)	Modeled Concentration[a] ($\mu g/m^3$)	Maximum Modeled Concentration ($\mu g/m^3$)	ASIL ($\mu g/m^3$)	Above ASIL? (Yes/No)
Diesel Particulate	205-99-2	year	Generator	7.62E-05	1.30E-03	1.30E-03	0.00330	No
Formaldehyde	50-0-0	year	Generator	2.86E-04	0.00	0.09	0.17	No
			Normal Case	0.000	0.04			
			Start-Up (Commissioning)	0.001	0.04			
			Start-Up (Restart After Shutdown)	0.001	0.08			
			Shutdown	0.000	0.02			
			Main Fractionator Reflux Failure	0.000	1.65E-03			
Mercury, elemental	7439-97-6	year	Generator	1.45E-06	1.49E-04	1.49E-04	0.03	No
Acrolein	107-02-8	24-hr	Generator	2.46E-05	2.52E-03	6.80E-03	0.35	No
			Normal Case	0.000	1.95E-03			
			Start-Up (Commissioning)	0.000	2.15E-03			
			Start-Up (Restart After Shutdown)	0.000	4.28E-03			
			Shutdown	0.000	8.14E-04			
			Main Fractionator Reflux Failure	0.000	8.49E-05			
Nitrogen Dioxide	10102-44-0	1-hr	Generator	2.491	383.59	437.53	470	No
			Normal Case	0.01	11.36			
			Start-Up (Commissioning)	0.02	16.48			
			Start-Up (Restart After Shutdown)	0.05	29.33			
			Shutdown	0.14	53.95			
			Main Fractionator Reflux Failure	0.27	17.35			
Carbon Monoxide	630-08-0	1-hr	Generator	0.10	17.13	3,485.12	23,000	No
			Normal Case	0.07	100			
			Start-Up (Commissioning)	0.35	281			
			Start-Up (Restart After Shutdown)	0.79	449			
			Shutdown	4.34	1,679.73			
			Main Fractionator Reflux Failure	0.53	34			
			Fugitives	0.22	1,788.26			

a. Main Fractionator Reflux Failure operating case assumes that operation time is only 10 minutes of a 1-hour averaging period.

Table 24.C. NAAQS Modeling Results - SIL Screening Analysis

NAAQS Air Pollutant	CAS	Averaging Period	Operating Case	Model Emissions (hourly, averaged over period) (g/s)	Modeled Concentration[a] ($\mu g/m^3$)	Maximum Modeled Concentration ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Exceed SIL? (Yes/No)
Carbon Monoxide	630-08-0	8-hr	Generator	0.10	15	1,832	500	Yes
			Normal Case	0.03	39			
			Start-Up (Commissioning)	0.14	101			
			Start-Up (Restart After Shutdown)	0.41	207			
			Shutdown	1.16	50			
			Main Fractionator Reflux Failure	0.53	34			
			Fugitives	0.22	1,609.41			
		1-hr	Generator	0.10	17	3,485	2,000	Yes
			Normal Case	0.07	100			
			Start-Up (Commissioning)	0.35	281			
			Start-Up (Restart After Shutdown)	0.79	449			
			Shutdown	4.34	1,679.73			
			Main Fractionator Reflux Failure	0.53	34			
			Fugitives	0.22	1,788.26			

a. Main Fractionator Reflux Failure operating case assumes that operation time is only 10 minutes of a 1-hour averaging period, and 1 hour of an 8-hour averaging period.

Table 24.D. NAAQS Modeling Results - NAAQS Demonstration

NAAQS Air Pollutant	CAS	Averaging Period	Maximum Emissions Operating Case	Background Concentration ($\mu g/m^3$)	Maximum Modeled Concentration ($\mu g/m^3$)	Maximum Modeled Concentration + Background ($\mu g/m^3$)	NAAQS Limit ($\mu g/m^3$)	Exceed NAAQS? (Yes/No)
Carbon Monoxide	630-08-0	8-hr	Generator + Start-Up (Commissioning) + Fugitives	939	1,832	2,772	10,000	No
		1-hr	Generator + Shutdown + Fugitives	1,329	3,485	4,814	40,000	No

APPENDIX D. VENDOR GENERATOR SPECIFICATIONS

These records may be available upon request. To find out if there are more records for this project,
contact Ecology's Public Records Office.
• Online: https://ecology.wa.gov/footer-pages/public-records-requests
• Public Records Officer email: PublicRecordsOfficer@ecy.wa.gov • Call: 360-407-6040

Para averiguar si existen más registros sobre ese proyecto, póngase en contacto con la oficina de
archivos públicos del Departamento de Ecología, envíe un correo electrónico a recordsofficer@ecy.wa.gov, o llame al 360-407-6040

Inventory Details

Configuration Details

Item	AI	Quantity	Material	Description	L/N
100		1	V12 GCAG	V12 GC EPG PKG GEN SET	
	I	1	ACLOE01_I	AIR CLEANER - STANDARD OE 01	
	S	1	ANNR01_S	REMOTE ANNUNCIATOR (GCCP)	
	I	1	BAT2402_I	BATT SET 24V WET 1125CCA 02	
	I	1	BSIFT01_I	BASE - INTEGRAL FUEL TANK 01	
	S	1	BTC20A2_S	BATT CHARGER 20A NFPA	
	I	1	C32DRA0_I	D1000 GC (C32 1000KW) TIER 2	
	I	1	COOL020_I	COOLANT LONG LIFE 20	
	I	1	CT20006_I	CT 2000:5 RATIO	

Item	AI	Quantity	Material	Description	L/N
	I	1	ELSM248_I	ELEC. START MOTOR HEAVY DUTY	
	I	1	EMCCAS5_I	GEN RUNNING & FAULT RELAY	
	S	1	EMCSD20_S	INPUT EXPANSION MODULE	
	I	1	EMPTYPL_I	LEFT SIDE EXTENSION BOX	
	I	1	ENCIML5_I	ENCLOSURE INTERIOR LIGHT 5 DC	
	I	1	ENCSAC1_I	ENCLOSURE SOUND ATTENUATED 01	
	S	1	EXPMD01_S	OUTPUT EXPANSION MODULE	
	S	1	FULSPL1_S	7 GAL FUEL FILL SPILL CONT	
	I	1	GCCP12_I	GCCP1.2 CONTROL PANEL	
	I	1	GFCICS1_I	20A GFCI (CONTROLS SIDE)	
	I	1	GFR001_I	GROUND FAULT RELAY INDICATION	
	I	1	GRD0008_I	GUARD AND SHIELD SYSTEM 08	
	I	1	JWH0241_I	JW HEATER - SINGLE W/PUMP 60HZ	
	I	1	KW01000_I	60 Hz, 1000 EKW W/FAN	
	I	1	LCONL01_I	L FRAME CONN 250-400A LHS 01	
	I	1	LDC100A_I	100A LOAD CENTER	
	I	1	LMS1ASL_I	L 400A LSI 3P UL MO	
	I	1	LUBOD20_I	LUBE OIL DRAIN 20	
	I	1	NGRDC03_I	NEUTRAL GROUND CONNECTION 03	
	I	1	OGPN081_I	E3855L4/1B-2/3-RW-PM 81	
	I	1	PAA1_I	PANEL MOUNTED AUDIBLE ALARM	
	I	1	RCONR02_I	R FRAME CONN 2000-2500A RHS 02	
	I	1	RMS1FSR_I	R 2000A LSI 3P UL MO	
	I	1	SHK0037_I	SPACE HEATER 37	
	I	1	SHO240V_I	240 VOLT SHORE POWER, 60HZ	
	I	1	WIRJW40_I	WIRING GP-JW HEATER 40	
	I	1	IBCSCCB_I	IBC SEISMIC CERT OF COMPLIANCE	
	I	1	PLG641U_I	PLG CELLULAR 4G U	
	I	1	ULLIST_I	UL 2200 LISTED PACKAGE GEN SET	

Item	AI	Quantity	Material	Description	L/N
	I	1	LANENGO_I	ENGLISH INSTRUCTION LANGUAGE	
	I	1	MSCEC72_I	COMMERCIAL BUSINESSES	
	I	1	MSEPGGN_I	GENERAL EPG	
	I	1	MWCODEF_I	STANDBY POWER	
	I	1	NONCSA_I	NO CSA CERTIFICATION	
	I	1	PNLFRHS_I	CONTROL PANEL MOUNTING - RIGHT	
	I	1	STANDBY_I	STANDBY_I	
	I	1	TCVYES_I	ACCEPT - REVIEW LINK IN DESC	
	I	1	60H0480_I	60H0480_I	
	I	1	CERTESE_I	EPA STATIONARY EMERGENCY	
	I	1	GENT105_I	GENT105_I	
	I	1	LANENGC_I	ENGLISH PANEL LANGUAGE	
101	I	1	LF5438	C32 60Hz 1000KW - D1000 GC	
102	I	1	6080719	GENERAL AR	
			Serial No.:	(GN700263)	
103	I	1	6034725	ENGINE AR-COMPL	
			Serial No.:	(PRH10421)	
104	I	1	9Y8156	NOTE - STAMP FOR STANDBY POWER	
105	I	1	3L0028	NAMEPLATE	
106	I	1	6347161	FILM GP	
107	I	1	5N9597	VOLTAGE INDICATOR 480V, 60HZ	
108	I	1	LF5649	GENERATOR AR-E3855L4-M FRAME	
109	I	1	6145656	GENERATOR AR-PWR	
			Serial No.:	(XJ802098)	
110	I	1	5P2506	LITERATURE - ENGLISH	
111	I	1	0V1065	END USE: EPG RETAIL	
112	I	1	LF5656	DSE6310 CONTROL PANEL	
113	I	1	LF5580	CELL TELEMATICS-PLG641 NA-ENCL	

Item	AI	Quantity	Material	Description
114	I	1	LS3836	INPUT EXPANSION MODULE
115	I	1	LS3837	OUTPUT EXPANSION MODULE
116	I	1	LS3834	REMOTE ANNUNCIATORS
117	I	1	6031981	WIRING GP
118	I	1	6015733	CONNECTION GP
119	I	1	6018432	WIRING GP
120	I	1	6041870	RELAY GP
121	I	1	LS3894	AUDIABLE ALARM GP
122	I	1	6000521	CONNECTION GP
123	I	1	6038120	CABLE GP-ELEC
124	I	1	LF5662	R 2000A LSI 3P UL MO BREAKER A
125	I	1	LF5669	L 400A LSI 3P UL MO BREAKER AS
126	I	1	6020245	CONNECTION GP
127	I	1	LF5693	250/400A-M GENERATORS CONNECTI
128	I	1	LF5691	LEFT SIDE EXTENSION BOX
129	I	1	LF6083	SOUND ATTEN ENCLOSURE-1000KW G
130	I	1	LF5616	EXH & ATAAC INSULATION-NON-SPU
131	I	1	LF5697	DC LIGHTING PACKAGE
132	I	1	LF5686	BASE-INTEGRAL FUEL TANK-NON-SP
133	S	1	4306294	CONTAINMENT GP-FLUIDS
134	I	1	6051997	CLEANER GP-AIR-D
135	I	1	6076063	DRAIN GP-OIL
136	I	1	LF5701	STANDARD BATTERY GP-ENCLOSED G
137	S	1	2860177	CHARGER-BATTERY
138	I	1	LS0328	ELECTRIC STARTING MOTOR-HEAVY
139	I	1	LF5704	JW HEATER-60HZ
140	I	1	6116740	WIRING GP
141	I	1	6030569	WIRING GP
142	I	1	LF5960	V12 NON-SPUR RADIATOR ENCLOSUR

Item	Al	Quantity	Material	Description
143	I	1	PP6050	1502BHP 1000 EKW WF@1800RPM-60
500	I	1	0V2329	PRODUCTION CORRECTION
501	I	1	6167295	FASTENER GP

With the Following Configuration

Parameter	Value
POWER FACTOR	0.80
POWER FACTOR	0.80
ENGINE PERFORMANCE SPEC	1120 BKW @ 1800RPM(STANDBY)
ENGINE PERFORMANCE SPEC	0K-8987
REMOTE ANNUNCIATOR (GCCP)	1
KW	1,000.0
KW	1,000.0
TEST CSTIC FOR KVA TEST	1,136.36
KVA	1,250.00
KVA	1,250.00
AMPS (FULL LOAD CURRENT)	1,504
AMPS (FULL LOAD CURRENT)	1,504
ALTITUDE (M ABOVE SEA LEVEL)	100.0
ALTITUDE (M ABOVE SEA LEVEL)	100.0
RPM	1800RPM_I
RPM	1800RPM
CT RATIO	2000/5A
CURRENT TRANSFORMER RATIO	2000/5A
ALTERNATOR IP RATING	IP22 PROTECTION
ALTERNATOR IP RATING	22
DC VOLTAGE	24V
TEMPERATURE (DEGREE CELSIUS)	25

Parameter	Value
TEMPERATURE (DEGREES CELSIUS)	25
LINE TO NEUTRAL VOLTAGE	277
LINE TO NEUTRAL VOLTAGE	277
PHASE	3
PHASE	3 PHASE
LINE TO LINE VOLTAGE	480
LINE TO LINE VOLTAGE	480
NO OF WIRES-ALT CONN	4WIRE
NO OF WIRES-ALT CONN	4 WIRE
FREQUENCY	60
FREQUENCY	60 HZ
VOLTAGE OPTION	60H0480_I
VOLTAGE OPTION	60HZ 480 VOLT (WYE)
TARIFF (COMMODITY) CODE	Output> 750kVA <= 2000kVA
AIR CLEANER (ENGINE)	AIR CLEANER - STANDARD OE 01
GOVERNOR TYPE	ADEMA4_I
GOVERNOR TYPE	ADEM A4 GOVERNOR
AUTOMATIC VOLTAGE REGULATOR	AVRSTD1_I
VOLTAGE REGULATOR	STANDARD VOLTAGE REGULATOR 01
BATTERY OPTIONS	BAT2402_I
BATTERY OPTIONS	BATT SET 24V WET 1125CCA 02
BASE TYPE (MOUNTING OPTION)	BSIFT01_I
BASE TYPE (MOUNTING OPTION)	BASE - INTEGRAL FUEL TANK 01
BATTERY CHARGERS	BATT CHARGER 20A NFPA
ENGINE MODEL	C32
ENGINE MODEL	C32
CONFIGURATION	D1000 GC (C32 1000KW) TIER 2
RATING PLATE - GENSET	CATERPILLAR
BRAND	CATERPILLAR

Parameter	Value
DIGITAL INPUT #04	GENERATOR CB OPEN (NFUW 4.4)
PGS EMISSION CERTIFICATION	EPA STATIONARY EMERGENCY
RELAY #08	COMMON ALARM
RELAY #06	GEN RUN RELAY - NFUW PSPS
RELAY #03	COMMON SHUTDOWN
RELAY #05	COMMON WARNING
COOLANT	COOLANT LONG LIFE 20
CURRENT TRANSFORMER	CT 2000:5 RATIO
PGS NUMBER CODE	D1000GC
PGS CODE / GENSET MODEL	D1000GC
PANEL MODULE TYPE	DEEPSEA
ALTERNATOR SERIES	E3800
ALTERNATOR MODEL	E3855L4/1B
ALTERNATOR MODEL	E3855L4/1B
ENGINE TYPE	C32 ELECTRONIC ENG - SPUR
STARTERS	ELEC. START MOTOR HEAVY DUTY
GEN RUNNING & FAULT RELAY	GEN RUNNING & FAULT RELAY
LOCAL DISCRETE I/O PACKAGE	INPUT EXPANSION MODULE
SIDE EXT BOX LEFT	LEFT SIDE EXTENSION BOX
INTERIOR MAINTENANCE LIGHT	ENCLOSURE INTERIOR LIGHT 5 DC
ENCLOSURE	ENCLOSURE SOUND ATTENUATED 01
ENCLOSURE	ENCLOSURE SOUND ATTENUATED 01
RELAY #07	ENCLOSURE LIGHT - NFUW PSPS
DIGITAL INPUT #05	DC ENCLOSURE LIGHT - NFUW PSPS
EXTERNAL CONTROL GROUP	OUTPUT EXPANSION MODULE
ANALOG INPUT #01	FUEL LEVEL - ALL SDs & WNs
DIGITAL INPUT #02	FUEL TANK LEAK
FUEL TANK OPTIONS	7 GAL FUEL FILL SPILL CONT

Parameter	Value
CONTROL PANEL MODEL PROD	GCCP12_I
CONTROL PANEL MODEL	GCCP1.2 CONTROL PANEL
PANEL TYPE	CAT GC CONTROL PANEL
LEVEL OF CONFIGURATION	GENSET
ALTERNATOR TEMPERATURE RISE	105C TEMP RISE OVER 40C AMB
ALTERNATOR TEMPERATURE RISE	GENT105_I
ANALOG INPUT #04	GND FAULT ANNUNCTN - NFUW PSPS
GFCI AC RECEPTACLE & WIRING	20A GFCI (CONTROLS SIDE)
GROUND FAULT RELAY	GROUND FAULT RELAY INDICATION
MANIFOLD AND TURBO GUARDS	GUARD AND SHIELD SYSTEM 08
SEISMIC CERTIFICATION	IBC SEISMIC CERT OF COMPLIANCE
JACKET WATER HEATER	JW HEATER - SINGLE W/PUMP 60HZ
ENGINE RATING	60 Hz, 1000 EKW W/FAN
GENSET CONTROLLER LANGUAGE	ENGLISH PANEL LANGUAGE
DECAL LANGUAGE	ENGLISH INSTRUCTION LANGUAGE
POWER CONNECTION CABLES-LEFT	L FRAME CONN 250-400A LHS 01
LOAD CENTER	100A LOAD CENTER
2ND CIRCUIT BREAKER	L 400A LSI 3P UL MO
VOLTAGE TYPE	LOW VOLTAGE
CIRCUIT BREAKER RH - TRIP UNIT	LSI TRIP UNIT
LUBE OIL DRAIN	LUBE OIL DRAIN 20
CUSTOMER SEGMENT	COMMERCIAL BUSINESSES
MARKET SEGMENT CODES	GENERAL EPG
MARKET WORK CODE	STANDBY POWER
FUEL VENT KIT	NO FUEL VENT KIT
SHRINK WRAP PROTECTION	NO SHRINK WRAP PROTECTION
EXHAUST FLEX FITTING-ADAPTERS	NO FLEXIBLE FITTING
SPECIAL ALTERNATOR	N
SPECIAL ENCLOSURE	N

Parameter	Value
SPECIAL VOLTAGE	N
SPECIAL RADIATOR (COOLING SYS)	N
SPECIAL CONTROL PANEL	N
SPECIAL BATTERY	N
SPECIAL CIRCUIT BREAKER	N
SPECIAL GOVERNOR	N
SPECIAL BASE (MOUNTING)	N
SPECIAL EXHAUST SYSTEM	N
SPECIAL PAINT COLOUR	N
SPECIAL ENGINE	N
SPECIAL AVR	N
SPECIAL REMOTE FUEL SYSTEM	N
SPECIAL SECONDARY FUEL FILTER	N
SUB BASE FUEL TANK	N
EXHAUST FLANGE	NO EXHAUST FLANGE
SPECIAL TEST	N
SPECIAL NO. OF WIRES-ALT CONN	N
SPECIAL ALT ELECT. CONN.	N
RADIATOR FLANGE	NO DUCT FLANGE REQUIRED
SPECIAL CONTAINER	N
SPECIAL HEAT EXCHANGER	N
SPECIAL PAINT - ALTERNATOR	NOT RELEVANT
SPECIAL PAINT- CIRCUIT BREAKER	NOT RELEVANT
SPECIAL PAINT - ENGINE	NOT RELEVANT
SPECIAL PAINT - ENCLOSURE	NOT RELEVANT
SPECIAL MUFFLER	N
SPECIAL PAINT - BASE	NOT RELEVANT
SPECIAL PAINT - PANEL	NOT RELEVANT

Parameter	Value
ENGINE PERFORMANCE SPEC	N
SPECIAL GENSET SPECIFICATION	N
SPECIAL PGS CODE/ GENSET MODEL	N
SPECIAL ALTERNATOR TEMPERATURE	NOT RELEVANT
SOLUTION SET BUILD INDICATOR	N
EXTENSION BOX COVER	NO EXTENSION BOX COVER
SPECIAL EU "CE" CERTIFICATION	NO SPECIAL CEC
CAT LTP LABEL	N
BATTERY CHARGER FOR PSPS	NO
SPECIAL APPLICATION INDICATOR	N
MECHANICAL SVR BUILD	N
SPECIAL ALTERNATOR IP RATING	NO ALTERNATOR IP RATING
ELECTRICAL SVR BUILD	N
SPECIAL ALT EXCITATION CURRENT	N
1 METER DECIBEL AWEIGHT	N
SPECIAL MASS	N
SPECIAL ALT EXCITATION VOLTAGE	N
NEUTRAL GROUNDING CONNECTIONS	NEUTRAL GROUND CONNECTION 03
EU & GB CERTIFICATION	NO EU(GB) NON-EMISSION CERT
EUROPEAN "CE" CERTIFICATION	NO EU CERTIFICATION
CSA CERTIFICATION	NO CSA CERTIFICATION
LOAD TRANSFER PANEL	NO LOAD TRANSFER PANEL.
TOP CABLE ENTRY LTP	NR
SOLID NEUTRAL LINK (TLINK)	NR
VOLTAGE SENSING TAP (VST)	NR
AUXILIARY CONTACTS (TAUX)	NR
TERMINAL SHROUD LTP (TIP1)	NR
LOAD TRANSFER PANEL OPTION	NR
EXTENDED LOAD TERMINAL (TELT)	NR

Parameter	Value
LIGHTING PROTECTION KIT (TLPR)	NR
IP54 PROTECTION KIT (TIP5)	NR
VLT FR CONTACTS MAIN /GEN TI02	NR
POWER METERING (TMET)	NR
COMMUNICATION MODULE (TCOM)	NR
ALTERNATOR	E3855L4/1B-2/3-RW-PM 81
USER	ORDER PROCESSING
PANEL MOUNTED AUDIBLE ALARM	PANEL MOUNTED AUDIBLE ALARM
TELEMATICS HARDWARE	PLG CELLULAR 4G U
REGULATOR EXCITIATION TYPE	PERMANENT MAGNET
CONTROL PANEL LOCATION	CONTROL PANEL MOUNTING - RIGHT
GENSET SPECIFICATION	PP-6050
GENSET SPECIFICATION	PP-6050
POWER CONNECTION CABLES-RIGHT	R FRAME CONN 2000-2500A RHS 02
1ST CIRCUIT BREAKER	R 2000A LSI 3P UL MO
RELAY #04	SPACE HEATER - NFUW PSPS
SPACE (ALT) HEATER KITS	SPACE HEATER 37
PACKAGE SHORE POWER	240 VOLT SHORE POWER, 60HZ
APPLICATION INDICATOR	STANDBY_I
APPLICATION INDICATOR	STANDBY POWER
ALTERNATOR ELECT. CONNECTION	STAR
ALTERNATOR ELECT. CONN.	STAR
PRODUCT_DIVISION	STANDARD (10)
RADIATOR	STANDARD RADIATOR 05
RADIATOR	STDRAD5_I
TELEMATICS HARDWARE CERTIFIED	ACCEPT - REVIEW LINK IN DESC
UL LISTING	UL 2200 LISTED PACKAGE GEN SET
ALTERNATOR WINDING	6 WIRE WINDING

Parameter	Value
JACKET WATER HEATER WIRING	WIRING GP-JW HEATER 40

CATERPILLAR ENGINE DIVISION
TECHNICAL COMMUNICATIONS GROUP

Installation Drawing Index
AutoCAD 2015 Format

Installation Drawing No. 6213215 chg 00

C32 60HZ 1000KW PACKAGE

Overall Dimensions:

Length = 4173.90 mm

Width = 2000.80 mm

Height = 2221.40 mm

Engine pricing arrangements found on drawing:

LF5438 chg 01

Attachment pricing arrangements found on drawing:

LF5598 chg 02	LF5660 chg 00	LF5668 chg 00
LF5644 chg 00	LF5661 chg 00	LF5669 chg 00
LF5647 chg 00	LF5662 chg 00	LF5670 chg 00
LF5649 chg 00	LF5663 chg 00	LF5691 chg 00
LF5651 chg 00	LF5664 chg 00	LF5692 chg 00
LF5654 chg 00	LF5665 chg 00	LF5698 chg 00
LF5656 chg 00	LF5666 chg 00	6051997 chg 00
LF5657 chg 00	LF5667 chg 00	6070611 chg 01
LF5659 chg 00		

6213215A.dwf = Summary of LF5438 Chg 01 W/ Attachments Shown. (sheet1)

PA and Part Numbers found on this sheet:

LF5657 chg 00	LF5668 chg 00	LF5659 chg 00
LF5644 chg 00	LF5669 chg 00	LF5660 chg 00
LF5647 chg 00	LF5670 chg 00	LF5661 chg 00
LF5649 chg 00	LF5665 chg 00	LF5698 chg 00
LF5651 chg 00	LF5666 chg 00	LF5438 chg 01
LF5654 chg 00	LF5667 chg 00	LF5598 chg 02
LF5656 chg 00	LF5662 chg 00	6051997 chg 00
LF5692 chg 00	LF5663 chg 00	6070611 chg 01
LF5691 chg 00	LF5664 chg 00	

6213215B.dwf = Right side view of LF5438 Chg 01 W/ Attachments Shown. (sheet2)

6213215C.dwf = Front view of LF5438 Chg 01 W/ Attachments Shown. (sheet3)

6213215D.dwf = Left side view of LF5438 Chg 01 W/ Attachments Shown. (sheet4)

6213215E.dwf = Rear view of LF5438 Chg 01 W/ Attachments Shown. (sheet5)

6213215F.dwf = Top view of LF5438 Chg 01 W/ Attachments Shown. (sheet6)

6213215G.dwf = Detail of Battery GP LF5698 Chg 00; Detail of Exhaust. (sheet7)

6213215H.dwf = Detail of Circuit Breaker Connections LF5664 Chg 00, LF5663 Chg 00 and LF5659 Chg 00. (sheet8)

PA and Part Numbers found on this sheet:

LF5663 chg 00	LF5664 chg 00	LF5659 chg 00

6213215I.dwf = Detail of Circuit Breaker Connections LF5662 Chg 00 and LF5665 Chg 00. (sheet9)

PA and Part Numbers found on this sheet:

LF5665 chg 00	LF5662 chg 00

6213215J.dwf = Detail of Circuit Breaker Connections LF5660 Chg 00, LF5660 Chg 00, LF5666 Chg 00 and LF5667 Chg 00. (sheet10)

PA and Part Numbers found on this sheet:

LF5666 chg 00	LF5660 chg 00	LF5661 chg 00
LF5667 chg 00		

These records may be available upon request. To find out if there are more records for this project, contact Ecology's Public Records Office.
• Online: https://ecology.wa.gov/footer-pages/public-records-requests
• Public Records Officer email: PublicRecordsOfficer@ecy.wa.gov • Call: 360-407-6040

Para averiguar si existen más registros sobre ese proyecto, póngase en contacto con la oficina de archivos públicos del Departamento de Ecología, envíe un correo electrónico a recordsofficer@ecy.wa.gov, o llame al 360-407-6040

APPENDIX E. MODELING FILES

AERSCREEN 21112 / AERMOD 22112 03/25/25
13:19:03

TITLE: TWELVE EGEN

********** STACK PARAMETERS **********

SOURCE EMISSION RATE: 1.0000 g/s 7.937 lb/hr
STACK HEIGHT: 14.02 meters 46.00 feet
STACK INNER DIAMETER: 0.320 meters 12.60 inches
PLUME EXIT TEMPERATURE: 751.0 K 892.1 Deg F
PLUME EXIT VELOCITY: 46.500 m/s 152.56 ft/s
STACK AIR FLOW RATE: 7924 ACFM
RURAL OR URBAN: RURAL

INITIAL PROBE DISTANCE = 10000. meters 32808. feet

********** BUILDING DOWNWASH PARAMETERS **********

BUILDING HEIGHT: 8.3 meters 27.3 feet
MAX BUILDING DIMENSION: 40.2 meters 132.0 feet
MIN BUILDING DIMENSION: 24.4 meters 80.0 feet
BUILDING ORIENTATION TO NORTH: 0. degrees
STACK DIRECTION FROM CENTER: 143. degrees
STACK DISTANCE FROM CENTER: 34.3 meters 112.5 feet

********** FLOW SECTOR ANALYSIS **********
25 meter receptor spacing: 4. meters - 5000. meters
50 meter receptor spacing: 5050. meters - 10000. meters

FLOW SECTOR	BUILD WIDTH	BUILD LENGTH	XBADJ	YBADJ	MAX 1-HR CONC	DIST (m)	TEMPORAL PERIOD
10	0.00	0.00	0.00	0.00	37.50	150.0	SUM
20	0.00	0.00	0.00	0.00	37.50	150.0	SUM
30	0.00	0.00	0.00	0.00	37.50	150.0	SUM
40	0.00	0.00	0.00	0.00	37.50	150.0	SUM
50	0.00	0.00	0.00	0.00	37.50	150.0	SUM
60	0.00	0.00	0.00	0.00	37.50	150.0	SUM
70	0.00	0.00	0.00	0.00	37.50	150.0	SUM

80	0.00	0.00	0.00	0.00	37.50	150.0	SUM
90	0.00	0.00	0.00	0.00	37.50	150.0	SUM
100	43.85	31.00	-40.66	23.30	61.52	150.0	WIN
110	46.14	36.67	-47.16	18.58	66.62	150.0	WIN
120	47.03	41.23	-52.22	13.29	62.97	150.0	WIN
130	46.49	44.54	-55.71	7.60	60.39	150.0	WIN
140	44.54	46.49	-57.49	1.68	58.50	150.0	WIN
150	41.23	47.03	-57.54	-4.30	56.67	150.0	WIN
160	36.67	46.14	-55.83	-10.14	52.99	125.0	WIN
170	31.00	43.85	-52.43	-15.67	50.59	125.0	WIN
180	0.00	0.00	0.00	0.00	37.50	150.0	SUM
190	0.00	0.00	0.00	0.00	37.50	150.0	SUM
200	0.00	0.00	0.00	0.00	37.50	150.0	SUM
210	0.00	0.00	0.00	0.00	37.50	150.0	SUM
220	0.00	0.00	0.00	0.00	37.50	150.0	SUM
230	0.00	0.00	0.00	0.00	37.50	150.0	SUM
240	0.00	0.00	0.00	0.00	37.50	150.0	SUM
250	0.00	0.00	0.00	0.00	37.50	150.0	SUM
260	0.00	0.00	0.00	0.00	37.50	150.0	SUM
270	0.00	0.00	0.00	0.00	37.50	150.0	SUM
280	43.85	31.00	9.66	-23.30	96.25	50.0	SUM
290	46.14	36.67	10.49	-18.58	94.33	50.0	SUM
300*	47.03	41.23	11.00	-13.29	162.0	75.0	AUT
310	46.49	44.54	11.17	-7.60	145.7	75.0	WIN
320	44.54	46.49	11.00	-1.68	146.4	75.0	AUT
330	41.23	47.03	10.51	4.30	136.4	75.0	SUM
340	36.67	46.14	9.69	10.14	158.8	75.0	SUM
350	31.00	43.85	8.57	15.67	83.63	75.0	SUM
360	0.00	0.00	0.00	0.00	37.50	150.0	SUM

* = worst case flow sector

********** MAKEMET METEOROLOGY PARAMETERS **********

MIN/MAX TEMPERATURE: 250.0 / 320.0 (K)

MINIMUM WIND SPEED: 0.5 m/s

ANEMOMETER HEIGHT: 10.000 meters

SURFACE CHARACTERISTICS INPUT: AERMET SEASONAL TABLES

DOMINANT SURFACE PROFILE: Cultivated Land
DOMINANT CLIMATE TYPE: Average Moisture
DOMINANT SEASON: Autumn

ALBEDO: 0.18
BOWEN RATIO: 0.70
ROUGHNESS LENGTH: 0.050 (meters)

SURFACE FRICTION VELOCITY (U*) NOT ADUSTED

METEOROLOGY CONDITIONS USED TO PREDICT OVERALL MAXIMUM IMPACT

YR MO DY JDY HR
-- -- -- --- --
10 01 22 22 13

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS
55.34	0.470	0.600	0.020	137.	741.	-164.2	0.050	0.70	0.18	6.00

HT	REF TA	HT
10.0	285.0	2.0

WIND SPEED AT STACK HEIGHT (non-downwash): 6.3 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 14.0 meters
ESTIMATED FINAL PLUME RISE (non-downwash): 16.1 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash): 30.1 meters

METEOROLOGY CONDITIONS USED TO PREDICT AMBIENT BOUNDARY IMPACT

YR MO DY JDY HR
-- -- -- --- --
10 01 02 22 12

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS
4.00	0.042	0.100	0.020	9.	20.	-1.7	0.010	1.50	0.60	0.50

HT	REF TA	HT
10.0	285.0	2.0

WIND SPEED AT STACK HEIGHT (non-downwash): 0.5 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 14.0 meters
ESTIMATED FINAL PLUME RISE (non-downwash): 186.0 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash): 200.1 meters

********** AERSCREEN AUTOMATED DISTANCES **********
OVERALL MAXIMUM CONCENTRATIONS BY DISTANCE

DIST (m)	MAXIMUM 1-HR CONC (ug/m3)	DIST (m)	MAXIMUM 1-HR CONC (ug/m3)

3.70	0.2669	3775.00	8.508
25.00	45.24	3800.00	8.470
50.00	127.0	3825.00	8.433
75.00	162.0	3850.00	8.396
100.00	78.49	3875.00	8.359
125.00	76.82	3900.00	8.323
150.00	73.35	3925.00	8.286
175.00	71.80	3950.00	8.250
200.00	72.11	3975.00	8.214
225.00	72.04	4000.00	8.179
250.00	71.09	4025.00	8.144
275.00	69.83	4050.00	8.109
300.00	67.25	4075.00	8.074
325.00	64.98	4100.00	8.039
350.00	62.79	4125.00	8.005
375.00	60.69	4150.00	7.971
400.00	58.51	4175.00	7.937
425.00	56.16	4200.00	7.904
450.00	53.69	4225.00	7.871
475.00	51.10	4250.00	7.838
500.00	48.45	4275.00	7.805
525.00	45.74	4300.00	7.772
550.00	43.03	4325.00	7.740
575.00	40.35	4350.00	7.708
600.00	37.68	4375.00	7.676
625.00	35.05	4400.00	7.644
650.00	32.46	4425.00	7.613
675.00	31.36	4450.00	7.582
700.00	30.27	4475.00	7.551
725.00	29.18	4500.00	7.520
750.00	28.08	4525.00	7.490
775.00	26.98	4550.00	7.460
800.00	26.10	4575.00	7.430
825.00	25.24	4600.00	7.400
850.00	24.37	4625.00	7.370
875.00	23.50	4650.00	7.341
900.00	22.64	4675.00	7.312
925.00	22.05	4700.00	7.283
950.00	21.48	4725.00	7.254
975.00	20.91	4750.00	7.226
1000.00	20.34	4775.00	7.197
1025.00	19.77	4800.00	7.169
1050.00	19.20	4825.00	7.141
1075.00	18.63	4850.00	7.114
1100.00	18.06	4875.00	7.086
1125.00	17.55	4900.00	7.059
1150.00	17.38	4925.00	7.032
1175.00	17.22	4950.00	7.005
1200.00	17.05	4975.00	6.978
1225.00	16.89	5000.00	6.952
1250.00	16.72	5050.00	6.899
1275.00	16.56	5100.00	6.848
1300.00	16.40	5150.00	6.797

1325.00	16.24	5200.00	6.747
1350.00	16.08	5250.00	6.697
1375.00	15.92	5300.00	6.648
1400.00	15.77	5350.00	6.600
1425.00	15.62	5400.00	6.553
1450.00	15.47	5450.00	6.506
1475.00	15.32	5500.00	6.460
1500.00	15.17	5550.00	6.414
1525.00	15.02	5600.00	6.369
1550.00	14.88	5650.00	6.332
1575.00	14.74	5700.00	6.295
1600.00	14.60	5750.00	6.259
1625.00	14.47	5800.00	6.223
1650.00	14.33	5850.00	6.187
1675.00	14.20	5900.00	6.152
1700.00	14.07	5950.00	6.117
1725.00	13.94	6000.00	6.083
1750.00	13.82	6050.00	6.049
1775.00	13.69	6100.00	6.015
1800.00	13.57	6150.00	5.982
1825.00	13.45	6200.00	5.949
1850.00	13.34	6250.00	5.916
1875.00	13.22	6300.00	5.884
1900.00	13.11	6350.00	5.852
1925.00	12.99	6400.00	5.820
1950.00	12.88	6450.00	5.789
1975.00	12.78	6500.00	5.758
2000.00	12.67	6550.00	5.727
2025.00	12.57	6600.00	5.697
2050.00	12.46	6650.00	5.667
2075.00	12.36	6700.00	5.637
2100.00	12.26	6750.00	5.608
2125.00	12.16	6800.00	5.579
2150.00	12.07	6850.00	5.550
2175.00	11.97	6900.00	5.521
2200.00	11.88	6950.00	5.493
2225.00	11.79	7000.00	5.465
2250.00	11.70	7050.00	5.437
2275.00	11.61	7100.00	5.410
2300.00	11.52	7150.00	5.383
2325.00	11.44	7200.00	5.356
2350.00	11.35	7250.00	5.329
2375.00	11.27	7300.00	5.303
2400.00	11.19	7350.00	5.277
2425.00	11.11	7400.00	5.251
2450.00	11.03	7450.00	5.225
2475.00	10.95	7500.00	5.200
2500.00	10.87	7550.00	5.175
2525.00	10.79	7600.00	5.150
2550.00	10.72	7650.00	5.125
2575.00	10.65	7700.00	5.101
2600.00	10.57	7750.00	5.077
2625.00	10.51	7800.00	5.053
2650.00	10.46	7850.00	5.029

2675.00	10.41	7900.00	5.005
2700.00	10.37	7950.00	4.982
2725.00	10.32	8000.00	4.959
2750.00	10.27	8050.00	4.936
2775.00	10.22	8100.00	4.914
2800.00	10.18	8150.00	4.891
2825.00	10.13	8200.00	4.869
2850.00	10.08	8250.00	4.847
2875.00	10.04	8300.00	4.825
2900.00	9.989	8350.00	4.803
2925.00	9.943	8400.00	4.782
2950.00	9.897	8450.00	4.761
2975.00	9.851	8500.00	4.739
3000.00	9.805	8550.00	4.719
3025.00	9.759	8600.00	4.698
3050.00	9.714	8650.00	4.677
3075.00	9.669	8700.00	4.657
3100.00	9.624	8750.00	4.637
3125.00	9.579	8800.00	4.617
3150.00	9.535	8850.00	4.597
3175.00	9.491	8900.00	4.577
3200.00	9.447	8950.00	4.558
3225.00	9.403	9000.00	4.538
3250.00	9.359	9050.00	4.519
3275.00	9.316	9100.00	4.500
3300.00	9.273	9150.00	4.481
3325.00	9.231	9200.00	4.463
3350.00	9.188	9250.00	4.444
3375.00	9.146	9300.00	4.426
3400.00	9.104	9350.00	4.407
3425.00	9.063	9400.00	4.389
3450.00	9.021	9450.00	4.371
3475.00	8.980	9500.00	4.353
3500.00	8.939	9550.00	4.336
3525.00	8.899	9600.00	4.318
3550.00	8.858	9650.00	4.312
3575.00	8.818	9700.00	4.306
3600.00	8.779	9750.00	4.299
3625.00	8.739	9800.00	4.293
3650.00	8.700	9850.00	4.286
3675.00	8.661	9900.00	4.279
3700.00	8.622	9950.00	4.273
3725.00	8.584	10000.00	4.266
3750.00	8.546		

********** AERSCREEN MAXIMUM IMPACT SUMMARY **********

CALCULATION	MAXIMUM 1-HOUR CONC	SCALED 3-HOUR CONC	SCALED 8-HOUR CONC	SCALED 24-HOUR CONC	SCALED ANNUAL CONC

PROCEDURE	(ug/m3)	(ug/m3)	(ug/m3)	(ug/m3)	(ug/m3)
FLAT TERRAIN	171.1	171.1	154.0	102.7	17.11

DISTANCE FROM SOURCE 74.00 meters directed toward 300 degrees

IMPACT AT THE AMBIENT BOUNDARY	0.2669	0.2669	0.2402	0.1601	0.2669E-01

DISTANCE FROM SOURCE 3.70 meters directed toward 10 degrees

AERSCREEN 21112 / AERMOD 22112 03/25/25
10:16:49

TITLE: TWELVE EGEN_NO2

********** STACK PARAMETERS **********

SOURCE EMISSION RATE: 1.0000 g/s 7.937 lb/hr
STACK HEIGHT: 14.02 meters 46.00 feet
STACK INNER DIAMETER: 0.320 meters 12.60 inches
PLUME EXIT TEMPERATURE: 751.0 K 892.1 Deg F
PLUME EXIT VELOCITY: 46.500 m/s 152.56 ft/s
STACK AIR FLOW RATE: 7924 ACFM
RURAL OR URBAN: RURAL

INITIAL PROBE DISTANCE = 10000. meters 32808. feet

NOx TO NO2 CHEMISTRY PVMRM
NO2/NOx IN-STACK RATIO: 0.10000
OZONE BACKGROUND CONCENTRATION: 0.52000E+02 PPB

********** BUILDING DOWNWASH PARAMETERS **********

BUILDING HEIGHT: 8.3 meters 27.3 feet
MAX BUILDING DIMENSION: 40.2 meters 132.0 feet
MIN BUILDING DIMENSION: 24.4 meters 80.0 feet
BUILDING ORIENTATION TO NORTH: 0. degrees
STACK DIRECTION FROM CENTER: 143. degrees
STACK DISTANCE FROM CENTER: 34.3 meters 112.5 feet

********** FLOW SECTOR ANALYSIS **********
25 meter receptor spacing: 4. meters - 5000. meters
50 meter receptor spacing: 5050. meters - 10000. meters

FLOW SECTOR	BUILD WIDTH	BUILD LENGTH	XBADJ	YBADJ	MAX 1-HR CONC	DIST (m)	TEMPORAL PERIOD
10	0.00	0.00	0.00	0.00	33.02	175.0	SUM
20	0.00	0.00	0.00	0.00	33.02	175.0	SUM

30	0.00	0.00	0.00	0.00	33.02	175.0	SUM
40	0.00	0.00	0.00	0.00	33.02	175.0	SUM
50	0.00	0.00	0.00	0.00	33.02	175.0	SUM
60	0.00	0.00	0.00	0.00	33.02	175.0	SUM
70	0.00	0.00	0.00	0.00	33.02	175.0	SUM
80	0.00	0.00	0.00	0.00	33.02	175.0	SUM
90	0.00	0.00	0.00	0.00	33.02	175.0	SUM
100	43.85	31.00	-40.66	23.30	55.37	150.0	WIN
110	46.14	36.67	-47.16	18.58	59.96	150.0	WIN
120	47.03	41.23	-52.22	13.29	56.68	150.0	WIN
130	46.49	44.54	-55.71	7.60	54.35	150.0	WIN
140	44.54	46.49	-57.49	1.68	52.65	150.0	WIN
150	41.23	47.03	-57.54	-4.30	51.00	150.0	WIN
160	36.67	46.14	-55.83	-10.14	47.69	125.0	WIN
170	31.00	43.85	-52.43	-15.67	45.53	125.0	WIN
180	0.00	0.00	0.00	0.00	33.02	175.0	SUM
190	0.00	0.00	0.00	0.00	33.02	175.0	SUM
200	0.00	0.00	0.00	0.00	33.02	175.0	SUM
210	0.00	0.00	0.00	0.00	33.02	175.0	SUM
220	0.00	0.00	0.00	0.00	33.02	175.0	SUM
230	0.00	0.00	0.00	0.00	33.02	175.0	SUM
240	0.00	0.00	0.00	0.00	33.02	175.0	SUM
250	0.00	0.00	0.00	0.00	33.02	175.0	SUM
260	0.00	0.00	0.00	0.00	33.02	175.0	SUM
270	0.00	0.00	0.00	0.00	33.02	175.0	SUM
280	43.85	31.00	9.66	-23.30	86.63	50.0	SUM
290	46.14	36.67	10.49	-18.58	84.89	50.0	SUM
300*	47.03	41.23	11.00	-13.29	145.8	75.0	AUT
310	46.49	44.54	11.17	-7.60	131.1	75.0	WIN
320	44.54	46.49	11.00	-1.68	131.8	75.0	AUT
330	41.23	47.03	10.51	4.30	122.8	75.0	SUM
340	36.67	46.14	9.69	10.14	142.9	75.0	SUM
350	31.00	43.85	8.57	15.67	75.27	75.0	SUM
360	0.00	0.00	0.00	0.00	33.02	175.0	SUM

* = worst case flow sector

********** MAKEMET METEOROLOGY PARAMETERS **********

MIN/MAX TEMPERATURE: 250.0 / 320.0 (K)

MINIMUM WIND SPEED: 0.5 m/s

ANEMOMETER HEIGHT: 10.000 meters

SURFACE CHARACTERISTICS INPUT: AERMET SEASONAL TABLES

DOMINANT SURFACE PROFILE: Cultivated Land
DOMINANT CLIMATE TYPE: Average Moisture
DOMINANT SEASON: Autumn

ALBEDO: 0.18
BOWEN RATIO: 0.70
ROUGHNESS LENGTH: 0.050 (meters)

SURFACE FRICTION VELOCITY (U*) NOT ADUSTED

METEOROLOGY CONDITIONS USED TO PREDICT OVERALL MAXIMUM IMPACT

YR	MO	DY	JDY	HR
10	01	22	22	13

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS
55.34	0.470	0.600	0.020	137.	741.	-164.2	0.050	0.70	0.18	6.00

HT	REF TA	HT
10.0	285.0	2.0

WIND SPEED AT STACK HEIGHT (non-downwash): 6.3 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 14.0 meters
ESTIMATED FINAL PLUME RISE (non-downwash): 16.1 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash): 30.1 meters

METEOROLOGY CONDITIONS USED TO PREDICT AMBIENT BOUNDARY IMPACT

YR	MO	DY	JDY	HR
10	01	01	22	12

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS
2.88	0.041	0.100	0.020	11.	19.	-1.9	0.010	1.50	0.60	0.50

HT	REF TA	HT
10.0	250.0	2.0

WIND SPEED AT STACK HEIGHT (non-downwash): 0.5 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 14.0 meters
ESTIMATED FINAL PLUME RISE (non-downwash): 198.6 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash): 212.6 meters

********** AERSCREEN AUTOMATED DISTANCES **********
OVERALL MAXIMUM CONCENTRATIONS BY DISTANCE

DIST (m)	MAXIMUM 1-HR CONC (ug/m3)	DIST (m)	MAXIMUM 1-HR CONC (ug/m3)
3.70	0.1486E-01	3775.00	7.657
25.00	40.72	3800.00	7.623
50.00	114.3	3825.00	7.590
75.00	145.8	3850.00	7.556
100.00	70.36	3875.00	7.523
125.00	64.92	3900.00	7.490
150.00	60.06	3925.00	7.458
175.00	55.75	3950.00	7.425
200.00	52.79	3975.00	7.393
225.00	51.30	4000.00	7.361
250.00	49.59	4025.00	7.329
275.00	47.44	4050.00	7.298
300.00	45.48	4075.00	7.266
325.00	43.94	4100.00	7.235
350.00	42.46	4125.00	7.205
375.00	41.05	4150.00	7.174
400.00	39.57	4175.00	7.144
425.00	37.98	4200.00	7.113
450.00	36.31	4225.00	7.083
475.00	34.56	4250.00	7.054
500.00	32.76	4275.00	7.024
525.00	30.93	4300.00	6.995
550.00	29.12	4325.00	6.966
575.00	27.40	4350.00	6.937
600.00	25.74	4375.00	6.908
625.00	24.12	4400.00	6.880
650.00	22.54	4425.00	6.852
675.00	21.00	4450.00	6.824
700.00	19.51	4475.00	6.796
725.00	18.75	4500.00	6.768
750.00	18.97	4525.00	6.741
775.00	18.64	4550.00	6.714
800.00	18.30	4575.00	6.687
825.00	17.97	4600.00	6.660
850.00	17.67	4625.00	6.633
875.00	17.37	4650.00	6.607
900.00	17.07	4675.00	6.581
925.00	16.91	4700.00	6.555
950.00	16.79	4725.00	6.529
975.00	16.65	4750.00	6.503
1000.00	16.52	4775.00	6.478
1025.00	16.38	4800.00	6.452
1050.00	16.23	4825.00	6.427
1075.00	16.09	4850.00	6.402
1100.00	15.94	4875.00	6.378
1125.00	15.79	4900.00	6.353
1150.00	15.65	4925.00	6.329
1175.00	15.50	4950.00	6.304

1200.00	15.35	4975.00	6.280
1225.00	15.20	5000.00	6.257
1250.00	15.05	5050.00	6.209
1275.00	14.91	5100.00	6.163
1300.00	14.76	5150.00	6.117
1325.00	14.62	5200.00	6.072
1350.00	14.47	5250.00	6.027
1375.00	14.33	5300.00	5.983
1400.00	14.19	5350.00	5.940
1425.00	14.06	5400.00	5.897
1450.00	13.92	5450.00	5.855
1475.00	13.78	5500.00	5.814
1500.00	13.65	5550.00	5.773
1525.00	13.52	5600.00	5.732
1550.00	13.39	5650.00	5.698
1575.00	13.27	5700.00	5.665
1600.00	13.14	5750.00	5.633
1625.00	13.02	5800.00	5.600
1650.00	12.90	5850.00	5.568
1675.00	12.78	5900.00	5.537
1700.00	12.66	5950.00	5.505
1725.00	12.55	6000.00	5.474
1750.00	12.44	6050.00	5.444
1775.00	12.32	6100.00	5.413
1800.00	12.22	6150.00	5.384
1825.00	12.11	6200.00	5.354
1850.00	12.00	6250.00	5.324
1875.00	11.90	6300.00	5.295
1900.00	11.80	6350.00	5.267
1925.00	11.69	6400.00	5.238
1950.00	11.60	6450.00	5.210
1975.00	11.50	6500.00	5.182
2000.00	11.40	6550.00	5.154
2025.00	11.31	6600.00	5.127
2050.00	11.22	6650.00	5.100
2075.00	11.13	6700.00	5.073
2100.00	11.04	6750.00	5.047
2125.00	10.95	6800.00	5.021
2150.00	10.86	6850.00	4.995
2175.00	10.78	6900.00	4.969
2200.00	10.69	6950.00	4.944
2225.00	10.61	7000.00	4.918
2250.00	10.53	7050.00	4.893
2275.00	10.45	7100.00	4.869
2300.00	10.37	7150.00	4.844
2325.00	10.29	7200.00	4.820
2350.00	10.22	7250.00	4.796
2375.00	10.14	7300.00	4.773
2400.00	10.07	7350.00	4.749
2425.00	9.995	7400.00	4.726
2450.00	9.923	7450.00	4.703
2475.00	9.853	7500.00	4.680
2500.00	9.783	7550.00	4.657
2525.00	9.714	7600.00	4.635

2550.00	9.647	7650.00	4.613
2575.00	9.580	7700.00	4.591
2600.00	9.515	7750.00	4.569
2625.00	9.450	7800.00	4.547
2650.00	9.387	7850.00	4.526
2675.00	9.324	7900.00	4.505
2700.00	9.262	7950.00	4.484
2725.00	9.201	8000.00	4.463
2750.00	9.141	8050.00	4.443
2775.00	9.202	8100.00	4.422
2800.00	9.159	8150.00	4.402
2825.00	9.117	8200.00	4.382
2850.00	9.074	8250.00	4.362
2875.00	9.032	8300.00	4.342
2900.00	8.990	8350.00	4.323
2925.00	8.949	8400.00	4.304
2950.00	8.907	8450.00	4.285
2975.00	8.866	8500.00	4.266
3000.00	8.824	8550.00	4.247
3025.00	8.783	8600.00	4.228
3050.00	8.742	8650.00	4.210
3075.00	8.702	8700.00	4.191
3100.00	8.661	8750.00	4.173
3125.00	8.621	8800.00	4.155
3150.00	8.581	8850.00	4.137
3175.00	8.541	8900.00	4.119
3200.00	8.502	8950.00	4.102
3225.00	8.463	9000.00	4.084
3250.00	8.424	9050.00	4.067
3275.00	8.385	9100.00	4.050
3300.00	8.346	9150.00	4.033
3325.00	8.308	9200.00	4.016
3350.00	8.269	9250.00	4.000
3375.00	8.231	9300.00	3.983
3400.00	8.194	9350.00	3.967
3425.00	8.156	9400.00	3.950
3450.00	8.119	9450.00	3.934
3475.00	8.082	9500.00	3.918
3500.00	8.045	9550.00	3.902
3525.00	8.009	9600.00	3.886
3550.00	7.973	9650.00	3.881
3575.00	7.937	9700.00	3.875
3600.00	7.901	9750.00	3.869
3625.00	7.865	9800.00	3.863
3650.00	7.830	9850.00	3.858
3675.00	7.795	9900.00	3.852
3700.00	7.760	9950.00	3.845
3725.00	7.726	10000.00	3.839
3750.00	7.691		

********** AERSCREEN MAXIMUM IMPACT SUMMARY **********

CALCULATION PROCEDURE	MAXIMUM 1-HOUR CONC (ug/m3)	SCALED 3-HOUR CONC (ug/m3)	SCALED 8-HOUR CONC (ug/m3)	SCALED 24-HOUR CONC (ug/m3)	SCALED ANNUAL CONC (ug/m3)
FLAT TERRAIN	154.0	154.0	138.6	92.41	15.40

DISTANCE FROM SOURCE 74.00 meters directed toward 300 degrees

IMPACT AT THE AMBIENT BOUNDARY	0.1486E-01	0.1486E-01	0.1338E-01	0.8918E-02	0.1486E-02

DISTANCE FROM SOURCE 3.70 meters directed toward 10 degrees

AERSCREEN 21112 / AERMOD 21112 03/11/25
10:27:18

TITLE: TWELVE ENCLOSED GROUND FLARE - NORMAL

********** STACK PARAMETERS **********

SOURCE EMISSION RATE: 1.0000 g/s 7.937 lb/hr
STACK HEIGHT: 15.24 meters 50.00 feet
STACK INNER DIAMETER: 3.710 meters 146.06 inches
PLUME EXIT TEMPERATURE: 589.0 K 600.5 Deg F
PLUME EXIT VELOCITY: 0.010 m/s 0.03 ft/s
STACK AIR FLOW RATE: 229 ACFM
RURAL OR URBAN: RURAL

FLAGPOLE RECEPTOR HEIGHT: 1.50 meters 4.92 feet

INITIAL PROBE DISTANCE = 10000. meters 32808. feet

********** BUILDING DOWNWASH PARAMETERS **********

BUILDING HEIGHT: 8.3 meters 27.3 feet
MAX BUILDING DIMENSION: 40.2 meters 132.0 feet
MIN BUILDING DIMENSION: 24.4 meters 80.0 feet
BUILDING ORIENTATION TO NORTH: 0. degrees
STACK DIRECTION FROM CENTER: 112. degrees
STACK DISTANCE FROM CENTER: 36.9 meters 120.9 feet

********** FLOW SECTOR ANALYSIS **********
25 meter receptor spacing: 38. meters - 5000. meters
50 meter receptor spacing: 5050. meters - 10000. meters

FLOW SECTOR	BUILD WIDTH	BUILD LENGTH	XBADJ	YBADJ	MAX 1-HR CONC	DIST (m)	TEMPORAL PERIOD
10*	0.00	0.00	0.00	0.00	1456.	50.0	SUM
20	0.00	0.00	0.00	0.00	1456.	50.0	SUM
30	0.00	0.00	0.00	0.00	1456.	50.0	SUM
40	0.00	0.00	0.00	0.00	1456.	50.0	SUM
50	0.00	0.00	0.00	0.00	1456.	50.0	SUM

60	0.00	0.00	0.00	0.00	1456.	50.0	SUM
70	46.14	36.67	-45.84	24.53	1031.	38.3	SUM
80	43.85	31.00	-46.85	19.38	1058.	38.3	SPR
90	40.23	24.38	-46.43	13.64	1058.	38.3	SPR
100	43.85	31.00	-51.59	7.49	1058.	38.3	SPR
110	46.14	36.67	-55.18	1.11	1058.	38.3	SPR
120	47.03	41.23	-57.09	-5.30	1058.	38.3	SPR
130	46.49	44.54	-57.27	-11.56	1045.	38.3	AUT
140	44.54	46.49	-55.71	-17.46	1045.	38.3	AUT
150	41.23	47.03	-52.45	-22.83	1031.	38.3	SUM
160	0.00	0.00	0.00	0.00	1456.	50.0	SUM
170	0.00	0.00	0.00	0.00	1456.	50.0	SUM
180	0.00	0.00	0.00	0.00	1456.	50.0	SUM
190	0.00	0.00	0.00	0.00	1456.	50.0	SUM
200	0.00	0.00	0.00	0.00	1456.	50.0	SUM
210	0.00	0.00	0.00	0.00	1456.	50.0	SUM
220	0.00	0.00	0.00	0.00	1456.	50.0	SUM
230	0.00	0.00	0.00	0.00	1456.	50.0	SUM
240	0.00	0.00	0.00	0.00	1456.	50.0	SUM
250	46.14	36.67	9.17	-24.53	988.4	38.3	SUM
260	43.85	31.00	15.85	-19.38	988.4	38.3	SUM
270	0.00	0.00	0.00	0.00	1456.	50.0	SUM
280	0.00	0.00	0.00	0.00	1456.	50.0	SUM
290	0.00	0.00	0.00	0.00	1456.	50.0	SUM
300	47.03	41.23	15.86	5.30	988.4	38.3	SUM
310	46.49	44.54	12.73	11.56	988.4	38.3	SUM
320	44.54	46.49	9.22	17.46	988.4	38.3	SUM
330	41.23	47.03	5.42	22.83	988.4	38.3	SUM
340	0.00	0.00	0.00	0.00	1456.	50.0	SUM
350	0.00	0.00	0.00	0.00	1456.	50.0	SUM
360	0.00	0.00	0.00	0.00	1456.	50.0	SUM

* = worst case flow sector

********** MAKEMET METEOROLOGY PARAMETERS **********

MIN/MAX TEMPERATURE: 250.0 / 320.0 (K)

MINIMUM WIND SPEED: 0.5 m/s

ANEMOMETER HEIGHT: 10.000 meters

SURFACE CHARACTERISTICS INPUT: AERMET SEASONAL TABLES

DOMINANT SURFACE PROFILE: Cultivated Land
DOMINANT CLIMATE TYPE: Average Moisture
DOMINANT SEASON: Summer

ALBEDO: 0.20
BOWEN RATIO: 0.50
ROUGHNESS LENGTH: 0.200 (meters)

SURFACE FRICTION VELOCITY (U*) NOT ADUSTED

METEOROLOGY CONDITIONS USED TO PREDICT OVERALL MAXIMUM IMPACT

```
 YR MO DY JDY HR
 -- -- -- --- --
 10 03 20  20 01

   H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN    Z0  BOWEN ALBEDO  REF WS
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 -1.51  0.144 -9.000  0.020 -999.  126.    193.4 0.200   0.50   0.20    1.50

   HT  REF TA     HT
- - - - - - - - - - -
  10.0   320.0    2.0
```

WIND SPEED AT STACK HEIGHT (non-downwash): 1.7 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 4.2 meters
ESTIMATED FINAL PLUME RISE (non-downwash): 3.1 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash): 7.3 meters

METEOROLOGY CONDITIONS USED TO PREDICT AMBIENT BOUNDARY IMPACT

```
 YR MO DY JDY HR
 -- -- -- --- --
 10 04 10  20 01

   H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN    Z0  BOWEN ALBEDO  REF WS
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 -2.08  0.198 -9.000  0.020 -999.  202.    364.7 0.200   0.50   0.20    2.00

   HT  REF TA     HT
- - - - - - - - - - -
  10.0   320.0    2.0
```

WIND SPEED AT STACK HEIGHT (non-downwash): 2.2 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 4.1 meters
ESTIMATED FINAL PLUME RISE (non-downwash): 2.4 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash): 6.5 meters

********** AERSCREEN AUTOMATED DISTANCES **********
OVERALL MAXIMUM CONCENTRATIONS BY DISTANCE

MAXIMUM MAXIMUM

DIST (m)	1-HR CONC (ug/m3)	DIST (m)	1-HR CONC (ug/m3)
38.30	1394.	3775.00	117.3
50.00	1456.	3800.00	116.5
75.00	1383.	3825.00	115.7
100.00	1346.	3850.00	114.8
125.00	1249.	3875.00	114.0
150.00	1113.	3900.00	113.2
175.00	1017.	3925.00	112.4
200.00	944.9	3950.00	111.6
225.00	873.5	3975.00	110.8
250.00	807.3	4000.00	110.1
275.00	759.2	4025.00	109.3
300.00	730.6	4050.00	108.5
325.00	700.8	4075.00	107.8
350.00	670.8	4100.00	107.0
375.00	641.3	4125.00	106.6
400.00	619.0	4150.00	106.3
425.00	597.4	4175.00	106.0
450.00	576.1	4200.00	105.7
475.00	555.3	4225.00	105.4
500.00	538.7	4250.00	105.1
525.00	522.9	4275.00	104.8
550.00	507.3	4300.00	104.5
575.00	493.5	4325.00	104.2
600.00	483.2	4350.00	103.8
625.00	472.9	4375.00	103.5
650.00	462.5	4400.00	103.2
675.00	452.1	4425.00	102.9
700.00	443.6	4450.00	102.6
725.00	435.8	4475.00	102.3
750.00	428.0	4500.00	102.0
775.00	420.1	4525.00	101.7
800.00	412.2	4550.00	101.4
825.00	404.5	4575.00	101.1
850.00	396.8	4600.00	100.8
875.00	389.2	4625.00	100.5
900.00	381.7	4650.00	100.2
925.00	374.4	4675.00	99.85
950.00	367.2	4700.00	99.54
975.00	360.4	4725.00	99.24
1000.00	354.3	4750.00	98.93
1025.00	348.2	4775.00	98.63
1050.00	342.2	4800.00	98.33
1075.00	336.5	4825.00	98.02
1100.00	331.0	4850.00	97.72
1125.00	325.5	4875.00	97.42
1150.00	320.2	4900.00	97.12
1175.00	314.9	4925.00	96.82
1200.00	309.8	4950.00	96.52
1225.00	304.7	4975.00	96.22
1250.00	300.1	5000.00	95.92
1275.00	296.6	5050.00	95.33

1300.00	293.1	5100.00	94.74
1325.00	289.7	5150.00	94.15
1350.00	286.3	5200.00	93.56
1375.00	282.9	5250.00	92.98
1400.00	279.5	5300.00	92.40
1425.00	276.2	5350.00	91.83
1450.00	272.9	5400.00	91.25
1475.00	269.6	5450.00	90.68
1500.00	266.4	5500.00	90.12
1525.00	263.3	5550.00	89.56
1550.00	260.1	5600.00	89.00
1575.00	257.0	5650.00	88.45
1600.00	254.0	5700.00	87.89
1625.00	251.0	5750.00	87.35
1650.00	248.0	5800.00	86.80
1675.00	245.2	5850.00	86.27
1700.00	242.7	5900.00	85.73
1725.00	240.2	5950.00	85.20
1750.00	237.8	6000.00	84.67
1775.00	235.3	6050.00	84.15
1800.00	232.9	6100.00	83.63
1825.00	230.5	6150.00	83.11
1850.00	228.2	6200.00	82.60
1875.00	225.9	6250.00	82.09
1900.00	223.7	6300.00	81.58
1925.00	221.5	6350.00	81.08
1950.00	219.4	6400.00	80.58
1975.00	217.2	6450.00	80.09
2000.00	215.1	6500.00	79.60
2025.00	213.0	6550.00	79.12
2050.00	211.0	6600.00	78.63
2075.00	208.9	6650.00	78.16
2100.00	206.9	6700.00	77.68
2125.00	204.9	6750.00	77.21
2150.00	203.0	6800.00	76.74
2175.00	201.0	6850.00	76.28
2200.00	199.1	6900.00	75.82
2225.00	197.2	6950.00	75.37
2250.00	195.3	7000.00	74.91
2275.00	193.5	7050.00	74.47
2300.00	191.7	7100.00	74.08
2325.00	189.9	7150.00	73.69
2350.00	188.1	7200.00	73.30
2375.00	186.4	7250.00	72.92
2400.00	184.6	7300.00	72.53
2425.00	182.9	7350.00	72.15
2450.00	181.3	7400.00	71.78
2475.00	179.6	7450.00	71.40
2500.00	178.0	7500.00	71.03
2525.00	176.3	7550.00	70.66
2550.00	174.8	7600.00	70.29
2575.00	173.2	7650.00	69.92
2600.00	171.6	7700.00	69.56
2625.00	170.1	7750.00	69.19

2650.00	168.6	7800.00	68.83
2675.00	167.1	7850.00	68.48
2700.00	165.6	7900.00	68.14
2725.00	164.2	7950.00	67.80
2750.00	162.7	8000.00	67.46
2775.00	161.3	8050.00	67.13
2800.00	159.9	8100.00	66.80
2825.00	158.6	8150.00	66.47
2850.00	157.2	8200.00	66.14
2875.00	155.9	8250.00	65.82
2900.00	154.5	8300.00	65.49
2925.00	153.2	8350.00	65.17
2950.00	151.9	8400.00	64.85
2975.00	150.7	8450.00	64.53
3000.00	149.4	8500.00	64.22
3025.00	148.2	8550.00	63.90
3050.00	146.9	8600.00	63.59
3075.00	145.7	8650.00	63.28
3100.00	144.5	8700.00	62.98
3125.00	143.4	8750.00	62.67
3150.00	142.2	8800.00	62.37
3175.00	141.0	8850.00	62.06
3200.00	139.9	8900.00	61.76
3225.00	138.8	8950.00	61.46
3250.00	137.7	9000.00	61.17
3275.00	136.6	9050.00	60.87
3300.00	135.5	9100.00	60.58
3325.00	134.4	9150.00	60.29
3350.00	133.4	9200.00	60.00
3375.00	132.4	9250.00	59.71
3400.00	131.3	9300.00	59.43
3425.00	130.3	9350.00	59.14
3450.00	129.3	9400.00	58.86
3475.00	128.3	9450.00	58.58
3500.00	127.3	9500.00	58.30
3525.00	126.4	9550.00	58.03
3550.00	125.4	9600.00	57.75
3575.00	124.5	9650.00	57.48
3600.00	123.6	9700.00	57.21
3625.00	122.6	9750.00	56.94
3650.00	121.7	9800.00	56.67
3675.00	120.8	9850.00	56.41
3700.00	119.9	9900.00	56.14
3725.00	119.1	9950.00	55.88
3750.00	118.2	10000.00	55.62

********** AERSCREEN MAXIMUM IMPACT SUMMARY **********

MAXIMUM 1-HOUR	SCALED 3-HOUR	SCALED 8-HOUR	SCALED 24-HOUR	SCALED ANNUAL

CALCULATION PROCEDURE	CONC (ug/m3)	CONC (ug/m3)	CONC (ug/m3)	CONC (ug/m3)	CONC (ug/m3)
FLAT TERRAIN	1459.	1459.	1313.	875.7	145.9

DISTANCE FROM SOURCE 52.00 meters directed toward 10 degrees

IMPACT AT THE AMBIENT BOUNDARY	1394.	1394.	1255.	836.5	139.4

DISTANCE FROM SOURCE 38.30 meters directed toward 10 degrees

AERSCREEN 21112 / AERMOD 21112 03/06/25
15:25:58

TITLE: TWELVE ENCLOSED GROUND FLARE - NORMAL

********** STACK PARAMETERS **********

SOURCE EMISSION RATE: 1.0000 g/s 7.937 lb/hr
STACK HEIGHT: 15.24 meters 50.00 feet
STACK INNER DIAMETER: 3.710 meters 146.06 inches
PLUME EXIT TEMPERATURE: 589.0 K 600.5 Deg F
PLUME EXIT VELOCITY: 0.060 m/s 0.20 ft/s
STACK AIR FLOW RATE: 1374 ACFM
RURAL OR URBAN: RURAL

FLAGPOLE RECEPTOR HEIGHT: 1.50 meters 4.92 feet

INITIAL PROBE DISTANCE = 10000. meters 32808. feet

********** BUILDING DOWNWASH PARAMETERS **********

BUILDING HEIGHT: 8.3 meters 27.3 feet
MAX BUILDING DIMENSION: 40.2 meters 132.0 feet
MIN BUILDING DIMENSION: 24.4 meters 80.0 feet
BUILDING ORIENTATION TO NORTH: 0. degrees
STACK DIRECTION FROM CENTER: 112. degrees
STACK DISTANCE FROM CENTER: 36.9 meters 120.9 feet

********** FLOW SECTOR ANALYSIS **********
25 meter receptor spacing: 38. meters - 5000. meters
50 meter receptor spacing: 5050. meters - 10000. meters

FLOW SECTOR	BUILD WIDTH	BUILD LENGTH	XBADJ	YBADJ	MAX 1-HR CONC	DIST (m)	TEMPORAL PERIOD
10*	0.00	0.00	0.00	0.00	682.9	38.3	SUM
20	0.00	0.00	0.00	0.00	682.9	38.3	SUM
30	0.00	0.00	0.00	0.00	682.9	38.3	SUM
40	0.00	0.00	0.00	0.00	682.9	38.3	SUM
50	0.00	0.00	0.00	0.00	682.9	38.3	SUM

60	0.00	0.00	0.00	0.00	682.9	38.3	SUM
70	46.14	36.67	-45.84	24.53	488.6	38.3	SUM
80	43.85	31.00	-46.85	19.38	524.8	38.3	SUM
90	40.23	24.38	-46.43	13.64	524.8	38.3	SUM
100	43.85	31.00	-51.59	7.49	524.8	38.3	SUM
110	46.14	36.67	-55.18	1.11	524.8	38.3	SUM
120	47.03	41.23	-57.09	-5.30	524.8	38.3	SUM
130	46.49	44.54	-57.27	-11.56	488.6	38.3	SUM
140	44.54	46.49	-55.71	-17.46	488.6	38.3	SUM
150	41.23	47.03	-52.45	-22.83	426.8	38.3	SUM
160	0.00	0.00	0.00	0.00	682.9	38.3	SUM
170	0.00	0.00	0.00	0.00	682.9	38.3	SUM
180	0.00	0.00	0.00	0.00	682.9	38.3	SUM
190	0.00	0.00	0.00	0.00	682.9	38.3	SUM
200	0.00	0.00	0.00	0.00	682.9	38.3	SUM
210	0.00	0.00	0.00	0.00	682.9	38.3	SUM
220	0.00	0.00	0.00	0.00	682.9	38.3	SUM
230	0.00	0.00	0.00	0.00	682.9	38.3	SUM
240	0.00	0.00	0.00	0.00	682.9	38.3	SUM
250	46.14	36.67	9.17	-24.53	396.3	38.3	SUM
260	43.85	31.00	15.85	-19.38	426.8	38.3	SUM
270	0.00	0.00	0.00	0.00	682.9	38.3	SUM
280	0.00	0.00	0.00	0.00	682.9	38.3	SUM
290	0.00	0.00	0.00	0.00	682.9	38.3	SUM
300	47.03	41.23	15.86	5.30	396.3	38.3	SUM
310	46.49	44.54	12.73	11.56	396.3	38.3	SUM
320	44.54	46.49	9.22	17.46	396.3	38.3	SUM
330	41.23	47.03	5.42	22.83	396.3	38.3	SUM
340	0.00	0.00	0.00	0.00	682.9	38.3	SUM
350	0.00	0.00	0.00	0.00	682.9	38.3	SUM
360	0.00	0.00	0.00	0.00	682.9	38.3	SUM

* = worst case flow sector

********** MAKEMET METEOROLOGY PARAMETERS **********

MIN/MAX TEMPERATURE: 250.0 / 320.0 (K)

MINIMUM WIND SPEED: 0.5 m/s

ANEMOMETER HEIGHT: 10.000 meters

SURFACE CHARACTERISTICS INPUT: AERMET SEASONAL TABLES

DOMINANT SURFACE PROFILE: Cultivated Land
DOMINANT CLIMATE TYPE: Average Moisture
DOMINANT SEASON: Summer

ALBEDO: 0.20
BOWEN RATIO: 0.50
ROUGHNESS LENGTH: 0.200 (meters)

SURFACE FRICTION VELOCITY (U*) NOT ADUSTED

METEOROLOGY CONDITIONS USED TO PREDICT OVERALL MAXIMUM IMPACT

YR MO DY JDY HR
-- -- -- --- --
10 05 14 14 01

H0 U* W* DT/DZ ZICNV ZIMCH M-O LEN Z0 BOWEN ALBEDO REF WS
- -
-26.95 0.497 -9.000 0.020 -999. 806. 447.9 0.200 0.50 0.20 5.00

HT REF TA HT
- - - - - - - - - - -
10.0 320.0 2.0

WIND SPEED AT STACK HEIGHT (non-downwash): 5.6 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 4.2 meters
ESTIMATED FINAL PLUME RISE (non-downwash): 1.8 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash): 6.0 meters

METEOROLOGY CONDITIONS USED TO PREDICT AMBIENT BOUNDARY IMPACT

YR MO DY JDY HR
-- -- -- --- --
10 05 14 14 01

H0 U* W* DT/DZ ZICNV ZIMCH M-O LEN Z0 BOWEN ALBEDO REF WS
- -
-26.95 0.497 -9.000 0.020 -999. 806. 447.9 0.200 0.50 0.20 5.00

HT REF TA HT
- - - - - - - - - - -
10.0 320.0 2.0

WIND SPEED AT STACK HEIGHT (non-downwash): 5.6 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 4.2 meters
ESTIMATED FINAL PLUME RISE (non-downwash): 1.8 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash): 6.0 meters

********** AERSCREEN AUTOMATED DISTANCES **********
OVERALL MAXIMUM CONCENTRATIONS BY DISTANCE

MAXIMUM MAXIMUM

DIST (m)	1-HR CONC (ug/m3)	DIST (m)	1-HR CONC (ug/m3)
38.30	682.9	3775.00	54.21
50.00	592.9	3800.00	53.91
75.00	472.3	3825.00	53.61
100.00	397.4	3850.00	53.32
125.00	332.0	3875.00	53.02
150.00	316.4	3900.00	52.73
175.00	287.2	3925.00	52.44
200.00	275.6	3950.00	52.15
225.00	270.0	3975.00	51.86
250.00	259.2	4000.00	51.58
275.00	245.8	4025.00	51.30
300.00	231.6	4050.00	51.02
325.00	223.7	4075.00	50.74
350.00	217.6	4100.00	50.47
375.00	210.6	4125.00	50.19
400.00	203.1	4150.00	49.92
425.00	195.4	4175.00	49.65
450.00	187.8	4200.00	49.39
475.00	180.3	4225.00	49.12
500.00	173.0	4250.00	48.86
525.00	166.0	4275.00	48.60
550.00	164.6	4300.00	48.34
575.00	162.9	4325.00	48.08
600.00	161.0	4350.00	47.83
625.00	158.8	4375.00	47.57
650.00	156.4	4400.00	47.32
675.00	154.0	4425.00	47.07
700.00	151.4	4450.00	46.83
725.00	148.7	4475.00	46.58
750.00	146.1	4500.00	46.34
775.00	143.4	4525.00	46.10
800.00	140.7	4550.00	45.86
825.00	138.0	4575.00	45.62
850.00	135.3	4600.00	45.38
875.00	132.7	4625.00	45.15
900.00	130.3	4650.00	44.91
925.00	128.1	4675.00	44.68
950.00	126.0	4700.00	44.45
975.00	123.8	4725.00	44.27
1000.00	121.7	4750.00	44.09
1025.00	119.7	4775.00	43.93
1050.00	117.6	4800.00	43.77
1075.00	116.3	4825.00	43.61
1100.00	115.3	4850.00	43.46
1125.00	114.3	4875.00	43.30
1150.00	113.2	4900.00	43.15
1175.00	112.1	4925.00	42.99
1200.00	111.0	4950.00	42.84
1225.00	109.9	4975.00	42.69
1250.00	108.8	5000.00	42.53
1275.00	107.7	5050.00	42.23

1300.00	106.5	5100.00	41.93
1325.00	105.4	5150.00	41.63
1350.00	104.2	5200.00	41.33
1375.00	103.1	5250.00	41.04
1400.00	102.0	5300.00	40.74
1425.00	100.8	5350.00	40.46
1450.00	99.73	5400.00	40.19
1475.00	98.86	5450.00	39.91
1500.00	98.04	5500.00	39.64
1525.00	97.20	5550.00	39.37
1550.00	96.36	5600.00	39.10
1575.00	95.52	5650.00	38.84
1600.00	94.68	5700.00	38.57
1625.00	93.84	5750.00	38.31
1650.00	93.00	5800.00	38.05
1675.00	92.16	5850.00	37.79
1700.00	91.33	5900.00	37.54
1725.00	90.49	5950.00	37.28
1750.00	89.66	6000.00	37.03
1775.00	88.84	6050.00	36.78
1800.00	88.02	6100.00	36.54
1825.00	87.21	6150.00	36.29
1850.00	86.40	6200.00	36.05
1875.00	85.59	6250.00	35.81
1900.00	84.80	6300.00	35.57
1925.00	84.02	6350.00	35.33
1950.00	83.27	6400.00	35.10
1975.00	82.52	6450.00	34.86
2000.00	81.79	6500.00	34.63
2025.00	81.06	6550.00	34.41
2050.00	80.33	6600.00	34.18
2075.00	79.61	6650.00	33.95
2100.00	79.01	6700.00	33.73
2125.00	78.64	6750.00	33.51
2150.00	78.26	6800.00	33.29
2175.00	77.87	6850.00	33.08
2200.00	77.48	6900.00	32.86
2225.00	77.09	6950.00	32.65
2250.00	76.70	7000.00	32.44
2275.00	76.30	7050.00	32.23
2300.00	75.90	7100.00	32.02
2325.00	75.50	7150.00	31.82
2350.00	75.09	7200.00	31.62
2375.00	74.69	7250.00	31.41
2400.00	74.28	7300.00	31.21
2425.00	73.87	7350.00	31.02
2450.00	73.47	7400.00	30.82
2475.00	73.06	7450.00	30.63
2500.00	72.65	7500.00	30.43
2525.00	72.24	7550.00	30.24
2550.00	71.83	7600.00	30.06
2575.00	71.42	7650.00	29.87
2600.00	71.01	7700.00	29.68
2625.00	70.61	7750.00	29.50

2650.00	70.20	7800.00	29.32
2675.00	69.79	7850.00	29.14
2700.00	69.39	7900.00	28.96
2725.00	68.99	7950.00	28.78
2750.00	68.58	8000.00	28.61
2775.00	68.18	8050.00	28.43
2800.00	67.78	8100.00	28.26
2825.00	67.39	8150.00	28.09
2850.00	66.99	8200.00	27.92
2875.00	66.60	8250.00	27.75
2900.00	66.20	8300.00	27.59
2925.00	65.81	8350.00	27.42
2950.00	65.42	8400.00	27.26
2975.00	65.04	8450.00	27.10
3000.00	64.65	8500.00	26.94
3025.00	64.27	8550.00	26.78
3050.00	63.89	8600.00	26.62
3075.00	63.53	8650.00	26.46
3100.00	63.17	8700.00	26.31
3125.00	62.81	8750.00	26.16
3150.00	62.45	8800.00	26.00
3175.00	62.10	8850.00	25.85
3200.00	61.74	8900.00	25.70
3225.00	61.39	8950.00	25.56
3250.00	61.04	9000.00	25.41
3275.00	60.70	9050.00	25.26
3300.00	60.35	9100.00	25.12
3325.00	60.01	9150.00	24.98
3350.00	59.67	9200.00	24.84
3375.00	59.33	9250.00	24.69
3400.00	58.99	9300.00	24.56
3425.00	58.66	9350.00	24.42
3450.00	58.33	9400.00	24.28
3475.00	58.00	9450.00	24.15
3500.00	57.67	9500.00	24.01
3525.00	57.34	9550.00	23.88
3550.00	57.02	9600.00	23.75
3575.00	56.70	9650.00	23.61
3600.00	56.38	9700.00	23.49
3625.00	56.07	9750.00	23.36
3650.00	55.75	9800.00	23.23
3675.00	55.44	9850.00	23.10
3700.00	55.13	9900.00	23.01
3725.00	54.82	9950.00	22.94
3750.00	54.52	10000.00	22.86

********** AERSCREEN MAXIMUM IMPACT SUMMARY **********

	MAXIMUM 1-HOUR	SCALED 3-HOUR	SCALED 8-HOUR	SCALED 24-HOUR	SCALED ANNUAL

CALCULATION PROCEDURE	CONC (ug/m3)	CONC (ug/m3)	CONC (ug/m3)	CONC (ug/m3)	CONC (ug/m3)
FLAT TERRAIN	682.9	682.9	614.6	409.7	68.29

DISTANCE FROM SOURCE 38.30 meters directed toward 10 degrees

IMPACT AT THE AMBIENT BOUNDARY	682.9	682.9	614.6	409.7	68.29

DISTANCE FROM SOURCE 38.30 meters directed toward 10 degrees

AERSCREEN 21112 / AERMOD 21112 03/10/25
10:53:25

TITLE: TWELVE ENCLOSED GROUND FLARE - NORMAL

********** STACK PARAMETERS **********

SOURCE EMISSION RATE: 1.0000 g/s 7.937 lb/hr
STACK HEIGHT: 15.24 meters 50.00 feet
STACK INNER DIAMETER: 3.710 meters 146.06 inches
PLUME EXIT TEMPERATURE: 589.0 K 600.5 Deg F
PLUME EXIT VELOCITY: 0.050 m/s 0.16 ft/s
STACK AIR FLOW RATE: 1145 ACFM
RURAL OR URBAN: RURAL

FLAGPOLE RECEPTOR HEIGHT: 1.50 meters 4.92 feet

INITIAL PROBE DISTANCE = 10000. meters 32808. feet

********** BUILDING DOWNWASH PARAMETERS **********

BUILDING HEIGHT: 8.3 meters 27.3 feet
MAX BUILDING DIMENSION: 40.2 meters 132.0 feet
MIN BUILDING DIMENSION: 24.4 meters 80.0 feet
BUILDING ORIENTATION TO NORTH: 0. degrees
STACK DIRECTION FROM CENTER: 112. degrees
STACK DISTANCE FROM CENTER: 36.9 meters 120.9 feet

********** FLOW SECTOR ANALYSIS **********
25 meter receptor spacing: 38. meters - 5000. meters
50 meter receptor spacing: 5050. meters - 10000. meters

FLOW SECTOR	BUILD WIDTH	BUILD LENGTH	XBADJ	YBADJ	MAX 1-HR CONC	DIST (m)	TEMPORAL PERIOD
10*	0.00	0.00	0.00	0.00	736.8	38.3	SUM
20	0.00	0.00	0.00	0.00	736.8	38.3	SUM
30	0.00	0.00	0.00	0.00	736.8	38.3	SUM
40	0.00	0.00	0.00	0.00	736.8	38.3	SUM
50	0.00	0.00	0.00	0.00	736.8	38.3	SUM

60	0.00	0.00	0.00	0.00	736.8	38.3	SUM
70	46.14	36.67	-45.84	24.53	532.3	38.3	SUM
80	43.85	31.00	-46.85	19.38	560.6	38.3	SUM
90	40.23	24.38	-46.43	13.64	560.6	38.3	SUM
100	43.85	31.00	-51.59	7.49	560.6	38.3	SUM
110	46.14	36.67	-55.18	1.11	560.6	38.3	SUM
120	47.03	41.23	-57.09	-5.30	560.6	38.3	SUM
130	46.49	44.54	-57.27	-11.56	532.3	38.3	SUM
140	44.54	46.49	-55.71	-17.46	532.3	38.3	SUM
150	41.23	47.03	-52.45	-22.83	472.3	38.3	SUM
160	0.00	0.00	0.00	0.00	736.8	38.3	SUM
170	0.00	0.00	0.00	0.00	736.8	38.3	SUM
180	0.00	0.00	0.00	0.00	736.8	38.3	SUM
190	0.00	0.00	0.00	0.00	736.8	38.3	SUM
200	0.00	0.00	0.00	0.00	736.8	38.3	SUM
210	0.00	0.00	0.00	0.00	736.8	38.3	SUM
220	0.00	0.00	0.00	0.00	736.8	38.3	SUM
230	0.00	0.00	0.00	0.00	736.8	38.3	SUM
240	0.00	0.00	0.00	0.00	736.8	38.3	SUM
250	46.14	36.67	9.17	-24.53	444.0	38.3	SUM
260	43.85	31.00	15.85	-19.38	472.3	38.3	SUM
270	0.00	0.00	0.00	0.00	736.8	38.3	SUM
280	0.00	0.00	0.00	0.00	736.8	38.3	SUM
290	0.00	0.00	0.00	0.00	736.8	38.3	SUM
300	47.03	41.23	15.86	5.30	444.0	38.3	SUM
310	46.49	44.54	12.73	11.56	444.0	38.3	SUM
320	44.54	46.49	9.22	17.46	444.0	38.3	SUM
330	41.23	47.03	5.42	22.83	444.0	38.3	SUM
340	0.00	0.00	0.00	0.00	736.8	38.3	SUM
350	0.00	0.00	0.00	0.00	736.8	38.3	SUM
360	0.00	0.00	0.00	0.00	736.8	38.3	SUM

* = worst case flow sector

********** MAKEMET METEOROLOGY PARAMETERS **********

MIN/MAX TEMPERATURE: 250.0 / 320.0 (K)

MINIMUM WIND SPEED: 0.5 m/s

ANEMOMETER HEIGHT: 10.000 meters

SURFACE CHARACTERISTICS INPUT: AERMET SEASONAL TABLES

DOMINANT SURFACE PROFILE: Cultivated Land
DOMINANT CLIMATE TYPE: Average Moisture
DOMINANT SEASON: Summer

ALBEDO: 0.20
BOWEN RATIO: 0.50
ROUGHNESS LENGTH: 0.200 (meters)

SURFACE FRICTION VELOCITY (U*) NOT ADUSTED

METEOROLOGY CONDITIONS USED TO PREDICT OVERALL MAXIMUM IMPACT

YR MO DY JDY HR
-- -- -- --- --
10 05 14 14 01

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS
-26.95	0.497	-9.000	0.020	-999.	806.	447.9	0.200	0.50	0.20	5.00

HT	REF TA	HT
10.0	320.0	2.0

WIND SPEED AT STACK HEIGHT (non-downwash): 5.6 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 4.2 meters
ESTIMATED FINAL PLUME RISE (non-downwash): 1.6 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash): 5.8 meters

METEOROLOGY CONDITIONS USED TO PREDICT AMBIENT BOUNDARY IMPACT

YR MO DY JDY HR
-- -- -- --- --
10 05 14 14 01

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS
-26.95	0.497	-9.000	0.020	-999.	806.	447.9	0.200	0.50	0.20	5.00

HT	REF TA	HT
10.0	320.0	2.0

WIND SPEED AT STACK HEIGHT (non-downwash): 5.6 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 4.2 meters
ESTIMATED FINAL PLUME RISE (non-downwash): 1.6 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash): 5.8 meters

********** AERSCREEN AUTOMATED DISTANCES **********
OVERALL MAXIMUM CONCENTRATIONS BY DISTANCE

MAXIMUM MAXIMUM

DIST (m)	1-HR CONC (ug/m3)	DIST (m)	1-HR CONC (ug/m3)
38.30	736.8	3775.00	58.84
50.00	636.0	3800.00	58.55
75.00	501.5	3825.00	58.25
100.00	421.5	3850.00	57.96
125.00	384.4	3875.00	57.71
150.00	353.3	3900.00	57.45
175.00	337.1	3925.00	57.20
200.00	330.4	3950.00	56.95
225.00	315.3	3975.00	56.70
250.00	296.4	4000.00	56.45
275.00	283.3	4025.00	56.21
300.00	275.0	4050.00	55.96
325.00	264.9	4075.00	55.71
350.00	253.9	4100.00	55.47
375.00	242.7	4125.00	55.23
400.00	231.6	4150.00	54.98
425.00	220.7	4175.00	54.74
450.00	210.4	4200.00	54.50
475.00	206.4	4225.00	54.26
500.00	203.8	4250.00	54.03
525.00	200.8	4275.00	53.79
550.00	197.4	4300.00	53.56
575.00	193.8	4325.00	53.34
600.00	190.0	4350.00	53.11
625.00	186.1	4375.00	52.89
650.00	182.1	4400.00	52.67
675.00	178.1	4425.00	52.45
700.00	174.2	4450.00	52.23
725.00	170.2	4475.00	52.01
750.00	166.3	4500.00	51.79
775.00	162.9	4525.00	51.57
800.00	159.6	4550.00	51.36
825.00	156.4	4575.00	51.14
850.00	153.3	4600.00	50.93
875.00	150.1	4625.00	50.71
900.00	147.7	4650.00	50.50
925.00	146.2	4675.00	50.29
950.00	144.6	4700.00	50.08
975.00	143.0	4725.00	49.87
1000.00	141.3	4750.00	49.67
1025.00	139.7	4775.00	49.46
1050.00	138.0	4800.00	49.25
1075.00	136.3	4825.00	49.05
1100.00	134.5	4850.00	48.85
1125.00	132.8	4875.00	48.64
1150.00	131.1	4900.00	48.44
1175.00	129.4	4925.00	48.24
1200.00	127.7	4950.00	48.04
1225.00	126.0	4975.00	47.84
1250.00	124.8	5000.00	47.65
1275.00	123.5	5050.00	47.25

1300.00	122.3	5100.00	46.87
1325.00	121.0	5150.00	46.48
1350.00	119.7	5200.00	46.10
1375.00	118.5	5250.00	45.73
1400.00	117.2	5300.00	45.36
1425.00	115.9	5350.00	44.99
1450.00	114.7	5400.00	44.63
1475.00	113.4	5450.00	44.27
1500.00	112.2	5500.00	43.92
1525.00	110.9	5550.00	43.56
1550.00	109.7	5600.00	43.22
1575.00	108.5	5650.00	42.87
1600.00	107.3	5700.00	42.54
1625.00	106.1	5750.00	42.20
1650.00	105.0	5800.00	41.87
1675.00	103.9	5850.00	41.54
1700.00	102.8	5900.00	41.22
1725.00	101.7	5950.00	40.89
1750.00	100.6	6000.00	40.58
1775.00	99.95	6050.00	40.26
1800.00	99.38	6100.00	39.95
1825.00	98.80	6150.00	39.65
1850.00	98.22	6200.00	39.34
1875.00	97.62	6250.00	39.04
1900.00	97.02	6300.00	38.75
1925.00	96.42	6350.00	38.45
1950.00	95.81	6400.00	38.16
1975.00	95.20	6450.00	37.88
2000.00	94.59	6500.00	37.59
2025.00	93.98	6550.00	37.31
2050.00	93.36	6600.00	37.04
2075.00	92.74	6650.00	36.76
2100.00	92.12	6700.00	36.49
2125.00	91.51	6750.00	36.22
2150.00	90.89	6800.00	35.96
2175.00	90.27	6850.00	35.70
2200.00	89.66	6900.00	35.44
2225.00	89.04	6950.00	35.18
2250.00	88.43	7000.00	34.93
2275.00	87.82	7050.00	34.68
2300.00	87.21	7100.00	34.43
2325.00	86.60	7150.00	34.18
2350.00	86.00	7200.00	33.94
2375.00	85.40	7250.00	33.70
2400.00	84.80	7300.00	33.46
2425.00	84.20	7350.00	33.23
2450.00	83.61	7400.00	33.00
2475.00	83.03	7450.00	32.77
2500.00	82.44	7500.00	32.54
2525.00	81.86	7550.00	32.32
2550.00	81.28	7600.00	32.09
2575.00	80.73	7650.00	31.92
2600.00	80.18	7700.00	31.78
2625.00	79.64	7750.00	31.64

2650.00	79.10	7800.00	31.50
2675.00	78.56	7850.00	31.36
2700.00	78.03	7900.00	31.23
2725.00	77.50	7950.00	31.09
2750.00	76.98	8000.00	30.95
2775.00	76.46	8050.00	30.82
2800.00	75.94	8100.00	30.68
2825.00	75.43	8150.00	30.55
2850.00	74.92	8200.00	30.42
2875.00	74.41	8250.00	30.28
2900.00	73.91	8300.00	30.15
2925.00	73.41	8350.00	30.02
2950.00	72.92	8400.00	29.89
2975.00	72.43	8450.00	29.76
3000.00	71.94	8500.00	29.63
3025.00	71.46	8550.00	29.50
3050.00	70.98	8600.00	29.37
3075.00	70.51	8650.00	29.24
3100.00	70.04	8700.00	29.11
3125.00	69.57	8750.00	28.99
3150.00	69.11	8800.00	28.86
3175.00	68.65	8850.00	28.74
3200.00	68.20	8900.00	28.61
3225.00	67.75	8950.00	28.49
3250.00	67.30	9000.00	28.36
3275.00	66.86	9050.00	28.24
3300.00	66.42	9100.00	28.12
3325.00	65.99	9150.00	28.00
3350.00	65.56	9200.00	27.87
3375.00	65.13	9250.00	27.75
3400.00	64.71	9300.00	27.63
3425.00	64.29	9350.00	27.52
3450.00	63.87	9400.00	27.40
3475.00	63.46	9450.00	27.28
3500.00	63.05	9500.00	27.16
3525.00	62.65	9550.00	27.05
3550.00	62.25	9600.00	26.93
3575.00	61.85	9650.00	26.82
3600.00	61.46	9700.00	26.70
3625.00	61.07	9750.00	26.59
3650.00	60.68	9800.00	26.47
3675.00	60.30	9850.00	26.36
3700.00	59.92	9900.00	26.25
3725.00	59.55	9950.00	26.14
3750.00	59.17	10000.00	26.03

********** AERSCREEN MAXIMUM IMPACT SUMMARY **********

	MAXIMUM 1-HOUR	SCALED 3-HOUR	SCALED 8-HOUR	SCALED 24-HOUR	SCALED ANNUAL

CALCULATION PROCEDURE	CONC (ug/m3)	CONC (ug/m3)	CONC (ug/m3)	CONC (ug/m3)	CONC (ug/m3)
FLAT TERRAIN	736.8	736.8	663.1	442.1	73.68

DISTANCE FROM SOURCE 38.30 meters directed toward 10 degrees

IMPACT AT THE AMBIENT BOUNDARY	736.8	736.8	663.1	442.1	73.68

DISTANCE FROM SOURCE 38.30 meters directed toward 10 degrees

AERSCREEN 21112 / AERMOD 21112 03/10/25
12:15:17

TITLE: TWELVE ENCLOSED GROUND FLARE - NORMAL

********** STACK PARAMETERS **********

SOURCE EMISSION RATE: 1.0000 g/s 7.937 lb/hr
STACK HEIGHT: 15.24 meters 50.00 feet
STACK INNER DIAMETER: 3.710 meters 146.06 inches
PLUME EXIT TEMPERATURE: 589.0 K 600.5 Deg F
PLUME EXIT VELOCITY: 0.330 m/s 1.08 ft/s
STACK AIR FLOW RATE: 7559 ACFM
RURAL OR URBAN: RURAL

FLAGPOLE RECEPTOR HEIGHT: 1.50 meters 4.92 feet

INITIAL PROBE DISTANCE = 10000. meters 32808. feet

********** BUILDING DOWNWASH PARAMETERS **********

BUILDING HEIGHT: 8.3 meters 27.3 feet
MAX BUILDING DIMENSION: 40.2 meters 132.0 feet
MIN BUILDING DIMENSION: 24.4 meters 80.0 feet
BUILDING ORIENTATION TO NORTH: 0. degrees
STACK DIRECTION FROM CENTER: 112. degrees
STACK DISTANCE FROM CENTER: 36.9 meters 120.9 feet

********** FLOW SECTOR ANALYSIS **********
25 meter receptor spacing: 38. meters - 5000. meters
50 meter receptor spacing: 5050. meters - 10000. meters

FLOW SECTOR	BUILD WIDTH	BUILD LENGTH	XBADJ	YBADJ	MAX 1-HR CONC	DIST (m)	TEMPORAL PERIOD
10*	0.00	0.00	0.00	0.00	367.4	38.3	SUM
20	0.00	0.00	0.00	0.00	367.4	38.3	SUM
30	0.00	0.00	0.00	0.00	367.4	38.3	SUM
40	0.00	0.00	0.00	0.00	367.4	38.3	SUM
50	0.00	0.00	0.00	0.00	367.4	38.3	SUM

60	0.00	0.00	0.00	0.00	367.4	38.3	SUM
70	46.14	36.67	-45.84	24.53	154.7	38.3	SUM
80	43.85	31.00	-46.85	19.38	230.8	38.3	SUM
90	40.23	24.38	-46.43	13.64	275.5	38.3	SUM
100	43.85	31.00	-51.59	7.49	230.8	38.3	SUM
110	46.14	36.67	-55.18	1.11	230.8	38.3	SUM
120	47.03	41.23	-57.09	-5.30	230.8	38.3	SUM
130	46.49	44.54	-57.27	-11.56	206.2	38.3	SUM
140	44.54	46.49	-55.71	-17.46	154.7	38.3	SUM
150	41.23	47.03	-52.45	-22.83	154.7	38.3	SUM
160	0.00	0.00	0.00	0.00	367.4	38.3	SUM
170	0.00	0.00	0.00	0.00	367.4	38.3	SUM
180	0.00	0.00	0.00	0.00	367.4	38.3	SUM
190	0.00	0.00	0.00	0.00	367.4	38.3	SUM
200	0.00	0.00	0.00	0.00	367.4	38.3	SUM
210	0.00	0.00	0.00	0.00	367.4	38.3	SUM
220	0.00	0.00	0.00	0.00	367.4	38.3	SUM
230	0.00	0.00	0.00	0.00	367.4	38.3	SUM
240	0.00	0.00	0.00	0.00	367.4	38.3	SUM
250	46.14	36.67	9.17	-24.53	125.4	50.0	SUM
260	43.85	31.00	15.85	-19.38	133.8	50.0	SUM
270	0.00	0.00	0.00	0.00	367.4	38.3	SUM
280	0.00	0.00	0.00	0.00	367.4	38.3	SUM
290	0.00	0.00	0.00	0.00	367.4	38.3	SUM
300	47.03	41.23	15.86	5.30	141.0	75.0	WIN
310	46.49	44.54	12.73	11.56	132.5	75.0	WIN
320	44.54	46.49	9.22	17.46	171.4	75.0	WIN
330	41.23	47.03	5.42	22.83	140.2	75.0	SUM
340	0.00	0.00	0.00	0.00	367.4	38.3	SUM
350	0.00	0.00	0.00	0.00	367.4	38.3	SUM
360	0.00	0.00	0.00	0.00	367.4	38.3	SUM

* = worst case flow sector

********** MAKEMET METEOROLOGY PARAMETERS **********

MIN/MAX TEMPERATURE: 250.0 / 320.0 (K)

MINIMUM WIND SPEED: 0.5 m/s

ANEMOMETER HEIGHT: 10.000 meters

SURFACE CHARACTERISTICS INPUT: AERMET SEASONAL TABLES

DOMINANT SURFACE PROFILE: Cultivated Land
DOMINANT CLIMATE TYPE: Average Moisture
DOMINANT SEASON: Summer

ALBEDO: 0.20
BOWEN RATIO: 0.50
ROUGHNESS LENGTH: 0.200 (meters)

SURFACE FRICTION VELOCITY (U*) NOT ADUSTED

METEOROLOGY CONDITIONS USED TO PREDICT OVERALL MAXIMUM IMPACT

```
 YR MO DY JDY HR
 -- -- -- --- --
 10 05 26  26 01

   H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN    Z0  BOWEN ALBEDO  REF WS
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
-55.06  1.016 -9.000  0.020 -999. 2354.   1869.7 0.200   0.50   0.20   10.00

   HT  REF TA     HT
- - - - - - - - - - -
  10.0   320.0    2.0
```

WIND SPEED AT STACK HEIGHT (non-downwash): 11.1 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 4.3 meters
ESTIMATED FINAL PLUME RISE (non-downwash): 1.4 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash): 5.7 meters

METEOROLOGY CONDITIONS USED TO PREDICT AMBIENT BOUNDARY IMPACT

```
 YR MO DY JDY HR
 -- -- -- --- --
 10 05 26  26 01

   H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN    Z0  BOWEN ALBEDO  REF WS
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
-55.06  1.016 -9.000  0.020 -999. 2354.   1869.7 0.200   0.50   0.20   10.00

   HT  REF TA     HT
- - - - - - - - - - -
  10.0   320.0    2.0
```

WIND SPEED AT STACK HEIGHT (non-downwash): 11.1 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 4.3 meters
ESTIMATED FINAL PLUME RISE (non-downwash): 1.4 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash): 5.7 meters

********** AERSCREEN AUTOMATED DISTANCES **********
OVERALL MAXIMUM CONCENTRATIONS BY DISTANCE

MAXIMUM	MAXIMUM

DIST (m)	1-HR CONC (ug/m3)	DIST (m)	1-HR CONC (ug/m3)
38.30	367.4	3775.00	13.01
50.00	300.9	3800.00	13.00
75.00	257.0	3825.00	12.98
100.00	209.9	3850.00	12.97
125.00	181.0	3875.00	12.95
150.00	155.2	3900.00	12.93
175.00	130.8	3925.00	12.91
200.00	110.2	3950.00	12.89
225.00	95.05	3975.00	12.89
250.00	87.03	4000.00	12.89
275.00	83.87	4025.00	12.90
300.00	80.72	4050.00	12.90
325.00	77.54	4075.00	12.90
350.00	74.51	4100.00	12.90
375.00	71.95	4125.00	12.90
400.00	69.71	4150.00	12.90
425.00	67.60	4175.00	12.90
450.00	65.59	4200.00	12.90
475.00	63.69	4225.00	12.90
500.00	61.89	4250.00	12.90
525.00	60.18	4275.00	12.90
550.00	58.53	4300.00	12.89
575.00	56.85	4325.00	12.89
600.00	55.14	4350.00	12.88
625.00	53.39	4375.00	12.88
650.00	51.62	4400.00	12.88
675.00	49.83	4425.00	12.87
700.00	48.03	4450.00	12.86
725.00	46.22	4475.00	12.86
750.00	44.42	4500.00	12.85
775.00	42.83	4525.00	12.84
800.00	41.39	4550.00	12.83
825.00	39.96	4575.00	12.83
850.00	38.52	4600.00	12.82
875.00	37.09	4625.00	12.81
900.00	35.68	4650.00	12.80
925.00	34.42	4675.00	12.79
950.00	33.48	4700.00	12.78
975.00	32.55	4725.00	12.77
1000.00	31.61	4750.00	12.76
1025.00	30.68	4775.00	12.75
1050.00	29.75	4800.00	12.74
1075.00	28.83	4825.00	12.72
1100.00	27.92	4850.00	12.71
1125.00	27.01	4875.00	12.70
1150.00	26.11	4900.00	12.69
1175.00	25.22	4925.00	12.67
1200.00	24.35	4950.00	12.66
1225.00	23.48	4975.00	12.65
1250.00	22.63	5000.00	12.63
1275.00	22.14	5050.00	12.60

1300.00	21.89	5100.00	12.57
1325.00	21.69	5150.00	12.54
1350.00	21.50	5200.00	12.51
1375.00	21.30	5250.00	12.48
1400.00	21.10	5300.00	12.45
1425.00	20.90	5350.00	12.41
1450.00	20.70	5400.00	12.38
1475.00	20.49	5450.00	12.34
1500.00	20.29	5500.00	12.31
1525.00	20.09	5550.00	12.27
1550.00	19.89	5600.00	12.23
1575.00	19.69	5650.00	12.20
1600.00	19.49	5700.00	12.16
1625.00	19.29	5750.00	12.12
1650.00	19.09	5800.00	12.08
1675.00	18.89	5850.00	12.04
1700.00	18.70	5900.00	12.00
1725.00	18.50	5950.00	11.96
1750.00	18.31	6000.00	11.92
1775.00	18.12	6050.00	11.88
1800.00	17.93	6100.00	11.84
1825.00	17.74	6150.00	11.79
1850.00	17.56	6200.00	11.75
1875.00	17.37	6250.00	11.71
1900.00	17.19	6300.00	11.67
1925.00	17.01	6350.00	11.62
1950.00	16.84	6400.00	11.58
1975.00	16.66	6450.00	11.54
2000.00	16.49	6500.00	11.50
2025.00	16.32	6550.00	11.47
2050.00	16.15	6600.00	11.44
2075.00	15.98	6650.00	11.41
2100.00	15.82	6700.00	11.38
2125.00	15.66	6750.00	11.35
2150.00	15.50	6800.00	11.33
2175.00	15.39	6850.00	11.30
2200.00	15.29	6900.00	11.27
2225.00	15.19	6950.00	11.24
2250.00	15.09	7000.00	11.21
2275.00	14.99	7050.00	11.17
2300.00	14.89	7100.00	11.14
2325.00	14.79	7150.00	11.11
2350.00	14.70	7200.00	11.08
2375.00	14.60	7250.00	11.05
2400.00	14.50	7300.00	11.02
2425.00	14.40	7350.00	10.99
2450.00	14.31	7400.00	10.95
2475.00	14.21	7450.00	10.92
2500.00	14.12	7500.00	10.89
2525.00	14.02	7550.00	10.86
2550.00	13.93	7600.00	10.82
2575.00	13.83	7650.00	10.79
2600.00	13.76	7700.00	10.76
2625.00	13.74	7750.00	10.73

2650.00	13.73	7800.00	10.69
2675.00	13.71	7850.00	10.66
2700.00	13.69	7900.00	10.63
2725.00	13.68	7950.00	10.59
2750.00	13.66	8000.00	10.56
2775.00	13.64	8050.00	10.52
2800.00	13.61	8100.00	10.49
2825.00	13.59	8150.00	10.46
2850.00	13.57	8200.00	10.42
2875.00	13.54	8250.00	10.39
2900.00	13.52	8300.00	10.36
2925.00	13.49	8350.00	10.32
2950.00	13.46	8400.00	10.29
2975.00	13.43	8450.00	10.26
3000.00	13.40	8500.00	10.22
3025.00	13.37	8550.00	10.19
3050.00	13.34	8600.00	10.15
3075.00	13.31	8650.00	10.12
3100.00	13.28	8700.00	10.09
3125.00	13.25	8750.00	10.05
3150.00	13.22	8800.00	10.02
3175.00	13.20	8850.00	9.985
3200.00	13.20	8900.00	9.952
3225.00	13.20	8950.00	9.918
3250.00	13.20	9000.00	9.885
3275.00	13.20	9050.00	9.851
3300.00	13.20	9100.00	9.818
3325.00	13.20	9150.00	9.784
3350.00	13.19	9200.00	9.751
3375.00	13.19	9250.00	9.718
3400.00	13.18	9300.00	9.704
3425.00	13.18	9350.00	9.688
3450.00	13.17	9400.00	9.673
3475.00	13.16	9450.00	9.658
3500.00	13.15	9500.00	9.642
3525.00	13.14	9550.00	9.627
3550.00	13.13	9600.00	9.611
3575.00	13.12	9650.00	9.595
3600.00	13.11	9700.00	9.579
3625.00	13.10	9750.00	9.562
3650.00	13.09	9800.00	9.546
3675.00	13.07	9850.00	9.529
3700.00	13.06	9900.00	9.512
3725.00	13.05	9950.00	9.495
3750.00	13.03	10000.00	9.478

********** AERSCREEN MAXIMUM IMPACT SUMMARY **********

MAXIMUM 1-HOUR	SCALED 3-HOUR	SCALED 8-HOUR	SCALED 24-HOUR	SCALED ANNUAL

CALCULATION PROCEDURE	CONC (ug/m3)	CONC (ug/m3)	CONC (ug/m3)	CONC (ug/m3)	CONC (ug/m3)
FLAT TERRAIN	367.4	367.4	330.7	220.4	36.74

DISTANCE FROM SOURCE 38.30 meters directed toward 10 degrees

IMPACT AT THE AMBIENT BOUNDARY	367.4	367.4	330.7	220.4	36.74

DISTANCE FROM SOURCE 38.30 meters directed toward 10 degrees

AERSCREEN 21112 / AERMOD 21112 03/10/25
12:27:37

TITLE: TWELVE ENCLOSED GROUND FLARE - NORMAL

********** STACK PARAMETERS **********

SOURCE EMISSION RATE: 1.0000 g/s 7.937 lb/hr
STACK HEIGHT: 15.24 meters 50.00 feet
STACK INNER DIAMETER: 3.710 meters 146.06 inches
PLUME EXIT TEMPERATURE: 589.0 K 600.5 Deg F
PLUME EXIT VELOCITY: 0.230 m/s 0.75 ft/s
STACK AIR FLOW RATE: 5268 ACFM
RURAL OR URBAN: RURAL

FLAGPOLE RECEPTOR HEIGHT: 1.50 meters 4.92 feet

INITIAL PROBE DISTANCE = 10000. meters 32808. feet

********** BUILDING DOWNWASH PARAMETERS **********

BUILDING HEIGHT: 8.3 meters 27.3 feet
MAX BUILDING DIMENSION: 40.2 meters 132.0 feet
MIN BUILDING DIMENSION: 24.4 meters 80.0 feet
BUILDING ORIENTATION TO NORTH: 0. degrees
STACK DIRECTION FROM CENTER: 112. degrees
STACK DISTANCE FROM CENTER: 36.9 meters 120.9 feet

********** FLOW SECTOR ANALYSIS **********
25 meter receptor spacing: 38. meters - 5000. meters
50 meter receptor spacing: 5050. meters - 10000. meters

FLOW SECTOR	BUILD WIDTH	BUILD LENGTH	XBADJ	YBADJ	MAX 1-HR CONC	DIST (m)	TEMPORAL PERIOD
10*	0.00	0.00	0.00	0.00	407.3	38.3	SUM
20	0.00	0.00	0.00	0.00	407.3	38.3	SUM
30	0.00	0.00	0.00	0.00	407.3	38.3	SUM
40	0.00	0.00	0.00	0.00	407.3	38.3	SUM
50	0.00	0.00	0.00	0.00	407.3	38.3	SUM

60	0.00	0.00	0.00	0.00	407.3	38.3	SUM
70	46.14	36.67	-45.84	24.53	212.9	38.3	SUM
80	43.85	31.00	-46.85	19.38	285.1	38.3	SUM
90	40.23	24.38	-46.43	13.64	314.1	38.3	SUM
100	43.85	31.00	-51.59	7.49	285.1	38.3	SUM
110	46.14	36.67	-55.18	1.11	285.1	38.3	SUM
120	47.03	41.23	-57.09	-5.30	285.1	38.3	SUM
130	46.49	44.54	-57.27	-11.56	217.2	38.3	SUM
140	44.54	46.49	-55.71	-17.46	212.9	38.3	SUM
150	41.23	47.03	-52.45	-22.83	212.9	38.3	SUM
160	0.00	0.00	0.00	0.00	407.3	38.3	SUM
170	0.00	0.00	0.00	0.00	407.3	38.3	SUM
180	0.00	0.00	0.00	0.00	407.3	38.3	SUM
190	0.00	0.00	0.00	0.00	407.3	38.3	SUM
200	0.00	0.00	0.00	0.00	407.3	38.3	SUM
210	0.00	0.00	0.00	0.00	407.3	38.3	SUM
220	0.00	0.00	0.00	0.00	407.3	38.3	SUM
230	0.00	0.00	0.00	0.00	407.3	38.3	SUM
240	0.00	0.00	0.00	0.00	407.3	38.3	SUM
250	46.14	36.67	9.17	-24.53	149.8	50.0	SUM
260	43.85	31.00	15.85	-19.38	181.9	50.0	SUM
270	0.00	0.00	0.00	0.00	407.3	38.3	SUM
280	0.00	0.00	0.00	0.00	407.3	38.3	SUM
290	0.00	0.00	0.00	0.00	407.3	38.3	SUM
300	47.03	41.23	15.86	5.30	160.4	38.3	SUM
310	46.49	44.54	12.73	11.56	149.8	50.0	SUM
320	44.54	46.49	9.22	17.46	189.3	75.0	AUT
330	41.23	47.03	5.42	22.83	161.5	75.0	SUM
340	0.00	0.00	0.00	0.00	407.3	38.3	SUM
350	0.00	0.00	0.00	0.00	407.3	38.3	SUM
360	0.00	0.00	0.00	0.00	407.3	38.3	SUM

* = worst case flow sector

********** MAKEMET METEOROLOGY PARAMETERS **********

MIN/MAX TEMPERATURE: 250.0 / 320.0 (K)

MINIMUM WIND SPEED: 0.5 m/s

ANEMOMETER HEIGHT: 10.000 meters

SURFACE CHARACTERISTICS INPUT: AERMET SEASONAL TABLES

DOMINANT SURFACE PROFILE: Cultivated Land
DOMINANT CLIMATE TYPE: Average Moisture
DOMINANT SEASON: Summer

ALBEDO: 0.20
BOWEN RATIO: 0.50
ROUGHNESS LENGTH: 0.200 (meters)

SURFACE FRICTION VELOCITY (U*) NOT ADUSTED

METEOROLOGY CONDITIONS USED TO PREDICT OVERALL MAXIMUM IMPACT

```
 YR MO DY JDY HR
 -- -- -- --- --
 10 05 26  26 01

   H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN    Z0  BOWEN ALBEDO  REF WS
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
-55.06  1.016 -9.000  0.020 -999. 2354.   1869.7 0.200   0.50   0.20   10.00

   HT  REF TA     HT
- - - - - - - - - - -
  10.0   320.0    2.0
```

WIND SPEED AT STACK HEIGHT (non-downwash): 11.1 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 4.3 meters
ESTIMATED FINAL PLUME RISE (non-downwash): 1.1 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash): 5.4 meters

METEOROLOGY CONDITIONS USED TO PREDICT AMBIENT BOUNDARY IMPACT

```
 YR MO DY JDY HR
 -- -- -- --- --
 10 05 26  26 01

   H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN    Z0  BOWEN ALBEDO  REF WS
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
-55.06  1.016 -9.000  0.020 -999. 2354.   1869.7 0.200   0.50   0.20   10.00

   HT  REF TA     HT
- - - - - - - - - - -
  10.0   320.0    2.0
```

WIND SPEED AT STACK HEIGHT (non-downwash): 11.1 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 4.3 meters
ESTIMATED FINAL PLUME RISE (non-downwash): 1.1 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash): 5.4 meters

********** AERSCREEN AUTOMATED DISTANCES **********
OVERALL MAXIMUM CONCENTRATIONS BY DISTANCE

MAXIMUM MAXIMUM

DIST (m)	1-HR CONC (ug/m3)	DIST (m)	1-HR CONC (ug/m3)
38.30	407.3	3775.00	17.69
50.00	365.3	3800.00	17.63
75.00	295.1	3825.00	17.56
100.00	244.3	3850.00	17.50
125.00	207.8	3875.00	17.46
150.00	171.1	3900.00	17.43
175.00	142.3	3925.00	17.41
200.00	130.1	3950.00	17.39
225.00	117.2	3975.00	17.36
250.00	105.1	4000.00	17.34
275.00	102.5	4025.00	17.31
300.00	99.18	4050.00	17.28
325.00	96.41	4075.00	17.26
350.00	93.80	4100.00	17.23
375.00	91.27	4125.00	17.20
400.00	88.82	4150.00	17.17
425.00	86.47	4175.00	17.14
450.00	84.22	4200.00	17.11
475.00	82.05	4225.00	17.08
500.00	79.98	4250.00	17.05
525.00	78.00	4275.00	17.02
550.00	76.06	4300.00	16.99
575.00	74.05	4325.00	16.96
600.00	71.97	4350.00	16.93
625.00	69.83	4375.00	16.90
650.00	68.04	4400.00	16.86
675.00	66.24	4425.00	16.83
700.00	64.43	4450.00	16.80
725.00	63.13	4475.00	16.76
750.00	61.84	4500.00	16.73
775.00	60.53	4525.00	16.70
800.00	59.21	4550.00	16.66
825.00	57.86	4575.00	16.63
850.00	56.50	4600.00	16.59
875.00	55.13	4625.00	16.56
900.00	53.75	4650.00	16.52
925.00	52.36	4675.00	16.49
950.00	50.97	4700.00	16.45
975.00	49.57	4725.00	16.42
1000.00	48.17	4750.00	16.38
1025.00	46.78	4775.00	16.35
1050.00	45.38	4800.00	16.31
1075.00	43.99	4825.00	16.27
1100.00	42.61	4850.00	16.24
1125.00	41.24	4875.00	16.20
1150.00	39.88	4900.00	16.16
1175.00	38.54	4925.00	16.13
1200.00	37.21	4950.00	16.09
1225.00	35.90	4975.00	16.05
1250.00	34.61	5000.00	16.01
1275.00	33.34	5050.00	15.94

1300.00	32.10	5100.00	15.86
1325.00	30.89	5150.00	15.81
1350.00	29.70	5200.00	15.76
1375.00	29.07	5250.00	15.71
1400.00	28.79	5300.00	15.66
1425.00	28.50	5350.00	15.61
1450.00	28.21	5400.00	15.56
1475.00	27.93	5450.00	15.51
1500.00	27.64	5500.00	15.46
1525.00	27.36	5550.00	15.40
1550.00	27.08	5600.00	15.35
1575.00	26.79	5650.00	15.29
1600.00	26.51	5700.00	15.24
1625.00	26.24	5750.00	15.18
1650.00	25.96	5800.00	15.13
1675.00	25.69	5850.00	15.07
1700.00	25.42	5900.00	15.01
1725.00	25.15	5950.00	14.96
1750.00	24.89	6000.00	14.90
1775.00	24.62	6050.00	14.84
1800.00	24.36	6100.00	14.78
1825.00	24.11	6150.00	14.72
1850.00	23.85	6200.00	14.67
1875.00	23.60	6250.00	14.61
1900.00	23.36	6300.00	14.55
1925.00	23.25	6350.00	14.49
1950.00	23.23	6400.00	14.43
1975.00	23.20	6450.00	14.37
2000.00	23.17	6500.00	14.31
2025.00	23.14	6550.00	14.25
2050.00	23.10	6600.00	14.19
2075.00	23.06	6650.00	14.14
2100.00	23.02	6700.00	14.08
2125.00	22.97	6750.00	14.02
2150.00	22.92	6800.00	13.96
2175.00	22.87	6850.00	13.90
2200.00	22.81	6900.00	13.84
2225.00	22.75	6950.00	13.78
2250.00	22.69	7000.00	13.72
2275.00	22.63	7050.00	13.66
2300.00	22.56	7100.00	13.60
2325.00	22.49	7150.00	13.55
2350.00	22.43	7200.00	13.49
2375.00	22.35	7250.00	13.45
2400.00	22.28	7300.00	13.43
2425.00	22.21	7350.00	13.40
2450.00	22.13	7400.00	13.37
2475.00	22.06	7450.00	13.35
2500.00	21.98	7500.00	13.32
2525.00	21.90	7550.00	13.29
2550.00	21.82	7600.00	13.26
2575.00	21.73	7650.00	13.23
2600.00	21.65	7700.00	13.21
2625.00	21.57	7750.00	13.18

2650.00	21.48	7800.00	13.15
2675.00	21.40	7850.00	13.12
2700.00	21.31	7900.00	13.09
2725.00	21.23	7950.00	13.06
2750.00	21.14	8000.00	13.03
2775.00	21.05	8050.00	13.00
2800.00	20.96	8100.00	12.96
2825.00	20.88	8150.00	12.93
2850.00	20.79	8200.00	12.90
2875.00	20.70	8250.00	12.87
2900.00	20.61	8300.00	12.84
2925.00	20.52	8350.00	12.81
2950.00	20.43	8400.00	12.77
2975.00	20.34	8450.00	12.74
3000.00	20.25	8500.00	12.71
3025.00	20.16	8550.00	12.68
3050.00	20.07	8600.00	12.64
3075.00	19.98	8650.00	12.61
3100.00	19.89	8700.00	12.58
3125.00	19.80	8750.00	12.54
3150.00	19.71	8800.00	12.51
3175.00	19.62	8850.00	12.48
3200.00	19.53	8900.00	12.44
3225.00	19.44	8950.00	12.41
3250.00	19.35	9000.00	12.38
3275.00	19.26	9050.00	12.34
3300.00	19.17	9100.00	12.31
3325.00	19.08	9150.00	12.28
3350.00	18.99	9200.00	12.24
3375.00	18.90	9250.00	12.21
3400.00	18.81	9300.00	12.17
3425.00	18.72	9350.00	12.14
3450.00	18.64	9400.00	12.11
3475.00	18.55	9450.00	12.07
3500.00	18.46	9500.00	12.04
3525.00	18.37	9550.00	12.00
3550.00	18.29	9600.00	11.97
3575.00	18.21	9650.00	11.94
3600.00	18.15	9700.00	11.90
3625.00	18.08	9750.00	11.87
3650.00	18.02	9800.00	11.83
3675.00	17.95	9850.00	11.80
3700.00	17.89	9900.00	11.77
3725.00	17.82	9950.00	11.73
3750.00	17.76	10000.00	11.70

********** AERSCREEN MAXIMUM IMPACT SUMMARY **********

MAXIMUM 1-HOUR	SCALED 3-HOUR	SCALED 8-HOUR	SCALED 24-HOUR	SCALED ANNUAL

CALCULATION PROCEDURE	CONC (ug/m3)	CONC (ug/m3)	CONC (ug/m3)	CONC (ug/m3)	CONC (ug/m3)
FLAT TERRAIN	407.3	407.3	366.6	244.4	40.73

DISTANCE FROM SOURCE 38.30 meters directed toward 10 degrees

IMPACT AT THE AMBIENT BOUNDARY	407.3	407.3	366.6	244.4	40.73

DISTANCE FROM SOURCE 38.30 meters directed toward 10 degrees

APPENDIX F. APPROVAL ORDER NO. 23AQ-E048 REDLINE

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Eastern Region Office
4601 North Monroe St., Spokane, WA 99205-1295 • 509-329-3400

December 27, 2023

Etosha Cave
Twelve Benefit Corporation
614 Bancroft Way, Suite B
Berkeley, CA 94710

Re: Approval Order No. 23AQ-E048
AQPID No. A0250328

Dear Etosha Cave:

The Department of Ecology's Air Quality Program (Ecology) approves the installation and operation of equipment for pilot-scale production of sustainable jet fuel and Naphtha at Twelve Benefit Corporation's (Twelve) facility at 13583 Wheeler Road NE, Moses Lake, Washington in Grant County.

The facility's approval order contains a list of equipment at the site. Ecology's approval is based on the Notice of Construction application submitted on May 5th, 2023, and supplemental information provided on December 13th, 2023. The 15-day notification period required per Washington Administrative Code (WAC) 173-400-171 was completed. Ecology received no requests for a public comment period.

Enclosed is Approval Order No. 23AQ-E048 for Twelve's facility. If you have any questions, please contact me at david.finley@ecy.wa.gov or 509-342-5917.

Sincerely,

David Finley, P.E.
Commercial/Industrial Unit
Regional Air Quality Program

DF:sg

Enclosures: Approval Order No. 23AQ-E048

Certified Mail: 7019 0140 0000 6498 2209

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

Eastern Region Office
4601 North Monroe St., Spokane, WA 99205-1295 • 509-329-3400

December 27, 2023

Etosha Cave
Twelve Benefit Corporation
614 Bancroft Way, Suite B
Berkeley, CA 94710

Re: Approval Order No. 23AQ-E048
AQPID No. A0250328

Dear Etosha Cave:

The Department of Ecology's Air Quality Program (Ecology) approves the installation and operation of equipment for pilot-scale production of sustainable jet fuel and Naphtha at Twelve Benefit Corporation's (Twelve) facility at 13583 Wheeler Road NE, Moses Lake, Washington in Grant County.

The facility's approval order contains a list of equipment at the site. Ecology's approval is based on the Notice of Construction application submitted on May 5th, 2023, and supplemental information provided on December 13th, 2023. The 15-day notification period required per Washington Administrative Code (WAC) 173-400-171 was completed. Ecology received no requests for a public comment period.

Enclosed is Approval Order No. 23AQ-E048 for Twelve's facility. If you have any questions, please contact me at david.finley@ecy.wa.gov or 509-342-5917.

Sincerely,

David Finley, P.E.
Commercial/Industrial Unit
Regional Air Quality Program

DF:sg

Enclosures: Approval Order No. 23AQ-E048

Certified Mail: 7019 0140 0000 6498 2209

State of Washington Department of Ecology
Notice of Construction Approval Order

In the matter of approving a new air contaminant source for Twelve Benefit Corporation	)))	**Approval Order No. 23AQ-E048** **AQPID No. A0250328**

Project Summary

Twelve Benefit Corporation, herein referred to as the Permittee, is a new pilot-scale sustainable jet fuel (E-Jet Fuel) and Naphtha production facility located at 13583 Wheeler Road NE, Moses Lake, Washington, in Grant County.

The Permittee is classified as a true minor source.

The project consists of installation and operation of all equipment necessary for the pilot-scale production facility. Equipment at the facility is listed in the table below.

Equipment	Notes	Permit Applicable?
Enclosed ground flare	For control of process gas waste streams	Yes
Naphtha Product Tank	2,500 gal capacity	Yes
Naphtha Off-Spec Tank	1,000 gal capacity	Yes
Naphtha Day Tank	60 gal capacity	No
E-Jet Fuel Product Tank	5,047 ~~5,000~~ gal capacity	Yes
E-Jet Fuel Off-Spec Tank	1,000 gal capacity	No
E-Jet Fuel Day Tank No. 1	500 gal capacity	No
E-Jet Fuel Day Tank No. 2	500 gal capacity	No
Additive Storage Tanks	3 tanks, 30 gal capacity each	No
Cooling tower	None	Yes
Emergency diesel generator	1 megawatt	Yes
CO_2 Electrolysis units	None	Yes

Legal Authority

The emissions from the proposed project have been reviewed under the legal authority of RCW 70A.15.2210 and the applicable rules and regulations adopted thereunder. The proposed project, if operated as specified, will be in accordance with applicable rules and regulations, as set forth in Chapters 173-400 WAC and 173-460 WAC and the operation thereof, at the location proposed, will not result in ambient air quality standards being exceeded.

Therefore, it is ordered that the project as described in the Notice of Construction (NOC) application and more specifically detailed in plans, specifications, and other information submitted to the Washington State Department of Ecology (Ecology) is approved for construction and operation, provided the following conditions are satisfied:

Approval Conditions

1. **Operational Limitations**
   a. **Flare Operational Requirements**
      i. The flare is only approved to dispose of the waste gas produced by the fuel synthesis process. Any alterations that increase the capacity of the fuel synthesis process will require New Source Review of the flare emissions.
      ii. The flare must be operated with a flame present when waste gas is directed to the flare.
      iii. Propane or natural gas must be used to fuel the pilot light.
      iv. The pilot lights to the flare and high energy ignition system must be fully operable at all times when the fuel synthesis process is occurring, and gas is diverted to the flare.
      v. The heat content of the gas and vapors routed to the flare must be maintained at or above ~~300 British thermal units per standard cubic feet.~~ Replace with non-assisted and air assisted btu/ scf requirements of 40 CFR 60.18(c)(3)(ii)
      vi. The propane and natural gas lines to the pilot lights must be closed during periods when the flare is out of service.
      vii. The pilot light high energy ignition system must be operated and maintained in accordance with manufacturer specifications.
      viii. The exhaust gases from the flare must discharge into the atmosphere vertically with no horizontal deflection by a rain cover.
   b. **Production Limits**
      i. The facility is limited to producing one barrel (42 gallons) of Naphtha per day.
      ii. The facility is limited to producing four barrels (168 gallons) of E-Jet Fuel per day.
   c. **Emission Limits**
      i. There must be no visible emissions from the flare, as measured by 40 C.F.R. Part 60, Appendix A, Test Method 9.

2. **Operation and Maintenance**
   a. The Permittee must follow all recommended installation, configuration, operation, and maintenance provisions supplied by emission unit and component manufacturers.
   b. An operations and maintenance (O&M) manual must be developed by the Permittee for each emission unit. The manufacturer's instructions may be referenced in the O&M manual.
      i. The O&M manual must include the following, at a minimum:
         A. Normal operating parameters for emissions units.
         B. A maintenance schedule for each emissions unit.
         C. A description of the monitoring procedures.
         D. Monitoring and record keeping requirements.
         E. Actions for abnormal control system operation.
      ii. The O&M manuals must be developed within 30 days of commencing operation of each emission unit.
   c. Emission units must be operated and maintained in accordance with the O&M manual.
   d. The Permittee must assess all complaints received. The Permittee must initiate corrective action in response to a complaint within three calendar days of receipt of the complaint.

3. **Monitoring and Recordkeeping**
   a. The O&M manual must be reviewed annually.
      i. The date of each review and the person performing each review must be documented in the O&M manual.
      ii. The O&M manual be updated to reflect any modifications to emission units or operating procedures.
   b. O&M records must be kept on premises in hard copy or readily available on-site electronically.
   c. For all air-quality related complaints, the following records must be kept:
      i. A written record of the complaint received by the Permittee or forwarded to the Permittee.
      ii. The Permittee's action to investigate the validity of the complaint, any corrective action that was taken in response to the complaint, and the effectiveness of the remedial action.

d. The date, time, duration, and cause of any periods where control technology equipment is out of service must be documented and maintained.

e. All data required by this NOC Approval Order must be maintained in a readily retrievable manner for a period of five years and must be made available to authorized representatives of Ecology upon request.

f. The Permittee must complete any additional monitoring or recordkeeping necessary to determine compliance with the requirements of this NOC Approval Order, as determined by Ecology.

4. **Testing** Note, the flare will be operating in a non-assisted scheme during normal operations.

a. The ~~air-assisted~~ flare system must be initially tested for net heating value and exit velocity at normal operations. The test methods listed must be used for all test events unless an alternate method is proposed by the Permittee and approved in writing by Ecology prior to the test.

i. Net heating value of gas being combusted (in units of megajoules per standard cubic meter) must be determined using the concentration of the sample in parts per million on a wet basis, and the net heat combustion of the sample in kilocalories per gram mole at 25 degrees Celsius (temperature) and 760 millimeters of mercury (atmospheric pressure). The concentration of the sample on a wet basis must be measured using EPA Method 18. The net heating value of gas being combusted must be greater than or equal to ~~300~~ 200 British thermal units per standard cubic foot for the ~~air-assisted flare~~ flare when operating non-assisted (during normal operations).

ii. The actual exit velocity for the flare (in units of meters per second) must be determined by dividing the volumetric flowrate (in units of standard temperature and pressure) by the unobstructed cross-sectional area of the flare tip. Volumetric flowrate must be determined using EPA Method 2, 2A, 2C, or 2D, as appropriate. The actual exit velocity must be less than or equal to the maximum permitted velocity for the flare (in units of meters per second). The maximum permitted velocity for the flare must be determined using the following equation.

A. Maximum permitted velocity = ~~8.706 + (0.7084 x Net heating value of gas being combusted as determined in Condition 4.a.i)~~ Replace with 40 CFR 60.18(f)(5) for non-assisted flares.

b. The Permittee must conduct its initial performance test within 120 days of commissioning the flare system, unless a request for extension is received by Ecology in writing prior to the deadline and subsequently approved.

c. The Permittee must submit a test plan to Ecology for review and approval at least 30 days prior to source testing. Ecology may require a new protocol for re-test events conducted after a failed source test, when required, and Ecology may approve a shorter timeframe for submission for the re-test protocol. The test plan must include the following information, at a minimum:

i. Identification of each emission unit to be tested.

ii. The operating parameters to be monitored during the test.

iii. A description of the emission units to be tested.

iv. The time and date of the proposed source test.

v. Identification and qualifications of the source test personnel.

vi. A description of the test methods and procedures to be used.

d. Test reports must be submitted to Ecology within 60 days of completion of the source testing. Test reports must include the following information, at a minimum:

i. The information described under Approval Conditions 4.a.i and 4.a.ii.

ii. The information described in the test plan and any subsequent test plan approval letters.

iii. Field and analytical laboratory data.

iv. Quality assurance/quality control procedures and documentation.

v. Analyzer data recorded during the test.

vi. A summary of results, reported in units and averaging periods consistent with the applicable limits.

vii. A summary of control system and equipment operating conditions.

viii. Copies of all field data.

ix. Chain of custody information.

x. Calibration documentation.

xi. Discussion of any abnormalities associated with the results.

xii. A statement signed by the senior management official of the testing firm certifying the validity of the source test report.

xiii. Calculations for applicable test results.

e. The Permittee must provide adequate sampling ports, safe sampling platforms, and access to platforms and utilities for sampling and testing, in accordance with 40 C.F.R. 60.8, 40 C.F.R. 63.7(d), and WAC 173-400-105(4).

f. When information obtained by Ecology indicates the need to quantify emissions, Ecology may require the Permittee to conduct material analysis or air emission testing under WAC 173-400-105. This testing requirement is in addition to any testing required by Ecology in this NOC Approval Order, other permits, or other state or federal requirements.

5. **Reporting**

   a. All notifications, plans, reports, and other submittals must be submitted to Ecology's Eastern Region Office at the following address:

      Washington State Department of Ecology
      Eastern Region Air Quality Program
      4601 N. Monroe St.
      Spokane, WA 99205-1295

      Reports may be submitted electronically to ecyaqciero@ecy.wa.gov

      OR AS DIRECTED.

   b. The Permittee must notify Ecology within one business day of the receipt of any complaint.

   c. The Permittee must notify Ecology within three days anytime there is an excursion from the requirements in Approval Condition 1.

   d. The Permittee must notify Ecology of commissioning of emission units within one week of initiating such activities, unless otherwise specified by Ecology. The notice must include:

      i. Equipment make, model, and serial number, as applicable.

   e. The Permittee must notify Ecology within 30 days of the following events:

      i. Commencement of construction of the project.

      ii. Completion of the construction of the project.

      iii. If construction or operation has been discontinued for more than 18 months.

   f. The Permittee must notify Ecology within 60 days (or longer as approved by Ecology) of the following events:

      i. Changes in operation contrary to information submitted in the NOC application.

      ii. Discontinued operations. This notification must include a shutdown status maintenance plan containing the following information, at a minimum:

         A. Maintenance that will be performed during the shutdown to allow startup in a timely manner with minimum amount of work and emissions, (allowable emission levels as of the date of shutdown cannot increase upon reopening).

      iii. Reactivating the facility following discontinued operations of 18 months or more. This notification must include a start-up plan containing the following information, at a minimum:

         A. Documentation that the shutdown maintenance was performed during shutdown to allow startup in a timely manner with minimum amount of work

and emissions (allowable emissions levels as of the date of shutdown cannot increase upon reopening).

B. Documentation of testing performed which demonstrates that units are still able to meet the parameters of this approval order after being inactive, or other documentation which demonstrates why testing is not necessary.

6. **General Conditions**

a. **Activities Inconsistent with this Order** - Any activity undertaken by the Permittee, or others, in a manner that is inconsistent with the data and specifications submitted as part of the NOC application or this NOC Approval Order, must be subject to Ecology enforcement under applicable regulations.

b. **Availability of Order** - Legible copies of this NOC Approval Order and any O&M manual(s) must be available to employees in direct operation of the equipment described in the NOC application and must be available for review upon request by Ecology.

c. **Compliance Assurance Access** - Access to the source by representatives of Ecology or the United States Environmental Protection Agency (EPA) must be permitted upon request. Failure to allow access is grounds for enforcement action under the federal Clean Air Act or the Washington State Clean Air Act, and may result in revocation of this NOC Approval Order.

d. **Discontinuing Construction or Operation** – This NOC Approval Order will become invalid if construction of the equipment described in the NOC application and this NOC Approval Order does not commence within 18 months after receipt of this NOC Approval Order.

If construction or operation is discontinued for 18 months or longer on a portion or all of the equipment described in the NOC application and this NOC Approval Order, the portion of the NOC Approval Order regulating the inactive equipment will become invalid. Ecology may extend the 18-month period upon request by the Permittee and a satisfactory showing that an extension is justified.

e. **Equipment Operation** - Operation of the facility must be conducted in compliance with all data and specifications submitted as part of the NOC application and in accordance with O&M manuals, unless otherwise approved in writing by Ecology.

f. **Registration** - Periodic emissions inventory and other information may be requested by Ecology. The requested information must be submitted within 30 days of receiving the request, unless otherwise specified. All fees must be paid by the date specified.

g. **Violation Duration** - If the Permittee violates an approval condition in this NOC Approval Order, testing, recordkeeping, monitoring, or credible evidence will be used to establish the starting date of the violation. The violation will be presumed to

continue until testing, recordkeeping, monitoring, or other credible evidence indicates compliance. A violation of an approval condition includes, but is not limited to, failure of air pollution control equipment, failure of other equipment resulting in increased emissions, or a failed source test indicating an exceedance of an emission limit.

h. **Obligations Under Other Laws or Regulations** - Nothing in this NOC Approval Order must be construed so as to relieve the Permittee of its obligations under any state, local, or federal laws or regulations.

i. **Maintaining Compliance** - It must not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the operations in order to maintain compliance with the conditions of this NOC Approval Order.

j. **Visible Emissions** - No visible emissions from the source are allowed beyond the property line, as determined by 40 C.F.R. Part 60, Appendix A, Test Method 22.

k. **Changes in Operations** - Any changes in operation contrary to information submitted in the NOC application must be reported to Ecology at least 60 days before the changes are implemented. Such changes in operation may require a new or amended NOC Approval Order.

Authorization may be modified, suspended, or revoked in whole or part for cause, including, but not limited to, the following:

- Violation of any terms or conditions of this authorization.
- Obtaining this authorization by misrepresentation or failure to disclose all relevant facts.

The provisions of this authorization are severable and, if any provision of this authorization or application of any provision to any circumstance is held invalid, the application of such provision to other circumstances, and the remainder of this authorization, must not be affected thereby.

Your Right to Appeal

You have a right to appeal this NOC Approval Order to the Pollution Control Hearings Board (PCHB) within 30 days of the date of receipt of this NOC Approval Order. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do all of the following within 30 days of the date of receipt of this NOC Approval Order:

- File your appeal and a copy of this NOC Approval Order with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.

- Serve a copy of your appeal and this NOC Approval Order on Ecology in paper form - by mail or in person (see addresses below). E-mail is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

Address and Location Information

Street Addresses:

Department of Ecology
Attn: Appeals Processing Desk
300 Desmond Drive SE
Lacey, WA 98503

Pollution Control Hearings Board
1111 Israel Rd SW
STE 301
Tumwater, WA 98501

Mailing Addresses:

Department of Ecology
Attn: Appeals Processing Desk
PO Box 47608
Olympia, WA 98504-7608

Pollution Control Hearings Board
PO Box 40903
Olympia, WA 98504-0903

E-mail Address:

Department of Ecology
Not currently available (see WAC 371-08)

Pollution Control Hearings Board
Pchb-shbappeals@eluho.wa.gov

Americans with Disabilities Act Information

Accommodation Requests

To request ADA accommodation including materials in a format for the visually impaired, call Ecology at 360-407-7668 or visit https://ecology.wa.gov/accessibility. People with impaired hearing may call Washington Relay Service at 711. People with speech disability may call TTY at 877-833-6341.

Dated on this 27th Day of December, 2023.

Prepared by:

David Finley, PE
Commercial Industrial Unit
Air Quality Program
Eastern Region Office

Approved by:

Karin Baldwin
Section Manager
Air Quality Program
Eastern Region Office

Dated on this 27th Day of December, 2023.

Prepared by:

David Finley, PE
Commercial Industrial Unit
Air Quality Program
Eastern Region Office

Approved by:

Karin Baldwin
Section Manager
Air Quality Program
Eastern Region Office

APPENDIX G. BACT COST CALCULATION AND SUPPORT DOCUMENTS

Table D-1. General Cost Calculation Inputs

Number of Engines	1
Bank Prime Rate (Feb 2025) [a]	7.50%
Lifespan of SCR (yrs.) [b]	25
Lifespan of DPF (yrs.) [b]	25
Lifespan of Tier 4 Integrated Control System (yrs.)	25
CEPCI 2016 ($)	541.7
CEPCI 2023 ($)	797.9

a. Capital recovery is calculated using a 7.50% annual interest rate, which is the bank prime rate as of February 2025.

b. A 25-yr life span is conservatively assumed for the SCR system, in accordance with Section 4, Chapter 2 of EPA APCCM, 7th Edition. A 25-year life span is conservatively assumed for the DPF and Tier 4 Integrated Control System as well.

Table D-2. Criteria Pollutant Emission Rates and Control Efficiencies

Pollutant	Engine EF tpy	SCR Removal[a.] %	DPF Removal %	Tier 4 Removal[b.] %
Nitrogen Oxides (NO_X)	1.58	90%	0%	92%

a. NOx removal % conservatively set to 90% as maximum of range from Section B.15 "Selective Catlaytic Reduction" of EPAs CAM Technical Guidance Document.

b. NOx reduction from Tier 4 based on 2015 NOx emission standard for gensets >1200 hp from Table II. A-4 "Tier 4 Standards for Engines Over 750 HP".

(5.97 [g/bhp-hr] - 0.50 [g/bhp-hr]) / 5.97 [g/bhp-hr]) = 92%

Table D-3. Toxic Air Pollutant Emission Rates and Control Efficiencies [a]

Pollutant	CAS	Engine EF tpy	SCR Removal %	DPF Removal %	Tier 4 Removal %
Nitrogen Dioxide (NO_2)	10102-44-0	1.58	90%	0%	92%

a. Conservatively assumed that all NOx emitted as NO2.

Table D-4. SCR Cost Calculation Inputs

MW of NH_3 (g/mol)	17.03
MW of NO_X (g/mol)	46.01
Ammonia Cost ($/gal)	0.293
Operational Hours (hr/yr/engine)	170
Aqueous Ammonia Concentration (%w/w)	29%
Specific Gravity 29% ammonia [a]	0.9
Water density (lb/gal)	8.35
Size of engines (MW)	1
Engine Rating (MMBTU/hr)	3.82
Elevation Factor (P/P_0) [b]	1.00
NRF [c]	1.125
$CC_{replace}$ ($/ft^3) [d]	227

a. The specific gravity of 29% ammonia is estimated as 0.9, per the aqua ammonia specific gravity chart from Inyo Process (https://inyoprocess.com/images/chem_appl/aqua_ammonia_specific_gravity_chart.pdf)

b. Elevation factor based on EPA Control Cost Manual, 7th Edition, Equation 2.39a. Elevation of Moses Lake facility assumed to be approximately 1000ft.

c. NRF is the NOX removal, as defined in the EPA Control Cost Manual, 7th Edition, Equation 2.41.

d. $CC_{replace}$ is the cost of catalyst replacement. The value used is the catalyst replacement cost used in EPA Control Cost Manual, 7th Edition, Section 4, Chapter 2.5, Example Problem #1.

Table D-5. Tier 4. Cost Calculation Inputs

Tier 4 Emission Control Package Cost ($)	$ 433,464

a. Cost for tier 4 integrated control package is based on difference of vendor quotes for Tier 4 and Tier 2 genset.

BACT Cost Analysis for NO_X - SCR Option - Emergency Genset

Table D-5a. Capital Costs

Capital Cost	Description	Calculated Cost		Variable Reference
Direct Cost				
	Emission Control Package for Engine	$ 120,160	[a]	A
	Sales Tax	$ 7,810		B = WA State Tax of 6.5% x (A)
	Shipping	$ -	[f]	
	Installation for Engine	$ 24,032	[a]	C = A * 20%
Total Direct Cost		*$ 152,002*		TDC = A + B + C
Indirect Cost				
	Engineering	$ -	[f]	
	Construction and Field Expenses	$ -	[f]	
	Contractor Fees	$ -	[f]	
	Startup	$ -	[f]	
	Performance Test	$ -	[f]	
	Contingencies	$ -	[f]	
Total Indirect Cost				
Total Capital Investment		**$ 152,002**	[a]	

Table D-5b. Operating Costs

Operating Cost			Variable Reference
Direct Annual Cost			
	Maintenance	$ 760 [c]	M = 0.5% x TCI
	Catalyst Cost	$ 5,133 [c]	N = {Cost of replacement catalyst}
	Reagent Consumption	$ 149 [d]	O = {NO_X removal, cost of ammonia}
Total Direct Annual Costs		*$ 6,042*	DAC = M + N + O
Indirect Annual Costs			
	Administrative Charges	$ 315 [b]	P = 3% x ((Op. Labor Cost) + 40% x K)
	Property Tax	$ 1,520.02 [b]	Q = 1% x TCI
	Insurance	$ 1,520.02 [b]	R = 1% x TCI
		[e]	
	Capital Recovery	$ 13,636.24	CRC_S = TCI x CRF
Total Indirect Annual Costs		*$ 16,991*	IDAC = P + Q + R + CRC
Total Annual Cost [h]		**$ 23,033**	TAC = DAC + IDAC

a. Cost for SCR based on CARBs "Analysis of the Technical Feasibility and Costs of After-Treatment Controls on New Emergency Standby Engines", B-8.

b. Operator labor cost used in the calculation of administrative charges is calculated assuming a maximum labor usage of 170 hr/yr/engine, which is the maximum number of operational hours for the engine. Operator labor cost is calculated using the labor rate in Section 4, Chapter 2, 2.5 of the EPA Air Pollution Control Cost Manual Example Problem #1. Administrative charges, property tax, and insurance are calculated according to Section 1, Chapter 2, 2.6.5.8 of the APCCM.

c. Maintenance cost is calculated in accordance with Equation 2.57 of Chapter 2, Section 4 of EPA APCCM, 7th Edition. Catalyst cost is calculated per Equation 2.67, Chapter 2, Section 4 of EPA APCCM, 7th Edition.

d. Reagent consumption is calculated in accordance to Equation 2.35, Chapter 2, Section 4 of EPA APCCM. It is assumed that anhydrous ammonia is used for this BACT cost analysis, because "anhydrous ammonia

e. Capital recovery is calculated using a 7.5% annual interest rate, which is the bank prime rate as of February 2025, and a 25-yr life span for the SCR system, in accordance with Section 4, Chapter 2 of EPA APCCM, 7th Edition.

f. Indirect costs are assumed to be negligable for a conservative cost estimate. For annual operating cost, it is conservatively assumed that operating labor, supervisory labor, and electricity are negligible since the emission units will not be operated continuously.

Table D-5c. Criteria Pollutant Control Cost Effectiveness

Annual Control Cost for SCR	$ 23,033	
	Total Removal (tpy)	**Relative Cost ($/ton removed)**
Removal efficiency of 90% for NOx	1.42	$ 16,197.90

Table D-5d. Toxic Air Pollutant Control Cost Effectiveness

Pollutant [a]	**ASIL (µg/m^3)**	**ASIL Based Cost Factor [b]**	**Total Removal (tpy)**	**Relative Cost ($/ton removed)**
efficiency of 90% for Nitrogen Dioxide (NO2)	4.70E+02	1.8	1.42	$ 16,197.90

BACT Cost Analysis for NO_X- Tier 4 Integrated Control Package - Emergency Genset

Table D-8a. Capital Costs

Capital Cost	Description	Calculated Cost		Variable Reference
Direct Cost				
	Emission Control Package for Engine	$ 433,464	[a]	A
	Sales Tax	$ 28,175	[b]	B = WA State Tax of 6.5% x (A)
	Shipping	$ 3,000	[b]	C = 5% x (A)
	Instrumentation	$ -	[b]	D = 1% x (A)
Total Direct Cost		*$ 464,639*		TDC = A + B + C + D
Indirect Cost				
	Engineering	$ -	[c]	E
	Construction and Field Expenses	$ -	[c]	F
	Contractor Fees	$ -	[c]	G = 6.8% x (A + B + C + D)
	Startup	$ -	[c]	H
	Performance Test	$ -	[c]	I = 1% x (A + B + C + D + E)
	Contingencies	$ -	[c]	J = 3% x (A + B + C + D + E)
Total Indirect Cost		*$* -		TIC = E + F + G + H + I + J
Total Capital Investment		**$ 464,639**		TCI = TDC + TIC

Table D-8b. Operating Costs

Operating Cost				Variable Reference
Indirect Annual Costs				
	Administrative Charges	$ 9,293	[b]	K = 2% × TCI
	Property Tax	$ 4,646	[b]	L = 1% × TCI
	Insurance	$ 4,646	[b]	M = 1% × TCI
	Capital Recovery	$ 41,683.09	[d]	CRC_S = TCI x CRF
Total Indirect Annual Costs		*$ 60,269*		IDAC = K + L + M + CRC
Total Annual Cost [e]		**$ 60,269**	[e]	TAC = IDAC

a. Cost for tier 4 integrated control package is based on difference of vendor quotes for Tier 4 and Tier 2 genset.

b. Shipping costs from vendor quote for Tier 4 genset. = Instrumentation costs are calculated in accordance to Table 2.4, Section 2.6.4, Chapter 2, Section 1 of EPA Air Pollution Control Cost Manual (APCCM), 7th Edition. Sales tax is calculated using the Washington state sales tax rate. Indirect annual costs are calculated per EPA APCCM Section 1, Chapter 2, 2.6.5.8.

c. Indirect Costs conservatively assumed to be $0.00.

d. Capital recovery is calculated using a 7.5% annual interest rate, which is the bank prime rate as of February 2025, and a 25-yr life span for the Tier 4 genset.

e. For annual operating cost, it is conservatively assumed that operating labor, supervisory labor, and electricity are negligible since the emission units will not be operated continuously. The cost for maintenance is also conservatively assumed negligible.

Table D-8c. Criteria Pollutant Control Cost Effectiveness

Annual Control Cost for Diesel Oxidation	**$**	**60,269**
	Total Removal (tpy)	**Relative Cost ($/ton removed)**
Removal efficiency of 92% for NOx	1.45	$ 41,631.44

Table D-8d. Toxic Air Pollutant Control Cost Effectiveness

Pollutant [a]	**ASIL (µg/m^3)**	**ASIL Based Cost Factor** [b]	**Total Removal (tpy)**	**Relative Cost ($/ton removed)**
l efficiency of 92% for Nitrogen Dioxide (NO2)	4.70E+02	1.76	1.45	$ 41,631.44

United Rentals

POWER & HVAC
BRANCH #34
2249 DAVIS CT
STE B
HAYWARD CA 94545-1113
510-670-0373

SALE QUOTE

240062298

Job Site

MOSES LAKE PLANT
13583 WHEELER RD NE
MOSES LAKE WA 98837-8656

Office: 510-833-9312

TWELVE BENEFIT CORPORATION
614 BANCROFT WAY, SUITE B
BERKELEY CA 94710

Customer #	: 5934268
Quote Date	: 10/14/24
UR Job Loc	: 13583 WHEELER RD NE,
UR Job #	: 4
Customer Job ID:	
P.O. #	: TBD
Ordered By	: MATT NORLANDER
Written By	: TUCKER BISHOP
Salesperson	: TUCKER BISHOP

This is not an invoice
Please do not pay from this document

Qty	Equipment #		Price	Amount
1	2404050	CC: 240-4050	734148.00	734148.00

GENERATOR 1200-1399 KVA TIER 4
C1000DERE TIER 4 FINAL KW RENTAL BASE UNIT 208/240/480
ENCLOSED TRAILER MOUNTED
CUMMINS QSX15-G17 TWIN
3.3 CONTROLLER WITH MLD PARALLELING SYSTEM
ME GPS TELEMATICS DEVICE
PARALELINS HACOAS
RPM QUICK FIT KIT

DELIVERY CHARGE 3000.00

Sub-total:	737148.00
Tax:	62657.58
Total:	799805.58

CONTACT: MATT NORLANDER
CELL#: 925-819-0572

Note: This proposal may be withdrawn if not accepted within 30 days.