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Air Title V Operating Permit (AOP) - New

version 2.5

(Submission #: HQ2-AH74-JK32R, version 1)

Details

Submission ID HQ2-AH74-JK32R

Status In Process

Form Input

Form Instructions

Section A - Applicant Information

Owner

Company Name
Crestwood Midstream Partners LP (Roughrider LLC)

Address

1300 Main Street

Houston, TX 77002

United States

Responsible Official

Prefix
NONE PROVIDED

First Name	Last Name
Matthew	*Gordon*

Title
VP - Operations

Phone Type	Number	Extension
Business	610-670-3284	

Email
matthew.gordon@energytransfer.com

Address

525 Fritztown Road

Sinking Spring, PA 19608

United States

Contact Person for Air Pollution Matters

Prefix
NONE PROVIDED

First Name	Last Name
Melissa	*Benzaia*

Title
Manager - Environmental Engineering

Phone Type	Number	Extension
Business	7139897849	

Email
melissa.benzaia@energytransfer.com

Address
1300 Main Street
Houston, TX 77002
United States

Section B (Part 1) - Facility Information

Facility Name
Energy Transfer LP - Wild Basin Gas Processing & Crude Handling Facility

Is this a portable source?
No

Facility Location
[NO STREET ADDRESS SPECIFIED]
[NO CITY SPECIFIED], ND [NO ZIP CODE SPECIFIED]
United States

County
McKenzie

Facility Location:
47.858703,-103.192392

Please download the form linked here, complete it, and upload it to this application using the attachment control below.

When completing the online application, if uploaded files are provided in each section (when indicated), do not include those same files in the General Document Upload/File Upload section. If uploading the application files in the General Document Upload/File Upload section, only fill out the required (asterisked) sections of the online application.
PERMIT APPLICATION FOR TITLE V PERMIT TO OPERATE (SFN52858)

Attach completed form here
SFN52858-MG-SIGNED-032224.pdf - 03/22/2024 12:23 PM
Comment
NONE PROVIDED

Is this source subject to Title IV Acid Rain regulations?
No

Section B (Part 2) - Additional Location Information

Legal Description of Facility Site

Qtr Qtr	Qtr	Section	Township	Range
NONE PROVIDED	NW	35	151N	98W

Land area at facility site (in sq. ft.)
NONE PROVIDED

Mean sea level (MSL) elevation at facility (in feet)
NONE PROVIDED

Section C - Nature of Business

General Nature of Business

Describe Nature of Business	NAICS Code	SIC Code
Gas Processing and Crude Handling Facility	211112	1321-Natural Gas Liquids

Actual Start of Construction Date
NONE PROVIDED

Actual End of Construction Date
NONE PROVIDED

Facility Startup Date
NONE PROVIDED

Section D - Process Equipment Information (1 of 1)

Emission Unit -

Emission Unit ID
NONE PROVIDED

Emission Unit Description
NONE PROVIDED

Emission Point ID
NONE PROVIDED

Emission Point Description
NONE PROVIDED

Emission Process Description
NONE PROVIDED

Emission Unit Status
NONE PROVIDED

Applicable PTCs

PTC Number

Applicable Federal Air Programs

Program Code

Applicable State Regulations

Regulation

Emission Unit form

Download the emission unit form linked here, complete it, and upload it to this application using the attachment control below.

When completing the online application, if uploaded files are provided in each section (when indicated), do not include those same files in the General Document Upload/File Upload section. If uploading the application files in the General Document Upload/File Upload section, only fill out the required (asterisked) sections of the online application.

EMISSION UNIT FOR TITLE V PERMIT TO OPERATE (SFN61006)

Attach Emission Unit Form

NONE PROVIDED

Comment

NONE PROVIDED

Section E - Control Equipment (1 of 1)

Emission Unit: `EU_ID` - `EU_DESC`

Control Equipment ID

NONE PROVIDED

Control Equipment Description

NONE PROVIDED

Control equipment form

Download the form linked here, complete it, and upload it to this application using the attachment control below.

When completing the online application, if uploaded files are provided in each section (when indicated), do not include those same files in the General Document Upload/File Upload section. If uploading the application files in the General Document Upload/File Upload section, only fill out the required (asterisked) sections of the online application.
Control equipment form - SFN8532

Attach Control Equipment Form

NONE PROVIDED

Comment

NONE PROVIDED

Section F - Facility-Wide Applicable Regulations and Potential to Emit (PTE)

Applicable Federal Air Programs

Program Code

Applicable State Regulations

Regulation

Potential to Emit (PTE)

Pollutant	Tons Per Year Without Fugitives	Tons Per Year With Fugitives
NOx	207.7	207.7
CO	161.39	161.39
VOCs	169.662	219.48
SO2	1.52	1.52
PM	23.09	23.09
PM10	23.09	23.09
PM2.5	23.07	23.07
Total HAPs	16.891	18.37

Emission Calculations Document Upload

Using the attachment control below, upload emission calculations documents.

When completing the online application, if uploaded files are provided in each section (when indicated), do not include those same files in the General Document Upload/File Upload section. If uploading the application files in the General Document Upload/File Upload section, only fill out the required (asterisked) sections of the online application.

Attach Emission Calculations Documents

NONE PROVIDED

Comment

NONE PROVIDED

Section G - Compliance Schedule

Download the form linked here, complete it, and upload it to this application using the attachment control below.

When completing the online application, if uploaded files are provided in each section (when indicated), do not include those same files in the General Document Upload/File Upload section. If uploading the application files in the General Document Upload/File Upload section, only fill out the required (asterisked) sections of the online application.
COMPLIANCE SCHEDULE AND PLAN FOR TITLE V PERMIT TO OPERATE (SFN61008)

Attach completed form here

NONE PROVIDED

Comment

NONE PROVIDED

Section H - Flexible Permits

Are you requesting a flexible permit?

No

Section I - Compliance Assurance Monitoring (CAM)

To determine if your facility is subject to CAM, review the information provided at the link. Please provide new or modified CAM Plans here.

When completing the online application, if uploaded files are provided in each section (when indicated), do not include those same files in the General Document Upload/File Upload section. If uploading the application files in the General Document Upload/File Upload section, only fill out the required (asterisked) sections of the online application.
Compliance Assurance Monitoring (CAM) Guidance

Attach completed form

NONE PROVIDED

Comment

NONE PROVIDED

Section K - General Document Upload

General Document Upload

Use the attachment control below to upload any other information necessary for application review, such as plot plans, process diagrams, maps, etc.

When completing the online application, if uploaded files are provided in each section (when indicated), do not include those same files in the General Document Upload/File Upload section. If uploading the application files in the General Document Upload/File Upload section, only fill out the required (asterisked) sections of the online application.

Attachments

20240322_Initial PTO_Rough Rider Operating_Wild Basin Gas Proc and Crude Hndl.pdf - 03/22/2024 12:27 PM

Comment

NONE PROVIDED

Attachments

Date	Attachment Name	Context	User
3/22/2024 12:27 PM	20240322_Initial PTO_Rough Rider Operating_Wild Basin Gas Proc and Crude Hndl.pdf	Attachment	Melissa Benzaia
3/22/2024 12:23 PM	SFN52858-MG-SIGNED-032224.pdf	Attachment	Melissa Benzaia

Status History

	User	Processing Status
3/22/2024 11:04:43 AM	Melissa Benzaia	Draft
3/22/2024 1:34:06 PM	Melissa Benzaia	Signing
3/22/2024 1:34:07 PM	Melissa Benzaia	Submitting
3/22/2024 1:35:50 PM	Melissa Benzaia	Submitted
3/22/2024 1:35:52 PM	Melissa Benzaia	In Process

Agreements and Signature(s)

SUBMISSION AGREEMENTS

- ☑ I am the owner of the account used to perform the electronic submission and signature.
- ☑ I have the authority to submit the data on behalf of the facility I am representing.
- ☑ I agree that providing the account credentials to sign the submission document constitutes an electronic signature equivalent to my written signature.
- ☑ I have reviewed the electronic form being submitted in its entirety, and agree to the validity and accuracy of the information contained within it to the best of my knowledge.

I certify under penalty of lawthat the enclosed documents and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I also certify that the source(s) identified in this application is/are in compliance with all applicable requirements except those requirements for which a compliance schedule has been submitted in the Compliance Schedule Form or Compliance Schedule Section of the application . I understand that failure to comply with any term of a compliance schedule is considered to be a violation of regulation NDAC 33.1-15-14-06.1.e. The source will continue to comply with the current applicable requirements with which it is in compliance. The source will meet, on a timely basis, any applicable requirement, which becomes effective during the permit term. The source is properly implementing any required risk management plan in accordance with section 112(r) of the federal clean air act, if appropriate.

I certify, as the Responsible Official, that I have read and understood the above requirements and conditions applicable to my source/facility and that the information and attachments provided in this application are true, accurate, and complete to the best of my knowledge." Further, I agree to comply with the provisions of Chapter 23.1-06 of the North Dakota Century Code and all rules and regulations of the Department, or revisions thereof. I also understand a permit is nontransferable and, if granted a permit, I will promptly notify the Department upon sale or legal transfer of this permitted establishment.

Note: This certification must be signed by a "responsible official" as defined in NDAC 33.1-15-14-06.1.

Signed By Melissa Benzaia on 03/22/2024 at 1:34 PM

INITIAL PERMIT TO OPERATE APPLICATION

Wild Basin Gas Processing and Crude Handling Facility
Watford City, North Dakota

Prepared for:

ENERGY TRANSFER

Rough Rider Operating, LLC, a subsidiary of
Energy Transfer, LP
Houston, Texas 77002

MARCH 2024

Prepared by:

EDGE ENGINEERING & SCIENCE
further insight.

Edge Engineering and Science, LLC
16285 Park Ten Place; Suite 300
Houston, Texas 77084

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LIST OF TABLES

LIST OF APPENDICES

LIST OF ACRONYMS

AAQS	Ambient Air Quality Standard
bbl	barrel
CAAA	Clean Air Act Amendments
CAM	Compliance Assurance Monitoring
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2e	carbon dioxide equivalents
EDGE	Edge Engineering and Science, LLC
EPA	U.S. Environmental Protection Agency
EU	emission unit
HAP	hazardous air pollutant
hp	horsepower
hr	hour
ICE	internal combustion engine
IFR	internal floating roof
LACT	Lease Automatic Custody Transfer
LDAR	Leak Detection and Repair
MACT	Maximum Achievable Control Technology
MMBtu	million British thermal units
MMscf	million standard cubic feet
MSS	maintenance, startup, and shutdown
NDAC	North Dakota Administrative Code
NDDEQ	North Dakota Department of Environmental Quality
NESHAP	National Emission Standard for Hazardous Air Pollutants
NGL	natural gas liquid
NO_X	nitrogen oxides
NSPS	New Source Performance Standard
PM	particulate matter
$PM_{2.5}$	PM less than 2.5 microns in diameter
PM_{10}	PM less than 10 microns in diameter
PSD	Prevention of Significant Deterioration

PTE	potential to emit
PTO	Permit to Operate
SI	spark ignition
SO_2	sulfur dioxide
TEG	triethylene glycol
tpy	tons per year
VOC	volatile organic compound
VRU	vapor recovery unit

1.0 INTRODUCTION

Rough Rider Operating, LLC (Rough Rider), a subsidiary of Energy Transfer, LP, is submitting this updated initial Pemit to Operate (PTO) application to authorize the sources at the Wild Basin Gas Processing and Crude Handling Facility (Wild Basin Facility or "the Facility" [Agency Air Number 05300162, Facility Code 38-053]) located near Watford City, McKenzie County, North Dakota. The Facility gathers and processes natural gas and crude oil production from the Wild Basin area of the Bakken Shale Formation. The Facility, located approximately 5.5 miles northeast of Watford City, North Dakota, is capable of processing 280 million standard cubic feet (MMscf) of gas per day (MMscf/day). The sources included in this application are authorized under Permit to Construct (PTC) No. ACP-18195 v1.0, issued on August 24, 2023. With the issuance of PTC No. ACP-18195 v1.0, the Facility's previous authorization – PTC 17032 – was rescinded in its entirety.

Initial PTO applications for the Facility were previously submitted in November 2018 and July 2020, but are still pending due to continued revisions of the Facility's PTC. Due to multiple revisions of the Facility's PTCs since the initial issuance on June 15, 2015, the North Dakota Department of Environmental Quality (NDDEQ) has required that the updated initial PTO application for this site is submitted by March 22, 2024, ahead of the 12 months after start of operation sites typically have to submit their PTO application.

The remaining sections in this initial PTO application are organized as follows:

- Section 2.0 – Facility Information;
- Section 3.0 – Environmental, Health, and Safety;
- Section 4.0 – Facility Emission Points;
- Section 5.0 – Permitted Emissions;
- Section 6.0 – Potentially Applicable Regulations;
- Appendix A – Permit Application Forms;
- Appendix B – Facility Equipment Emission Calculations;
- Appendix C – Supporting Documentation/Output Files; and
- Appendix D – Block Flow Diagram.

2.0 FACILITY INFORMATION

The Wild Basin Gas Processing and Crude Handling Facility consists of the Crude Handling Plant on the south side of the site, Gas Plant 1 in the middle, and Gas Plant 2 on the north side. The processes and emission sources at each of these plants are described in further detail below. A control room is located at the site to monitor operations at all three plants. An emergency generator driven by an 85-horsepower (hp) Generac diesel engine with an associated 62-gallon diesel tank is used to provide backup power to the control room.

The emission unit numbers assigned by the NDDEQ are prefaced below with the designation "EU". The other identifiers are internal identifiers that are included in the process description for reference.

2.1 Crude Handling Facility Process Description

Crude oil enters the plant via pipeline or via truck at the truck Lease Automatic Custody Transfer (LACT) skids. Crude oil from the truck rack is transferred into the six truck unloading tanks (T-103 – T-108; EUs STC-1 – STC-6). These are fixed roof tanks each have a capacity of 1,000-barrels (bbls). They are controlled by a dedicated combustor (EU EC-2) as the primary emission control device and have a vapor recovery unit (VRU) as a secondary control device (EU VRU-1). When used, the VRU screw compressor (C-1100) recovers vapors from the tanks and transfers them to the adjacent Gas Plant 1. These tanks are provided with blanket gas to maintain a positive pressure to prevent a vacuum condition.

Crude oil from the six truck unloading tanks can either be sent to the stabilizers or transferred directly to the three floating roof tanks (T-601 at 50,000-bbl working capacity; EU CT-1, T-602 at 50,000-bbls; EU CT-3, T-1201 at 100,000-bbls; EU CT-2). Similarly, crude oil from the inlet pipeline can either be routed through the stabilizers or transferred directly to the three floating roof tanks. In the stabilizers, crude oil is heated to recover the light end hydrocarbons which are routed to the adjacent gas plant. Each stabilizer consists of two natural gas-fired line heaters (LH-1040/LH-1050, LH-1140/LH-1150, and LH-1240/LH-1250). Each line heater includes three burners rated a total of 5 million British thermal units (MMBtu) per hour (hr, MMBtu/hr) (EUs HTR-2a through HTR 2f, HTR-3a through HTR-3f, HTR-5a through HTR-5f) with each burner having a separate exhaust stack; thus, each stabilizer heater system uses a total of 10 MMBtu/hr heat input and has six exhaust stacks. The stabilized oil from the stabilizers is transferred to the three floating roof tanks (EUs CT-1, CT-2, CT-3).

The three floating roof tanks (EUs CT-1, CT-2, CT-3) are manifolded together and can be used in series or parallel. Each tank is equipped with a mixer to circulate the oil. Stabilized crude oil is often blended with unstabilized crude oil received from the six truck unloading tanks (EUs STC-1 – STC-6). Finally, crude oil is transferred from the three floating roof tanks to the LACT meter for measurement prior to leaving the site via oil pipeline.

Various maintenance activities occur at the site (EU MSS). Pigs are received at the inlet pig receiver (PR-100) and to recover the pig, the chamber must be vented to atmosphere. Water collected on the bottom of the tanks must be periodically removed by vacuum truck. The floating roofs in tanks T-601, T-602, and T-1201 must be landed infrequently (approximately once every 5-10 years) and the tanks degassed. The site also includes various fugitive piping components for crude oil and vapors (EU FUG-2).

2.2 Gas Plant 1 Process Description

Natural gas is received at the Plant 1 inlet via pipeline and goes through two slug catchers (PV-001 and PV-002) to remove water and condensate. Water from the slug catchers is transferred to the flare knockout drum (PV-114) and then pumped from the knockout drum into the slop storage tank (TK-101; EU ST-1). Condensate from the slug catchers is transferred to the condensate stabilization system. Gas from the slug catchers goes to inlet filter separators and then to inlet compression. Inlet compression is provided by four reciprocating compressors (C-001 – C-004) driven by Caterpillar G3608 engines rated 2,370-hp (EUs ENG-1 – ENG-4). Only three compressors are operated simultaneously while the fourth serves as a backup.

From the inlet compressors, the compressed gas is routed to an inlet gas heater which uses hot oil as a heat transfer medium and then to the mole sieve dehydration system. There are three mole sieve dehydrators (PV102, PV103, and PV104) that remove water using a bed packed with adsorbent material. A regen heater (E-110) which uses hot oil and two electrically driven regen compressors (C-103 and C-104) are used to regenerate the adsorbent beds and remove water which is routed to the flare knockout drum.

From the mole sieve dehydrators, the dried gas is routed to the cryogenic process to recover NGLs. The gas goes through a demethanizer column (T-101), where the overhead methane is recovered as residue gas and the bottoms routed to the deethanizer column (T-102). The deethanizer column is heated by the deethanizer reboiler (E-107), which uses hot oil, to recover ethane as residue gas and the remaining natural gas liquid (NGL) bottoms from deethanizer column are sent through a cooler before being transferred to the bullet tanks or directly to a third-party NGL pipeline. The residue gas is routed to the residue compressors to increase the pressure of the gas before leaving the facility through a meter to a third-party natural gas pipeline. There are three residue gas compressors (C-107, C-108, and C-109) driven by Caterpillar G3608 engines rated 2,370-hp (EUs ENG-5 – ENG-7).

In the condensate stabilization system, the condensate is heated by the stabilizer reboiler (E-002), which uses hot oil, in a stabilization column (T-001) to boil off lighter hydrocarbons. The overhead vapors from the stabilizer column are recovered by an electrically driven VRU screw compressor (C-005) back to the slug catchers. The bottoms from the stabilizer column are routed over to the adjacent crude oil handling facility.

Water from the slug catchers as well as drain systems throughout the plant for compressors and vessels are routed to the flare knockout drum (PV-114). At the flare knockout drum some vapors flash off from the liquid hydrocarbons entrained with the water. The flash vapors will be reconfigured to recycle to the plant inlet. The liquids from the flare knockout drum are pumped over to the 400-bbl slop tank (TK-101; EU ST-1). The slop tank stores the slop water and condensate mixture until being removed from the site by truck (EU STL-1). No flash occurs in the slop tank.

The cryogenic process is cooled using propane as a refrigerant. The refrigeration system includes two centrifugal refrigerant compressors (C-105 and C-106) driven by electric motors. A natural gas-fired heater (H-101; EU HTR-1) with a maximum burner heat input of 46 MMBtu/hr is used to provide hot oil throughout the plant. An instrument air system consisting of electrically driven air compressors and dryers is used to provide instrument air throughout the plant.

The Plant 1 flare (FL-101; EU E-1) is used to control the pressure relief valves throughout the plant, compressor blow downs, and overhead vapors from the flare knockout drum. Miscellaneous tanks are used to store slop oil (400-bbl), lube oil (200-bbl), coolant (200-bbl), and methanol (500-gallon). Fugitive piping components in gas, hydrocarbon liquid, and water are present throughout the plant (EU FUG-1 shared between both gas plants).

A variety of maintenance activities (EU MSS) occur at the plant including pigging, compressor blowdowns routed to flare, various vessel blowdowns, and infrequent adsorbent bed changes.

2.3 Gas Plant 2 Process Description

Natural gas is received at the Plant 2 inlet via pipeline and goes through two slug catchers (V-1011 and V-1012) to remove water and condensate. Water from the slug catchers is transferred to the flare knockout drum and then pumped from the knockout drum into the slop storage tank (TK-7187 at 1,000-bbls; EU ST-4). Condensate from the slug catchers is transferred to the condensate stabilization system. Gas from the slug catchers goes to inlet filter separators and then to inlet compression. Inlet compression is provided by four reciprocating compressors (C-1031, C-1041, C-1051, C-1061) driven by Caterpillar G3616A4 engines rated 5,000-hp (EUs ENG-8 – ENG-11). Compressed gas is sent through filter coalescer vessel to the triethylene glycol (TEG) dehydrator for initial drying.

In the TEG dehydrator, natural gas enters the contactor tower (T-1081) where lean TEG is used to absorb water from the inlet gas. Dried natural gas exits the top of the contactor tower and is routed through filters and the inlet gas heater (E-1072), which uses hot oil, to the molecular sieve dehydration system for further drying. Rich TEG exits the bottom of the contactor tower and is routed for regeneration. The rich TEG is routed to a flash vessel (V-6011) to allow absorbed gas to flash off. The flash tank vapors are routed to a combustor (EU EC-3). The rich TEG is heated in the regenerator (E-6032) to boil off water and generate lean TEG which is pumped back to the contactor tower. Heat for regeneration is provided by hot oil. The overhead vapors from the regenerator still vent (T-6031) are routed to the overhead accumulator vessel (V-6042). In the accumulator vessel, vapors are preferentially routed to the combustor (EU EC-1), condensate is routed to slug catchers, and water is routed directly to the slop tank (TK-7187). The accumulator overhead vapors can also be recovered by two electrically driven reciprocating compressors in VRU service (C-6061 and C-6071) to recycle the flash gas to the slug catchers.

Gas from the TEG dehydrator is received at the mole sieve dehydration system for additional drying. There are three mole sieve dehydrators (D-1101, D-1102, and D-1103) that remove water using a bed packed with adsorbent material. A regen heater (E-1121), which uses hot oil and an electrically driven regen compressor (C-1133), is used to regenerate the adsorbent beds and remove water, which is routed to the flare knockout drum.

From the mole sieve dehydrators, the dried gas is routed to the cryogenic process to recover NGLs. The gas first goes through a cold separator (V-1161) which routes overheads to an absorber (T-1171) and bottoms to the deethanizer (T-1191). The absorber performs additional separation and routes overheads to the residue compressors and bottoms to the deethanizer. In the deethanizer column a reboiler (E-1193), which uses hot oil, heats the column. Overheads from the deethanizer are sent to the reflux accumulator (V-1201) and then to the absorber (T-1171) and bottoms are sent through a cooler to the NGL bullet tanks.

The residue gas from the absorber is routed to three residue compressors to increase the pressure of the gas before leaving the facility through a meter to a third-party natural gas pipeline. There are three residue gas compressors (C-1271, C-1281, and C-1291) driven by Caterpillar G3616 engines rated 5,000-hp (EUs ENG-12 – ENG-14).

Historically, Plant 2 had the ability to route NGL from the bullet tanks to an NGL truck loadout to leave the site. The NGL truck loadout has been decommissioned and now NGL only leaves the plant through a LACT meter to a third-party NGL pipeline.

In the condensate stabilization system, the condensate is heated by the stabilizer reboiler (E-2025), which uses hot oil, in a stabilization column (T-2024) to boil off lighter hydrocarbons. The overhead vapors from the stabilizer column are routed back to the slug catchers. The middle hydrocarbons are recovered as NGL and routed to the bullet tanks. The bottoms from the stabilizer column are routed through a cooler over to the adjacent Crude Handling Facility.

Water from the slug catchers as well as drain systems throughout the plant for vessels are routed to the flare knockout drum (V-7201). At the flare knockout drum some vapors flash off from the liquid hydrocarbons entrained with the water. The flash vapors are recycled to the plant inlet. The liquids from the flare knockout drum are pumped over to the 400-bbl slop oil tank (TK-7188; EU ST-3). The slop tank stores the slop water and condensate mixture until being removed from the site by truck (EU WTL-1). No flash occurs in the slop tank. An adjacent 400-bbl slop oil tank (TK-7188; EU ST-3) receives slop oil directly from the compressors. A 210-bbl bulk glycol storage tank (TK-6051) is also located in the same containment.

The cryogenic process is cooled using propane as a refrigerant. The refrigeration system includes three refrigerant compressors (C-3011, C-3021, and C-3031) driven by electric motors. A natural gas-fired hot oil heater (H-4021; EU HTR-7) with a maximum burner heat input of 86.58 MMBtu/hr is used to provide hot oil throughout the plant. An instrument air system consisting of electrically driven air compressors and dryers is used to provide instrument air throughout the plant.

The Plant 2 flare (FL-7023; EU FLR-1) is used to control the pressure relief valves throughout the plant, compressor blow downs, and overhead vapors from the flare knockout drum. Miscellaneous tanks are used to provide compressor lube oil (210-bbl), engine oil (210-bbl), jacket water for the compressor units (210-bbl). Fugitive piping components in gas, hydrocarbon liquid, and water are present throughout the plant (EU FUG-1 shared between both gas plants).

A variety of maintenance activities (EU MSS) occur at the plant including pigging, compressor blowdowns routed to flare, various vessel blowdowns, and infrequent adsorbent bed changes.

3.0 ENVIRONMENTAL, HEALTH, AND SAFETY

The health and safety of all facility personnel along with the surrounding community is a top priority in the operation of the Wild Basin Gas Processing and Crude Handling Facility. The Facility will be continuously manned with operations personnel onsite at all times. The emission sources will comply with all applicable federal regulations and any state and local requirements.

4.0 FACILITY EMISSION POINTS

The following table lists all emission sources at the Facility.

Table 4-1 – Facility-Wide Emission Sources

Emission Unit	Type of Equipment	Rating/Capacity	Plant
ENG-1	Caterpillar G3608LE (4SLB) Engine	2,370 hp	Gas Plant 1
ENG-2	Caterpillar G3608LE (4SLB) Engine	2,370 hp	Gas Plant 1
ENG-3	Caterpillar G3608LE (4SLB) Engine	2,370 hp	Gas Plant 1
ENG-4	Caterpillar G3608LE (4SLB) Engine	2,370 hp	Gas Plant 1
ENG-5	Caterpillar G3608LE (4SLB) Engine	2,370 hp	Gas Plant 1
ENG-6	Caterpillar G3608LE (4SLB) Engine	2,370 hp	Gas Plant 1
ENG-7	Caterpillar G3608LE (4SLB) Engine	2,370 hp	Gas Plant 1
ENG-8	Caterpillar G3616A4 (4SLB) Engine	5,000 hp	Gas Plant 2
ENG-9	Caterpillar G3616A4 (4SLB) Engine	5,000 hp	Gas Plant 2
ENG-10	Caterpillar G3616A4 (4SLB) Engine	5,000 hp	Gas Plant 2
ENG-11	Caterpillar G3616A4 (4SLB) Engine	5,000 hp	Gas Plant 2
ENG-12	Caterpillar G3616A4 (4SLB) Engine	5,000 hp	Gas Plant 2
ENG-13	Caterpillar G3616A4 (4SLB) Engine	5,000 hp	Gas Plant 2
ENG-14	Caterpillar G3616A4 (4SLB) Engine	5,000 hp	Gas Plant 2
GEN-1	Generac Diesel Generator Engine	85 hp	Shared by all
DEHY-1	TEG Dehydration Unit	200 MMscf/day	Gas Plant 2
HTR-1	Circulation System Combustion Heater	46 MMBtu/hr	Gas Plant 1
HTR-7	Hot Oil Heater	86.58 MMBtu/hr	Gas Plant 2
EC-3	Plant 2 TEG Dehydrator Combustor	--	Gas Plant 2
E-1	Plant 1 Flare	--	Gas Plant 1
FLR-1	Plant 2 Flare (FL-7203)	--	Gas Plant 2
FUG-1	Fugitives at Gas Processing Plants	--	Shared by Gas Plants

Table 4-1 – Facility-Wide Emission Sources

Emission Unit	Type of Equipment	Rating/Capacity	Plant
CT-1	Crude Oil IFR Tank No. 601	60,000 bbl	Crude Handling Facility
CT-2	Crude Oil IFR Tank No. 1201	120,000 bbl	Crude Handling Facility
CT-3	Crude Oil IFR Tank No. 602	60,000 bbl	Crude Handling Facility
STC-1	Crude Oil Fixed Roof Tank (T-103)	1,000 bbl	Crude Handling Facility
STC-2	Crude Oil Fixed Roof Tank (T-104)	1,000 bbl	Crude Handling Facility
STC-3	Crude Oil Fixed Roof Tank (T-105)	1,000 bbl	Crude Handling Facility
STC-4	Crude Oil Fixed Roof Tank (T-106)	1,000 bbl	Crude Handling Facility
STC-5	Crude Oil Fixed Roof Tank (T-107)	1,000 bbl	Crude Handling Facility
STC-6	Crude Oil Fixed Roof Tank (T-108)	1,000 bbl	Crude Handling Facility
HTR-2a to HTR-2f	Crude Stabilizer Medium Line Heater with 6 Stacks	10 MMBtu/hr	Crude Handling Facility
HTR-3a to HTR-3f	Crude Stabilizer Medium Line Heater with 6 Stacks	10 MMBtu/hr	Crude Handling Facility
HTR-5a to HTR-5f	Crude Stabilizer Medium Line Heater with 6 Stacks	10 MMBtu/hr	Crude Handling Facility
EC-2	Crude Truck Unloading Tanks Combustor	--	Crude Handling Facility
VRU-1	Vapor Recovery Unit	--	Crude Handling Facility
FUG-2	Fugitives at Crude Oil Stabilization Facility	--	Crude Handling Facility
DT-1	Diesel Tank for Generator	62 gal	Shared by all
DT-2	Diesel Tank	1,000 gal	Crude Handling Facility
STL-1	Slop Truck Loading	--	Gas Plant 1 Gas Plant 2
WTL-1	MSS-Water Loadout	--	Crude Handling Facility
MSS-PIG	MSS-Pigging	--	Shared by Gas Plants
MSS-Comp	MSS-Compressor Blowdowns	--	Gas Plant 1 Gas Plant 2

Table 4-1 – Facility-Wide Emission Sources

Emission Unit	Type of Equipment	Rating/Capacity	Plant
MSS-Vessel1	MSS-Vessel Blowdowns (Inlet)	--	Gas Plant 1 Gas Plant 2
MSS-Vessel2	MSS-Vessel Blowdowns (Residue)	--	Gas Plant 1 Gas Plant 2
MSS-Tank Cleaning	MSS-Tank Cleaning Venting	--	Gas Plant 1 Gas Plant 2
MSS-IFR Tanks	MSS-Tank Roof Landings/Cleaning/Venting	--	Gas Plant 1 Gas Plant 2

The following table lists all insignificant activities at the Facility.

Table 4-2 – Facility-Wide Insignificant Activities

Source ID	Type of Equipment	Rating/Capacity	Plant
MT-1	Methanol Tank (TK-117)	500 gal	Gas Plant 1
LT-1	Lube Oil Tank (TK-102)	210 bbl	Gas Plant 1
LT-2	Lube Oil Tank (TK-7121)	210 bbl	Gas Plant 2
LT-3	Lube Oil Tank (TK-7131)	210 bbl	Gas Plant 2
LT-4	Lube Oil Tank (TK-7187)	1,990 bbl	Crude Handling Facility
ST-1	Slop Water Tank (TK-101)	400 bbl	Gas Plant 1
ST-3	Slop Oil Tank (TK-7188)	400 bbl	Gas Plant 2
GT-1	TEG Tank (TK-6051)	210 bbl	Gas Plant 2
WT-1	JW/Coolant Tank (TK-103)	202 bbl	Gas Plant 1
WT-2	JW/Coolant Tank (TK-7133)	210 bbl	Gas Plant 2

5.0 PERMITTED EMISSIONS

The following table lists the Facility's total permitted potential to emit (PTE), authorized under PTC No. ACP-18195 v1.0. Detailed emission calculations are included in Appendix B of this application.

Table 5-1 – Sitewide PTE

Pollutant	Potential Emissions (lb/hr)	Potential Emissions (tons/yr)
CO	57.85	161.39
NO_X	54.80	207.70
SO_2	0.57	1.52
PM_{10}	5.96	23.09
$PM_{2.5}$	5.82	23.07
VOC	2,512.22	219.48
Total HAP	69.03	18.37
Formaldehyde	2.30	9.60
CO_2e	231,224.04	302,953.27

6.0 POTENTIALLY APPLICABLE REGULATIONS

6.1 North Dakota Rules Review

The following North Dakota rules have been assessed for applicability to the existing and currently authorized emission source equipment. The regulatory applicability review below is for the entire facility (Gas Plants and Crude Handling Facility).

6.1.1 Chapter 33.1-15-01 – General Provisions

Rough Rider will continue to comply with the requirements of this chapter.

6.1.2 Chapter 33.1-15-02 – Ambient Air Quality Standards

The NDDEQ policy requires facilities to demonstrate compliance with the Ambient Air Quality Standards (AAQS) and the Air Toxics Policy, as outlined in this chapter under North Dakota Administrative Code (NDAC) Chapter 33.1-15-02-04. The Facility has demonstrated compliance these requirements in the previously submitted permit to construct applications for this Facility.

6.1.3 Chapter 33.1-15-03 – Restriction of Emission of Visible Air Contaminants

The Facility's engines, heaters, emergency generator, and enclosed combustors must comply with an opacity limit of 20%, except for one six-minute period per hour when 40% opacity is permissible. Facility flares must comply with an opacity limit of 20%, except for one six-minute period per hour when 60% opacity is permissible. The Facility will continue to demonstrate compliance with these opacity requirements via proper equipment operation.

6.1.4 Chapter 33.1-15-04 – Open Burning Restrictions

Rough Rider will continue to comply with the requirements of this chapter.

6.1.5 Chapter 33.1-15-05 – Emissions of Particulate Matter Restricted

The Facility's combustion equipment will continue to comply with the requirements of this chapter.

6.1.6 Chapter 33.1-15-06 – Emissions of Sulfur Compounds Restricted

The Facility's sulfur emissions are due primarily to the sulfur in the fuel burned. Rough Rider has demonstrated that its sulfur dioxide emissions comply with the AAQS established by the NDDEQ as part of its application for PTC No. ACP-18195 v1.0. Rough Rider will continue to comply with the requirements of this chapter by operating equipment in the manner represented in the PTC application.

6.1.7 Chapter 33.1-15-07 – Control of Organic Compounds Emissions

Volatile organic compound (VOC)-containing tanks subject to NDAC Chapter 33.1-15-07-01.3 are equipped with submerged fill pipes. The Facility does not operate the loading facilities at more than 20,000 gallons per day. The Facility complies with NDAC Chapter 33.1-15-07-01.5 by equipping rotating pumps or compressors handling VOCs with properly maintained seals.

6.1.8 Chapter 33.1-15-08 – Control of Air Pollution from Vehicles and Other Internal Combustion Engines

This chapter prohibits the operation of any internal combustion engine which emits any unreasonable and excessive smoke, obnoxious and noxious gases, fumes or vapors. Also prohibited is the removal, alteration, or rendering inoperable an air pollution control device that is required by federal law. The Facility will continue to demonstrate compliance with this chapter by proper engine operation.

6.1.9 Chapter 33.1-15-10 – Control of Pesticides

Rough Rider will continue to ensure that pesticides used at the Facility comply with the requirements of this chapter.

6.1.10 Chapter 33.1-15-11 – Prevention of Air Pollution Emergency Episodes

This chapter pertains to the State declaring an air pollution emergency and its effect on the operations of sources of regulated air contaminants. Should an air pollution emergency episode be declared by the Department, Rough Rider will comply with the requirements contained in this chapter.

6.1.11 Chapter 33.1-15-12 – Standards of Performance for New Stationary Sources

Regulations outlined under this chapter are described in further detail in Section 6.2 of this application.

6.1.12 Chapter 33.1-15-13 – Emission Standards for Hazardous Air Pollutants

Regulations outlined under this chapter are described in further detail in Section 6.2 of this application.

6.1.13 Chapter 33.1-15-14 – Designated Air Contaminant Sources, Permit to Construct, Minor Source Permit to Operate, Title V Permit to Operate

The provisions under this code prohibit the construction, installation or establishment of a new stationary source unless the owner or operator has filed an application for and received a PTC in accordance this chapter. The PTC is required for any new stationary source, or modification to an existing source, within a source category designated in Section 33-15-14-01. The Facility has demonstrated compliance with this rule by obtaining PTC No. ACP-18195 v1.0. The Facility is demonstrating compliance with this rule by submitting an updated initial PTO application by the March 22, 2024 deadline from the NDDEQ.

6.1.14 Chapter 33.1-15-15 – Prevention of Significant Deterioration of Air Quality

The Wild Basin Facility has historically been classified as a minor source with respect to the Prevention of Significant Deterioration (PSD) program. The Facility includes petroleum storage associated with the crude handling plant with a capacity totaling more than 300,000 barrels. Petroleum storage and transfer of more than 300,000 barrels is one of the 28 named sources under the PSD permitting program in Title 40 of the Code of Federal Regulations (40 CFR) Part §52.21. Named PSD source categories have a major source threshold of 100 tons per year (tpy), which includes fugitive emissions, when assessing major source applicability. However, since the primary activity at the site is not petroleum storage, the NDDEQ has classified the petroleum storage as a nested PSD activity.[1] The PTE for the Facility is less than 250 tpy and the PTE for each pollutant from the nested PSD crude handling facility is below 100 tpy. As such, the

[1] Memorandum from Ms. Cheryl Newton, US EPA Permit and Grants Section Chief, to Mr. Robert Hodanbosi, DAPC Chief Ohio EPA, dated January 22, 1998.

Wild Basin Facility is a major source for Title V permitting purposes, but is not a major stationary source under the PSD rules.

6.1.15 Chapter 33.1-15-16 – Restriction of Odorous Air Contaminants

The Facility is subject to the odor restrictions established in this chapter, including that the Facility may not discharge into the ambient air any objectionable odorous air contaminant that measures seven odor concentrations or higher outside of the property boundary. Compliance with these requirements is demonstrated based on proper equipment operation.

6.1.16 Chapter 33.1-15-17 – Restriction of Fugitive Emissions

Fugitive emissions associated with the Facility comply with all applicable requirements based on good operating procedures and compliance with applicable requirements as identified herein. Please note that the fugitive components are managed under the Leak Detection and Repair (LDAR) Program as per the federal standards indicated below.

6.1.17 Chapter 33.1-15-18 – Stack Heights

The stack heights of sources included in this application comply with the requirements of this chapter.

6.1.18 Chapter 33.1-15-19 – Visibility Protection

The Facility is not a major stationary source or major modification, including fugitive emissions, as it relates to PSD permitting and is therefore not subject to these requirements.

6.1.19 Chapter 33.1-15-20 – Control of Emissions from Oil and Gas Well Production Facilities

These requirements do not apply to the Facility as it is not an oil and gas well facility.

6.1.20 Chapter 33.1-15-21 – Acid Rain Program

The Wild Basin Facility is not an affected source under the Acid Rain Program.

6.1.21 Chapter 33.1-15-22 – Emissions Standards for Hazardous Air Pollutants (NESHAP) for Source Categories

Regulations outlined under this chapter are described in further detail in Section 6.2.

6.1.22 Chapter 33.1-15-23 – Fees

The Wild Basin Facility is subject to the requirements of this chapter and will pay the annual PTO fees assessed by the NDDEQ based on the Facility's actual emissions.

6.1.23 Chapter 33.1-15-24 – Standards for Lead- Based Paint Activities

The Wild Basin Facility does not include any lead-based paint activities and thus is not subject to these requirements.

6.1.24 Chapter 33.1-15-25 – Regional Haze Requirements

The Wild Basin Facility is not an affected source under the Regional Haze Program.

6.2 Federal Rule Review

The Facility is a major source with respect to Title V permitting and is an area source of hazardous air pollutant (HAP) emissions. Below is a summary of all potentially applicable federal regulations for the Facility.

6.2.1 Title V Operating Permit Summary

The provisions of 40 CFR Part 70 provide for the formation of comprehensive state air quality permitting programs that align with the requirements of Title V of the 1990 Clean Air Act Amendments (CAAA): North Dakota's federally approved Part 70 permit program is collated in NDAC 33.1-15-14-06. A Title V permit is required by Title V of the Clean Air Act for applicable major source facilities. A “major source” is defined as a facility that emits or has the potential to emit (PTE) at or above 100 tpy of any criteria pollutant, 10 tpy of a single HAP, and/or 25 tpy of any combination of HAPs. The Wild Basin Facility began operating as a Title V major source on November 18, 2017. As a result, a Title V operating permit application was submitted within 12 months, as required. Additionally, this updated initial PTO application is being submitted by March 22, 2024, as required by the NDDEQ, for the sources authorized under PTC No. ACP-18195 v1.0, issued August 24, 2023.

6.2.2 Prevention of Significant Deterioration Summary

The PSD permitting provisions apply to new major sources or major modifications at existing major sources proposing to emit a "significant” increase of any criteria air pollutant. The major source threshold for PSD is 250 tpy of any criteria pollutant for most facilities. The Facility is below PSD permitting thresholds and did not trigger PSD review for PTC No. ACP-18195 v1.0.

6.3 40 Code of Federal Regulations (CFR) Part 60 – Standards of Performance for New Stationary Sources (NSPS)

6.3.1 Subpart A – General Provisions

Rough Rider will comply with all of the necessary requirements of this subpart as they pertain to the Wild Basin Facility operations.

6.3.2 Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

Rough Rider will continue to comply with all of the necessary requirements of this subpart including the applicable heater requirements for HTR-1 and HTR-7. The subpart potentially applies to the crude stabilizer heaters (HTR-2, HTR-3, and HTR-5), however each heater is less than 10 MMBtu/hr and exempt from these requirements.

6.3.3 Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984

Subpart Kb applies to each storage vessel with a capacity greater than or equal to 75 cubic meters (19,813 gallons) that is used to store volatile organic liquids for which construction, reconstruction, or modification is commenced after July 23, 1984. The crude oil storage tanks (CT-1, CT-2, and CT-3) and crude truck unloading tanks (STC-1 through STC-6) are subject to NSPS Subpart Kb and will continue to

comply with applicable requirements. The enclosed combustor (EC-2) and VRU (VRU-1) are the primary and secondary control devices, respectively, on the crude truck unloading tanks. These tanks will continue to comply with the closed vent requirements pursuant to 40 CFR §60.112b(b)(1).

6.3.4 Subpart GG – Standards of Performance for Stationary Gas Turbines

The Facility does not include any stationary gas turbines; therefore, the requirements of this subpart do not apply.

6.3.5 Subpart KKK – Standards of Performance for Equipment Leaks of VOC From Onshore Natural Gas Processing Plants for Which Construction, Reconstruction, or Modification Commenced After January 20, 1984, and on or Before August 23, 2011

Subpart KKK applies to onshore natural gas processing plants for which construction, reconstruction, or modification commenced after January 20, 1984 and on or before August 23, 2011. Based on date of construction for the site, NSPS Subpart KKK does not apply.

6.3.6 Subpart LLL – Standards of Performance for SO_2 Emissions from Onshore Natural Gas Processing for Which Construction, Reconstruction, or Modification Commenced After January 20, 1984 and on or Before August 23, 2011

Subpart LLL applies to sweetening units and sweetening units followed by sulfur recovery units that process natural gas at onshore natural gas processing plants for which construction, reconstruction, or modification commenced after January 20, 1984 and on or before August 23, 2011. The Facility does not have a sweetening unit and based on date of construction for the site, NSPS Subpart LLL does not apply.

6.3.7 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

The Facility's diesel-fired emergency generator (GEN-1) is subject to the requirements of NSPS Subpart IIII. The backup generator is equipped with a non-resettable hour meter and will be limited to 100 hours per year for non-emergency operation, per 40 CFR §60.4243(d)(1)-(2). The engine is certified to meet EPA Tier 3 Standards. Rough Rider only uses ultra-low sulfur diesel to fuel the engine. Rough Rider keeps records of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. Rough Rider will continue to comply with NSPS Subpart IIII requirements.

6.3.8 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

The compressor engines (ENG-1 through ENG-14) installed at the site are stationary spark ignition (SI) internal combustion engines (ICEs) with horsepower greater than 500 hp and manufactured after July 1, 2007; therefore, Subpart JJJJ applies to the engines at the site. The engines will comply through operation of oxidation catalyst control, maintenance plan, performance testing every 8,760 hours or 3 years, recordkeeping, and reporting.

6.3.9 Subpart KKKK – Standards of Performance for Stationary Combustion Turbines

As per the EPA, this subpart establishes emission standards and compliance schedules for the control of emissions from stationary combustion turbines that commenced construction, modification or

reconstruction after February 18, 2005. The Facility does not have any stationary gas turbines; therefore, NSPS Subpart KKKK does not apply.

6.3.10 Subpart OOOO – Standards of Performance for Crude Oil and Natural Gas Facilities for Which Construction, Modification, or Reconstruction Commenced After August 23, 2011, and on or Before September 18, 2015

This Facility was constructed after August 23, 2011. However, the Facility was also modified after September 18, 2015; therefore, Subpart OOOO is superseded by Subpart OOOOa. The Facility will continue to comply with Subpart OOOOa.

6.3.11 Subpart OOOOa – Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification or Reconstruction Commenced After September 18, 2015

Subpart OOOOa contains requirements for various oil and gas related affected facilities, including pneumatic devices, fugitives, centrifugal and reciprocating compressors, and storage vessels. The affected facilities at the site include fugitive components and reciprocating compressors. All of the Facility's tanks qualify for an exemption from this Subpart either based on having a PTE less than 6 tpy VOC or being subject to NSPS Subpart Kb. The Facility does not contain any continuous bleed pneumatic devices, sweetening units, or any other affected source types. Rough Rider will continue to comply with the applicable requirements of NSPS Subpart OOOOa.

6.3.12 Subpart OOOOb – Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification or Reconstruction Commenced After December 6, 2022

Subpart OOOOb is a new regulation, which has not yet taken effect at the time of this submittal. Rough Rider's preliminary evaluation of sources potentially subject to Subpart OOOOb requirements is as follows.

- Compressors (associated with ENG-1 through ENG-14) – These should not be considered affected facilities because they are existing sources with construction dates prior to December 6, 2022.
- Fugitives – These should not be considered affected facilities because they are still subject to Subpart OOOOa requirements.
- Pneumatics – There are no pneumatic sources at the site.
- Tanks – Tanks at the site are not part of a natural gas processing plant (gas plant), as defined in 40 CFR §60.5430b and are therefore not subject to Subpart OOOOb requirements.
- Control Devices – These should not be considered affected facilities because they are existing sources with construction dates prior to December 6, 2022.

6.4 40 CFR Part 61 – National Emission Standards for Hazardous Air Pollutants

6.4.1 Subpart J – National Emission Standard for Equipment Leaks (Fugitive Emission Sources) of Benzene

Subpart J applies to certain sources operating "in benzene service," which means that the fluid or gas contains at least 10% benzene by weight. The equipment at the Facility does not process or handle material containing at least 10% benzene by weight; therefore, Subpart J does not apply.

6.4.2 Subpart V – National Emission Standard for Equipment Leaks (Fugitive Emission Sources)

Subpart V applies to certain sources operating "in volatile HAP (VHAP) service," which means that the fluid or gas contains at least 10% VHAP (i.e., benzene or vinyl chloride) by weight. The equipment at the Facility does not process or handle material containing at least 10% VHAP by weight; therefore, Subpart V does not apply.

6.5 40 CFR Part 63 – National Emission Standards for Hazardous Air Pollutants for Source Categories

6.5.1 Subpart A – General Provisions

The Facility will comply with all of the necessary requirements of this subpart for 40 CFR Part 63 (Maximum Achievable Control Technology [MACT]) affected sources.

6.5.2 Subpart HH – National Emission Standards for Hazardous Air Pollutants From Oil and Natural Gas Production Facilities

Subpart HH applies to owners and operators of oil and natural gas production facilities that are major or area HAP sources. With the issuance of PTC No. ACP-18195 v1.0, the site became an area source of HAPs. According to §63.760(b)(2), affected sources at area sources of HAPs include each TEG dehydration unit. The TEG dehydration unit (DEHY-1) is potentially subject to the requirements of MACT Subpart HH; however, the dehydrator is exempt from the general standards requirements according to 40 CFR §63.764(e)(1)(ii) as its actual average emissions of benzene emissions are less than 0.90 megagrams per year (including federally enforceable controls). Therefore, the TEG dehydrator only has recordkeeping requirements as listed in 40 CFR §63.774(d)(1). The storage vessel, fugitive, and compressor requirements of MACT Subpart HH only apply at major sources of HAPs.

6.5.3 Subpart HHH – National Emission Standards for Hazardous Air Pollutants From Natural Gas Transmission and Storage Facilities

Subpart HHH applies to owners and operators of natural gas transmission and storage facilities that are major sources of HAP emissions. This regulation does not apply to the Facility as it is an area source of HAPs and does not fall under this classification.

6.5.4 Subpart YYYY – National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines

This is not applicable as the Wild Basin Facility does not operate any stationary combustion turbines.

6.5.5 Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

40 CFR §63.6580 states that Subpart ZZZZ "establishes national emission limitations and operating limitations for HAP emitted from stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions."

40 CFR §63.6585 explains "You are subject to this subpart if you own or operate a stationary RICE at a major or area source of HAP emissions, except if the stationary RICE is being tested at a stationary RICE test cell/stand."

With the issuance of PTC No. ACP-18195 v1.0, the site became an area source of HAP emissions. The engines at the site were manufactured after December 19, 2002; therefore, the engines are new stationary RICE located at an area source. The engines meet the requirements of MACT Subpart ZZZZ by meeting the requirements of NSPS Subpart IIII (GEN-1) and NSPS Subpart JJJJ (ENG-1 through ENG-14). No additional requirements under MACT Subpart ZZZZ apply.

6.5.6 Subpart DDDDD – National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters

This site is an area source of HAP; therefore, MACT Subpart DDDDD does not apply to this site.

6.5.7 Subpart JJJJJJ – National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources

With the issuance of PTC No. ACP-18195 v1.0, the site became an area source of HAPs. The Facility does not operate any boilers that are considered affected sources under this subpart; therefore, MACT Subpart JJJJJJ does not apply.

6.6 40 CFR Part 64 – Compliance Assurance Monitoring

As the facility is a major source with respect to Title V, Compliance Assurance Monitoring (CAM) requirements are potentially applicable to emission units at the site. ENG-8 through ENG-14 are the only pollutant-specific emission units equipped with control equipment with uncontrolled emissions greater than 100 tpy. These units have uncontrolled emissions greater than 100 tpy of carbon monoxide (CO), and applicable CO limits including the PTC No. ACP-18195 v1.0 limits, as well as the option to meet either formaldehyde or CO emission limits under MACT Subpart ZZZZ. The MACT CO emission limits meet the exemption in 40 CFR §64.2(b)(1)(i). The continuous temperature monitoring required in MACT Subpart ZZZZ will also meet the CAM exemption in 40 CFR §64.2(b)(vi) for the PTC No. ACP-18195 v1.0 CO limits, after Title V permit issuance, as an emission standard for which a Part 70 permit specifies a continuous compliance demonstration method.

6.7 40 CFR Part 68 – Chemical Accident Prevention Provisions

6.7.1 Subpart G – Risk Management Plan (RMP)

The RMP for Chemical Accidental Release Prevention applies to facilities that produce, process, store, or use any regulated toxic or flammable substance in excess of the thresholds as specified in §63.130. The provisions of this subpart apply to the Wild Basin Facility. The RMP was last submitted to the U.S. Environmental Protection Agency (EPA) in September 2022 because the Facility handles a flammable mixture. Rough Rider will continue to comply with the requirements of the RMP program.

6.8 40 CFR Part 98 – Mandatory Greenhouse Gas Reporting

Gas processing facilities, such as the Wild Basin Facility, are a source category subject to the Mandatory Greenhouse Gas (GHG) Reporting rule. Those facilities with actual annual emissions in excess of 25,000 metric tons of carbon dioxide equivalents (CO_2e) must report under the appropriate subpart, as specified in 40 CFR §98.2. The annual report must be submitted no later than March 31 of each calendar year for GHG emissions in the previous calendar year. The Facility is subject to these requirements; however, there are no requirements in the rule for inclusion into the Title V permit program.

APPENDIX A

PERMIT APPLICATION FORMS

PERMIT APPLICATION FOR TITLE V PERMIT TO OPERATE

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 52858 (9-2021)

SECTION A - FACILITY INFORMATION

Name of Firm or Organization Rough Rider Operating, LLC		
Responsible Person Matt Gordon		
Title VP - Operations	Telephone Number (610) 670-3284	E-mail Address matthew.gordon@energytransfer.com
Mailing Address (Street & Number) 525 Fritztown Road		
City Sinking Spring	State PA	ZIP Code 19608
Contact Person for Air Pollution Matters Melissa Benzaia		
Title Manager - Environmental Engineering	Telephone Number (713) 989-7849	E-mail Address melissa.benzaia@energytransfer.com
Mailing Address (Street & Number) 1300 Main Street		
City Houston	State TX	ZIP Code 77002
Facility Name Wild Basin Gas Processing and Crude Handling Facility		
Facility Address (Street & Number) 12170 31st Street NW		
City Watford City	State ND	ZIP Code 58854

County McKenzie	Latitude (decimal degrees) 47.858703	Longitude (decimal degrees) -103.192392

Legal Description of Facility Site

Quarter	Quarter NW	Section 35	Township 151N	Range 98W

Land Area at Facility Site 160 Acres (or) _____ Sq. Ft.	MSL Elevation at Facility 1982

SECTION B – GENERAL NATURE OF BUSINESS

Describe Nature of Business	North American Industry Classification System Code (NAICS)	Standard Industrial Classification Code (SIC)
Gas Processing and Crude Handling Facility	211112	1321

SECTION C – GENERAL PERMIT INFORMATION

Type of Permit to Operate? ☒ Initial ☐ Minor Modification ☐ Significant Modification

If application is for renewal or revision of an existing Title V permit, please provide the following data:

Current Permit to Operate Number:_____ Renewal:_____ Revision: _____	Current Permit to Operate Expiration Date:

SECTION D – MINOR PERMIT MODIFICATION

Affected Emission Unit(s):	Description of Proposed Change:
Applicable Requirements (NSPS, PSD, etc.):	Net Effect on Source Emissions Emission Unit(s): Facility:
Are you requesting that minor permit modification procedures be used in accordance with NDAC 33.1-15-14-06.e(1)(a)? ☐ Yes ☐ No	

SECTION E – SOURCE IDENTIFICATION AND CATEGORY OF EACH SOURCE INCLUDED ON THIS PERMIT APPLICATION

Your Emission Unit Number	Emission Unit Description	New Emission Unit? (check if yes)	PTC Number / ACP Number	Initial Application	Minor Modification	Significant Modification	Other	Explain if Other
ENG-1	Caterpillar G3608LE (4SLB) Engine	☒	ACP-18195 v1.0	☒	☐	☐		
ENG-2	Caterpillar G3608LE (4SLB) Engine	☒	ACP-18195 v1.0	☒	☐	☐		
ENG-3	Caterpillar G3608LE (4SLB) Engine	☒	ACP-18195 v1.0	☒	☐	☐		
ENG-4	Caterpillar G3608LE (4SLB) Engine	☒	ACP-18195 v1.0	☒	☐	☐		
ENG-5	Caterpillar G3608LE (4SLB) Engine	☒	ACP-18195 v1.0	☒	☐	☐		
ENG-6	Caterpillar G3608LE (4SLB) Engine	☒	ACP-18195 v1.0	☒	☐	☐		
ENG-7	Caterpillar G3608LE (4SLB) Engine	☒	ACP-18195 v1.0	☒	☐	☐		
ENG-8	Caterpillar G3616A4 (4SLB) Engine	☒	ACP-18195 v1.0	☒	☐	☐		
ENG-9	Caterpillar G3616A4 (4SLB) Engine	☒	ACP-18195 v1.0	☒	☐	☐		
ENG-10	Caterpillar G3616A4 (4SLB) Engine	☒	ACP-18195 v1.0	☒	☐	☐		
ENG-11	Caterpillar G3616A4 (4SLB) Engine	☒	ACP-18195 v1.0	☒	☐	☐		
ENG-12	Caterpillar G3616A4 (4SLB) Engine	☒	ACP-18195 v1.0	☒	☐	☐		
ENG-13	Caterpillar G3616A4 (4SLB) Engine	☒	ACP-18195 v1.0	☒	☐	☐		
ENG-14	Caterpillar G3616A4 (4SLB) Engine	☒	ACP-18195 v1.0	☒	☐	☐		
GEN-1	Generac Diesel Generator Engine	☒	ACP-18195 v1.0	☒	☐	☐		
DEHY-1	TEG Dehydration Unit	☒	ACP-18195 v1.0	☒	☐	☐		
HTR-1	Circulation System Combustion Heater	☒	ACP-18195 v1.0	☒	☐	☐		

Your Emission Unit Number	Emission Unit Description	New Emission Unit? (check if yes)	PTC Number / ACP Number	Initial Application	Minor Modification	Significant Modification	Other	Explain if Other
HTR-7	Hot Oil Heater	☒	ACP-18195 v1.0	☒	☐	☐		
EC-3	Plant 2 TEG Dehydrator Combustor	☒	ACP-18195 v1.0	☒	☐	☐		
E-1	Plant 1 Flare	☒	ACP-18195 v1.0	☒	☐	☐		
FLR-1	Plant 2 Flare (FL-7203)	☒	ACP-18195 v1.0	☒	☐	☐		
FUG-1	Fugitives at Gas Processing Plants	☒	ACP-18195 v1.0	☒	☐	☐		
CT-1	Crude Oil IFR Tank No. 601	☒	ACP-18195 v1.0	☒	☐	☐		
CT-2	Crude Oil IFR Tank No. 1201	☒	ACP-18195 v1.0	☒	☐	☐		
CT-3	Crude Oil IFR Tank No. 602	☒	ACP-18195 v1.0	☒	☐	☐		
STC-1	Crude Oil Fixed Roof Tank (T-103)	☒	ACP-18195 v1.0	☒	☐	☐		
STC-2	Crude Oil Fixed Roof Tank (T-104)	☒	ACP-18195 v1.0	☒	☐	☐		
STC-3	Crude Oil Fixed Roof Tank (T-105)	☒	ACP-18195 v1.0	☒	☐	☐		
STC-4	Crude Oil Fixed Roof Tank (T-106)	☒	ACP-18195 v1.0	☒	☐	☐		
STC-5	Crude Oil Fixed Roof Tank (T-107)	☒	ACP-18195 v1.0	☒	☐	☐		
STC-6	Crude Oil Fixed Roof Tank (T-108)	☒	ACP-18195 v1.0	☒	☐	☐		
HTR-2a to HTR-2f	Crude Stabilizer Medium Line Heater with 6 Stacks	☒	ACP-18195 v1.0	☐	☐	☐		
HTR-3a to HTR-3f	Crude Stabilizer Medium Line Heater with 6 Stacks	☒	ACP-18195 v1.0	☒	☐	☐		
HTR-5a to HTR-5f	Crude Stabilizer Medium Line Heater with 6 Stacks	☒	ACP-18195 v1.0	☒	☐	☐		
EC-2	Crude Truck Unloading Tanks Combustor	☒	ACP-18195 v1.0	☒	☐	☐		
VRU-1	Vapor Recovery Unit	☒	ACP-18195 v1.0	☒	☐	☐		
FUG-2	Fugitives at Crude Oil Stabilization Facility	☒	ACP-18195 v1.0	☒	☐	☐		
DT-1	Diesel Tank for Generator	☒	ACP-18195 v1.0	☒	☐	☐		
DT-2	Diesel Tank	☒	ACP-18195 v1.0	☒	☐	☐		
STL-1	Slop Truck Loading	☒	ACP-18195 v1.0	☒	☐	☐		
WTL-1	MSS-Water Loadout	☒	ACP-18195 v1.0	☒	☐	☐		
MSS-PIG	MSS-Pigging	☒	ACP-18195 v1.0	☒	☐	☐		
MSS-Comp	MSS-Compressor Blowdowns	☒	ACP-18195 v1.0	☒	☐	☐		

Your Emission Unit Number	Emission Unit Description	New Emission Unit? (check if yes)	PTC Number / ACP Number	Initial Application	Minor Modification	Significant Modification	Other	Explain if Other
MSS-Vessel1	MSS-Vessel Blowdowns (Inlet)	☒	ACP-18195 v1.0	☒	☐	☐		
MSS-Vessel2	MSS-Vessel Blowdowns (Residue)	☒	ACP-18195 v1.0	☒	☐	☐		
MSS-Tank Cleaning	MSS-Tank Cleaning Venting	☒	ACP-18195 v1.0	☒	☐	☐		
MSS-IFR Tanks	MSS-Tank Roof Landings/Cleaning/Venting	☒	ACP-18195 v1.0	☒	☐	☐		
MT-1	Methanol Tank (T-117)	☒	ACP-18195 v1.0	☒	☐	☐		
LT-1	Lube Oil Tank (TK-102)	☒	ACP-18195 v1.0	☒	☐	☐		
LT-2	Lube Oil Tank (TK-7121)	☒	ACP-18195 v1.0	☒	☐	☐		
LT-3	Lube Oil Tank (TK-7131)	☒	ACP-18195 v1.0	☒	☐	☐		
LT-4	Lube Oil Tank (TK-7187)	☒	ACP-18195 v1.0	☒	☐	☐		
ST-1	Slop Water Tank (TK-101)	☒	ACP-18195 v1.0	☒	☐	☐		
ST-3	Slop Oil Tank (TK-7188)	☒	ACP-18195 v1.0	☒	☐	☐		
GT-1	TEG Tank (TK-6051)	☒	ACP-18195 v1.0	☒	☐	☐		
WT-1	JW/Coolant Tank (TK-103)	☒	ACP-18195 v1.0	☒	☐	☐		
WT-2	JW/Coolant Tank (TK-7133)	☒	ACP-18195 v1.0	☒	☐	☐		

Add additional pages if necessary.

SECTION F1 – IDENTIFICATION OF AIR CONTAMINANTS

Check all which are emitted in measurable quantities into the atmosphere from any operation at facility

☐ Arsenic	☐ Chlorine Compounds	☐ Sulfur Compounds	☐ Radioisotopes
☐ Asbestos	☐ Chromium Compounds	☐ Hydrogen Sulfide	☐ Visible Emissions
☐ Beryllium	☐ Fluoride Compounds	☐ Odors	☒ Particulates (specify)
☐ Cadmium	☒ Volatile Organic Compounds	☒ Carbon Monoxide	☐ Dust
☐ Lead	☐ Other Organic Compounds	☒ Nitrogen Compounds	☐ Silica
☐ Mercury	☒ Greenhouse Gases (CO_2e)	☐ Pesticides	☐ Other (specify)

List Specific Compounds:

SECTION F2 – IDENTIFICATION OF AIR CONTAMINANTS

Has emission unit testing been done at the facility? ☒ Yes ☐ No

Emission Unit No.	Last Date when a Testing Program was Completed	If Program is Continuous, Give Approximate Testing Frequency	Regulation requiring frequency (NSPS, MACT, Permit Requirement- list permit number)
ENG-1 (C-001)	October 31, 2022 through November 2, 2022 **Engines were out of service in 2023, no testing*		
ENG-2 (C-002)			
ENG-3 (C-003)			
ENG-4 (C-004)			
ENG-5 (C-107)			
ENG-6 (C-108)			
ENG-7 (C-109)			
ENG-8 (C-1031)	December 28, 2023	Every 8,760 hours + Initial Testing for Formaldehyde for Select Engines per PTC Permit Condition	NSPS JJJJ, ACP-18195 v1.0
ENG-9 (C-1041)	May 24, 2023		
ENG-10 (C-1051)	June 20, 2023		
ENG-11 (C-1061)	June 20, 2023		
ENG-12 (C-1271)	December 28, 2023		
ENG-13 (C-1281)	June 13, 2023		
ENG-14 (C-1291)	April 26, 2023		
HTR-1	March 13-14, 2019	One time only	State requirement
HTR-7	March 13-14, 2019	One time only	State requirement

Add additional pages if necessary.

SECTION G1 – ADDITIONAL FORMS

Indicate which of the following forms are attached and made part of the application	
☒ Emission Unit Information (SFN 61006)	☐ Flexible Permits (SFN 61007)
☒ Compliance Schedule and Plan (SFN 61008)	☒ Potential to Emit Table

SECTION G2 – OTHER ATTACHMENTS INCLUDED AS PART OF THIS APPLICATION

1.	Application Text Document	4.	Plot Plan
2.	Calculations	5.	Process Flow Diagrams
3.	Supporting Documents	6.	

I, the undersigned applicant, am fully aware that statements made in this application and the attached exhibits and statements constitute the application for Permit to Operate Air Contaminant sources from the North Dakota Department of Environmental Quality and certify that the information in this application is true, correct and complete to the best of my knowledge and belief. Further, I agree to comply with the provisions of Chapter 23.1-06 of the North Dakota Century Code and all rules and regulations of the Department, or revisions thereof. I also understand the permit is nontransferable and, if granted a permit, I will promptly notify the Department upon sale or legal transfer of this permitted establishment.

Signature of Applicant	Date
	3/22/24

EMISSION UNIT FOR TITLE V PERMIT TO OPERATE

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 61006 (3-2019)

SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.) Stationary Natural Gas-Fired Engine, Non-Emergency Use	Emission Unit Number: C-001, C-002, C-003, C-004, C-107, C-108, C-109	Emission Point Number: ENG-1, ENG-2, ENG-3, ENG-4, ENG-5, ENG-6, ENG-7
Make Caterpillar	Model G3608LE	Installation or manufacture date 01/01/2015
Capacity (manufacturer's or designer's guaranteed maximum) 2370 BHP @ rpm	Operating Capacity (specific units) 2370 BHP @ rpm	
Brief description of operation of unit or process: Engines ENG-1 through ENG-4 provide inlet compression. 3 units operate routinely, 1 unit on standby. Engines ENG-5 through ENG-7 are residue gas compressors, which increase the pressure of the gas before leaving the facility through a meter to a third-party natural gas pipeline.		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	Alternative Emission Point:	

SECTION B – OPERATING SCHEDULE

Are you agreeing to a limit on the operating schedule for this unit? ☒Yes ☐No

6 of the 7 engines will operate a maximum of 8,760 hrs/yr. The 7th engine is a standby engine that will operate a maximum of 300 hrs/yr. Which engine is the standby engine can vary. Total operating hours for ENG-1 through ENG-7 will not exceed 52,860 hrs/yr.

Hours Per Day	Days Per Week	Weeks Per Year	Peak Production Season (if any)	Dates of Annual Shutdown
24	7	52		

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS) Per engine

Are you agreeing to a limit on the production for this unit? ☐Yes ☒No (If No, show normal operating schedule.)

Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	
Natural gas	15.71		137,619.6	MMBtu

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.

Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
NSPS JJJJ		Maintain maintenance plan and records of maintenance; all submittals	Initial notification	Initial performance test and subsequent annually of 8,760 hours for NOx, CO, VOC	NOx: 1.0 g/hp-hr or 82 ppmvd CO: 2.0 g/hp-hr or 270 ppmvd VOC: 0.7 g/hp-hr or 60 ppmvd
ACP-18195 v1.0					NOx: 2.61 lb/hr CO: 1.00 lb/hr VOC: 1.31 lb/hr Combust only gas with ≤ 2 gr S/100 scf

Generally describe all applicable requirements.

Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
NSPS OOOOa	Operating hours or months, continuously	Maintain records of hours, maintenance and compliance reports	Annual compliance reports	None	Rod packing replacement every 26,000 hours or 36 months
NDAC 33.1-15-03					Opacity: 20% except for one 6-minute period per hour of 40%

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

Has emission unit testing been done at the facility? ☒Yes ☐No

Emission Unit ID	Last Date when a Testing Program was Completed	If Program is Continuous, Give Approximate Testing Frequency	Regulation requiring frequency (NSPS, MACT, Permit Requirement-list permit number)
ENG-1 to ENG-7	10/31/22 – 11/02/22	Every 8,760 hours + initial testing for formaldehyde for select engines, per PTC permit condition	NSPS JJJJ; ACP-18195 v1.0

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

Include all, even those not usable because they do not meet specifications

Material	Hourly Process Weight (Pounds Per Hour)			Average Annual (Specify Units)	Intermittent Operation Only (Average Hours Per Week)
	Average	Maximum	Minimum		
N/A					

SECTION F – FUELS USED

Coal (Tons/Yr)	% Sulfur	% Ash	Oil (Gal/Yr)	% Sulfur	Grade No.
N/A	N/A	N/A	N/A	N/A	N/A

Natural Gas (Thousand CF/Yr)	LP Gas (Gal/Yr)	Other (Specify)
135,890 (per engine)	N/A	

SECTION G – STACK PARAMETERS **Each engine has an identical stack**

List each pollutant separately.

Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
All	57	1.625	16,211	858	270.18

Stack Base UTM Coordinate X:	Stack Base UTM Coordinate Y:
ENG-1 635212.43	ENG-1 5302156.36
ENG-2 635223.38	ENG-2 5302157.17
ENG-3 635233.84	ENG-3 5302157.36
ENG-4 635244.62	ENG-4 5302157.53
ENG-5 635259.33	ENG-5 5302159.24
ENG-6 635269.77	ENG-6 5302159.58
ENG-7 635280.54	ENG-7 5302159.93

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.

Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					

Stack Base UTM Coordinate X:	Stack Base UTM Coordinate Y:

SECTION I – AIR CONTAMINANTS EMITTED **Per Engine**

Known or Suspected - Use emission rates after control equipment.

Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
NOx	2.612	9.864	Catalyst Manufacturer's Specs
CO	0.993	3.748	Catalyst Manufacturer's Specs
VOC	1.411	5.327	Catalyst Manufacturer's Specs
PM	0.157	0.592	AP-42 Section 3.2, Table 3.2-2
PM_{10}	0.157	0.592	AP-42 Section 3.2, Table 3.2-2
$PM_{2.5}$	0.157	0.592	AP-42 Section 3.2, Table 3.2-2
SO_2	0.009	0.035	AP-42 Section 3.2, Table 3.2-2
Formaldehyde (CAS 50-00-0)	0.104	0.395	Catalyst Manufacturer's Specs
Total HAPs (see Appendix B for speciated HAPs)	0.126	0.476	AP-42 Section 3.2, Table 3.2-2
CO_2e	1,839.678	6,946.097	40 CFR Part 98, Subpart C, Tables C-1 and C-2

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT **Each engine has an identical catalyst**

Type: ☐Cyclone ☐Multiclone ☐Baghouse ☐Electrostatic Precipitator

☐Wet Scrubber ☐Spray Dryer ☐None

☒Other – Specify: Oxidation Catalyst, Standard Precious Group Metals

Name of Manufacturer	Model Number	Date to Be Installed
Emit Technologies, Inc.	EBH-7000-2022F-6C4E-36	2016

Application: ☐Boiler ☐Kiln ☒Engine

☐Other – Specify:_____

Pollutants Removed	CO	VOC	Formaldehyde	HAPs (Acetaldehyde, Acrolein, Benzene)
Design Efficiency (%)				
Operating Efficiency (%)	93%	60% (Specs); 65% (PSD avoidance)	80.8%	80%

Describe method used to determine operating efficiency:

Catalyst spec sheet emission reduction factors calculated based on engine manufacturer's operating conditions and emission rates.

SECTION J2 – GAS CONDITIONS

Gas Conditions	Inlet		Outlet	
Gas Volume (SCFM; 68°F; 14.7 psia)	ENG-1 to 4: 18,500 ENG-5 to 7: 14,500		ENG-1 to 4: 18,500 ENG-5 to 7: 14,500	
Gas Temperature (°F)	70		70-120	
Gas Pressure (in. H_2O)	ENG-1 to 4: 3,325 ENG-5 to 7: 13,480		ENG-1 to 4: 13,840 ENG-5 to 7: 38,200	
Gas Velocity (ft/sec)	ENG-1 to 4: 220 ENG-5 to 7: 180		ENG-1 to 4: 220 ENG-5 to 7: 180	
Pollutant Concentration (Specify pollutant and unit of concentration) **See calcs in Appendix B and spec sheet in Appendix C**	Pollutant	Unit of Concentration	Inlet	Outlet
Pressure drop through gas cleaning device (in. H_2O)				

EMISSION UNIT FOR TITLE V PERMIT TO OPERATE

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 61006 (3-2019)

SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.) Stationary Natural Gas-Fired Engine Non-Emergency Use	Emission Unit Number: C-1031, C-1041, C-1051, C-1061, C-1271, C-1281, C-1291	Emission Point Number: ENG-8, ENG-9, ENG-10, ENG-11, ENG-12, ENG-13, ENG-14
Make Caterpillar	Model G3616A4	Installation or manufacture date Mfg. Date: 2017 Install: 12/8/2018
Capacity (manufacturer's or designer's guaranteed maximum) 5,000 bhp per each engine	Operating Capacity (specific units) 5,000 bhp per each engine	
Brief description of operation of unit or process: 7 identical Caterpillar G3616A4 (4SLB) natural gas-fired compression engines rated at 5,000 bhp (manufactured in 2017) (JJJJ)		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate): N/A	Alternative Emission Point: N/A	

SECTION B –OPERATING SCHEDULE

Are you agreeing to a limit on the operating schedule for this unit? ☐Yes ☒No				
Hours Per Day 24	Days Per Week 7	Weeks Per Year 52	Peak Production Season (if any)	Dates of Annual Shutdown

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

Are you agreeing to a limit on the production for this unit? ☐Yes ☒No (If No, show normal operating schedule.)				
Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.

Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
NSPS JJJJ		Maintain maintenance plan and records of all maintenance; all submittals	Initial notification	Initial performance test and subsequent annually or 8,760 hours for NOx, CO, VOC	NOx: 1.0 g/hp-hr or 82 ppmvd; CO: 2.0 g/hp-hr or 270 ppmvd; VOC: 0.7 g/hp-hr or 60 ppmvd
PTC 18195 v1.0					NOx: 3.30 lb/hr; CO: 2.20 lb/hr; VOC: 2.75 lb/hr Combust only gas with ≤ 2 gr S/ 100 scf

Generally describe all applicable requirements.					
Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
NSPS OOOOa (for compressors)	Operating hours or months, continuously	Maintain records of hours, maintenance and compliance reports	Annual compliance reports	None	Rod packing replacement every 26,000 hours of operation or 36 months
NDAC 33.1-15-03					Opacity: 20%, except for on 6-minute period per hour of 40%

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

Has emission unit testing been done at the facility? ☒Yes ☐No			
Emission Unit ID	Last Date when a Testing Program was Completed	If Program is Continuous, Give Approximate Testing Frequency	Regulation requiring frequency (NSPS, MACT, Permit Requirement-list permit number)
ENG-8	December 28, 2023	Every 8,760 hours + initial testing for formaldehyde for select engines, per PTC permit condition	NSPS JJJJ; PTC 18195 v1.0
ENG-9	May 24, 2023		
ENG-10	June 20, 2023		
ENG-11	June 20, 2023		
ENG-12	December 28, 2023		
ENG-13	June 13, 2023		
ENG-14	April 26, 2023		

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

Include all, even those not usable because they do not meet specifications					
Material	Hourly Process Weight (Pounds Per Hour)			Average Annual (Specify Units)	Intermittent Operation Only (Average Hours Per Week)
	Average	Maximum	Minimum		
N/A					

SECTION F – FUELS USED

Coal (Tons/Yr)	% Sulfur	% Ash	Oil (Gal/Yr)	% Sulfur	Grade No.
N/A	N/A	N/A	N/A	N/A	N/A
Natural Gas (Thousand CF/Yr) 321,715 (per engine)		LP Gas (Gal/Yr) N/A		Other (Specify) N/A	

SECTION G – STACK PARAMETERS **Each engine has an identical stack**

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
All	47.5	3	31,255	830	73.7

Stack Base UTM Coordinate X:		Stack Base UTM Coordinate Y:	
ENG-8	635336.50	ENG-8	5302292.60
ENG-9	635336.31	ENG-9	5302303.16
ENG-10	635335.75	ENG-10	5302313.14
ENG-11	635335.63	ENG-11	5302323.34
ENG-12	635335.07	ENG-12	5302340.05
ENG-13	635334.74	ENG-13	5302350.36
ENG-14	635334.30	ENG-14	5302360.40

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.

Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					

Stack Base UTM Coordinate X:	Stack Base UTM Coordinate Y:

SECTION I – AIR CONTAMINANTS EMITTED Per Engine

Known or Suspected - Use emission rates after control equipment.

Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
NO_X	3.307	14.484	Catalyst Manufacturer's Specs
CO	2.205	9.656	Catalyst Manufacturer's Specs
VOC	2.976	13.036	Catalyst Manufacturer's Specs
PM	0.374	1.639	AP-42 Section 3.2, Table 3.2-2
PM_{10}	0.374	1.639	AP-42 Section 3.2, Table 3.2-2
$PM_{2.5}$	0.374	1.639	AP-42 Section 3.2, Table 3.2-2
SO_2	0.022	0.096	AP-42 Section 3.2, Table 3.2-2
Formaldehyde (CAS 50-00-0)	0.220	0.966	Catalyst Manufacturer's Specs
Total HAPs	0.316	1.382	AP-42 Section 3.2, Table 3.2-2
CO_2e	4,386.449	19,212.648	40 CFR Part 98, Subpart C, Tables C-1 and C-2

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT Each engine has an identical catalyst

Type: ☐Cyclone ☐Multiclone ☐Baghouse ☐Electrostatic Precipitator

☐Wet Scrubber ☐Spray Dryer ☐None

☒Other – Specify: Oxidation Catalyst, Standard Precious Group Metals

Name of Manufacturer	Model Number	Date to Be Installed
Emit Technologies, Inc	RT-4815-Z	2018

Application: ☐Boiler ☐Kiln ☒Engine

☐Other – Specify:_____

Pollutants Removed	CO	VOC	Formaldehyde	HAPs (Acetaldehyde, Acrolein, Benzene)
Design Efficiency (%)		40%		
Operating Efficiency (%)	93%	0%	71%	50%

Describe method used to determine operating efficiency:

Catalyst spec sheet emission reduction factors calculated based on engine manufacturer's operating conditions and emission rates.

SECTION J2 – GAS CONDITIONS

Gas Conditions	Inlet		Outlet	
Gas Volume (SCFM; 68°F; 14.7 psia)	ENG-8 to 11: 46,500 ENG-12 to 14: 39,500		ENG-8 to 11: 46,500 ENG-12 to 14: 39,500	
Gas Temperature (°F)	70		70-120	
Gas Pressure (in. H_2O)	ENG-8 to 11: 3,325 ENG-12 to 14: 13,840		ENG-8 to 11: 13,840 ENG-12 to 14: 38,200	
Gas Velocity (ft/sec)	ENG-8 to 11: 245 ENG-12 to 14: 210		ENG-8 to 11: 245 ENG-12 to 14: 210	
Pollutant Concentration (Specify pollutant and unit of concentration) **See calcs in Appendix B and spec sheet in Appendix C**	Pollutant	Unit of Concentration	Inlet	Outlet
Pressure drop through gas cleaning device (in. H_2O)				

EMISSION UNIT FOR TITLE V PERMIT TO OPERATE

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 61006 (3-2019)

SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.) Stationary Diesel and Dual Fuel Engine Energy Use Only	Emission Unit Number: GEN-1	Emission Point Number: GEN-1
Make Mitsubishi	Model In-Line	Installation or manufacture date Manufacture date: 8/1/2021
Capacity (manufacturer's or designer's guaranteed maximum) 85 BHP @ rpm	Operating Capacity (specific units) 85 BHP @ rpm	
Brief description of operation of unit or process: Emergency generator driven by a diesel-fired engine rated at 85 hp. 4-stroke compression ignition. Limited to 100 hours per calendar year of non-emergency operation. No time limit on use during emergency situations.		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	Alternative Emission Point:	

SECTION B – OPERATING SCHEDULE

Are you agreeing to a limit on the operating schedule for this unit? ☒Yes ☐No 100 hrs/yr of non-emergency use				
Hours Per Day	Days Per Week	Weeks Per Year	Peak Production Season (if any)	Dates of Annual Shutdown

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

Are you agreeing to a limit on the production for this unit? ☐Yes ☒No (If No, show normal operating schedule.)				
Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.

Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
NSPS IIII	Equip with non-resettable hours meter	- Maintain according to manufacturer's emission-related instructions - Keep records of hours of operation. Limited to 100 hrs non-emergency use.			NHMC+NOX = 4.7 g/kW-hr CO = 5.0 g/kW-hr PM = 0.40 g/kW-hr

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

Has emission unit testing been done at the facility? ☐Yes ☒No			
Emission Unit ID	Last Date when a Testing Program was Completed	If Program is Continuous, Give Approximate Testing Frequency	Regulation requiring frequency (NSPS, MACT, Permit Requirement-list permit number)

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

Include all, even those not usable because they do not meet specifications					
Material	Hourly Process Weight (Pounds Per Hour)			Average Annual (Specify Units)	Intermittent Operation Only (Average Hours Per Week)
	Average	Maximum	Minimum		
N/A					

SECTION F – FUELS USED

Coal (Tons/Yr)	% Sulfur	% Ash	Oil (Gal/Yr)	% Sulfur	Grade No.
N/A	N/A	N/A	N/A	N/A	N/A
Natural Gas (Thousand CF/Yr) N/A		LP Gas (Gal/Yr) N/A		Other (Specify) Ultra-low sulfur diesel	

SECTION G – STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
All pollutants	5	0.17	448	930	342.25
Stack Base UTM Coordinate X: 634922.09			Stack Base UTM Coordinate Y: 5302018.28		

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION I – AIR CONTAMINANTS EMITTED

Known or Suspected - Use emission rates after control equipment.			
Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
NOx	0.608	0.030	Table 3 to Appendix I to Part 1039(c): Tier 3 Emission Standards
CO	0.699	0.035	Table 3 to Appendix I to Part 1039(c): Tier 3 Emission Standards
VOC	0.049	0.003	Table 3 to Appendix I to Part 1039(c): Tier 3 Emission Standards
PM	0.056	0.003	Table 3 to Appendix I to Part 1039(c): Tier 3 Emission Standards
PM_{10}	0.056	0.003	Table 3 to Appendix I to Part 1039(c): Tier 3 Emission Standards

Known or Suspected - Use emission rates after control equipment.			
Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
$PM_{2.5}$	0.056	0.003	Table 3 to Appendix I to Part 1039(c): Tier 3 Emission Standards
SO_2	0.174	0.009	AP-42 Section 3.3, Table 3.3-1
Formaldehyde (CAS 50-00-0)	0.001	3.511E-05	AP-42 Section 3.3, Table 3.3-1
Total HAPs (see Appendix B for speciated HAPs)	0.002	1.128E-04	AP-42 Section 3.3, Table 3.3-1
CO2e	98.083	4.904	AP-42 Section 3.3, Table 3.3-1; 40 CFR Part 98, Subpart C, Table C-2

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT

Type: ☐Cyclone ☐Multiclone ☐Baghouse ☐Electrostatic Precipitator

☐Wet Scrubber ☐Spray Dryer ☒None

☐Other – Specify:

Name of Manufacturer	Model Number	Date to Be Installed

Application: ☐Boiler ☐Kiln ☐Engine

☐Other – Specify:_____

Pollutants Removed				
Design Efficiency (%)				
Operating Efficiency (%)				

Describe method used to determine operating efficiency:

SECTION J2 – GAS CONDITIONS N/A

Gas Conditions	Inlet		Outlet	
Gas Volume (SCFM; 68°F; 14.7 psia)				
Gas Temperature (°F)				
Gas Pressure (in. H_2O)				
Gas Velocity (ft/sec)				
Pollutant Concentration (Specify pollutant and unit of concentration)	Pollutant	Unit of Concentration	Inlet	Outlet

Pressure drop through gas cleaning device (in. H_2O)

EMISSION UNIT FOR TITLE V PERMIT TO OPERATE

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
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SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.) TEG Dehydration Unit	Emission Unit Number: DEHY-1	Emission Point Number: DEHY-1
Make N/A	Model N/A	Installation or manufacture date 12/8/2018
Capacity (manufacturer's or designer's guaranteed maximum) 200 MMscf/day (rated capacity)	Operating Capacity (specific units) 200 MMscf/day (rated capacity)	
Brief description of operation of unit or process: Triethylene glycol (TEG) dehydration unit rated at 200 MMscf/day		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	Alternative Emission Point:	

SECTION B – OPERATING SCHEDULE

Are you agreeing to a limit on the operating schedule for this unit? ☐Yes ☒No				
Hours Per Day 24	Days Per Week 7	Weeks Per Year 52	Peak Production Season (if any)	Dates of Annual Shutdown

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

Are you agreeing to a limit on the production for this unit? ☐Yes ☒No (If No, show normal operating schedule.)				
Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	
N/A				

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.					
Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
MACT HH	Measure natural gas flowrate to the dehy with an accuracy of +/- 2%.	- Calculate actual avg. benzene or BTEX emissions using GRI-GLYCalc v3.0 or higher. - Actual annual average natural gas throughput (in terms of NG flowrate to the dehy per day)	Unit is not and site is not a major source of HAPs. Because facility is an area source of HAPs, no reporting requirements for MACT HH apply.		

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

Has emission unit testing been done at the facility? ☐Yes ☒No			
Emission Unit ID	Last Date when a Testing Program was Completed	If Program is Continuous, Give Approximate Testing Frequency	Regulation requiring frequency (NSPS, MACT, Permit Requirement-list permit number)

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

Include all, even those not usable because they do not meet specifications					
Material	Hourly Process Weight (Pounds Per Hour)			Average Annual (Specify Units)	Intermittent Operation Only (Average Hours Per Week)
	Average	Maximum	Minimum		
N/A					

SECTION F – FUELS USED

Coal (Tons/Yr)	% Sulfur	% Ash	Oil (Gal/Yr)	% Sulfur	Grade No.
N/A	N/A	N/A	N/A	N/A	N/A
Natural Gas (Thousand CF/Yr) N/A – Reboiler heat provided by hot oil system		LP Gas (Gal/Yr) N/A		Other (Specify) N/A	

SECTION G – STACK PARAMETERS – N/A – Process vent connected to a process natural gas line

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION H – ALTERNATIVE STACK PARAMETERS – N/A

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION I – AIR CONTAMINANTS EMITTED

Known or Suspected - Use emission rates after control equipment.			
Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
VOC	2.59	11.36	GRI-GLYCalc 4.0
Total HAPs (see Appendix B for speciated HAPs)	0.35	1.55	GRI-GLYCalc 4.0
CO2e	17.03	74.60	GRI-GLYCalc 4.0

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT

Type: ☐Cyclone ☐Multiclone ☐Baghouse ☐Electrostatic Precipitator

☐Wet Scrubber ☐Spray Dryer ☐None

☒Other – Specify: Flare/combustor

Name of Manufacturer	Model Number	Date to Be Installed
Mission Flares and Combustion	MC 1500	

Application: ☐Boiler ☐Kiln ☐Engine

☒Other – Specify: Combustor for dehy

Pollutants Removed	VOC	HAP	BTEX	
Design Efficiency (%)	98%	98%	98%	
Operating Efficiency (%)	98%	98%	98%	

Describe method used to determine operating efficiency:

SECTION J2 – GAS CONDITIONS

Gas Conditions	Inlet		Outlet	
Gas Volume (SCFM; 68°F; 14.7 psia)	125.84 HP / 867.882 LP			
Gas Temperature (°F)	< 130			
Gas Pressure (in. H_2O)				
Gas Velocity (ft/sec)				
Pollutant Concentration (Specify pollutant and unit of concentration)	Pollutant	Unit of Concentration	Inlet	Outlet
	VOC		4.03E-04	1.77E-03
	HAPs		6.00E-03	2.80E-02
	CO2e		798.36	1,794.03

Pressure drop through gas cleaning device (in. H_2O)

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SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.) Process Heater	Emission Unit Number: HTR-1	Emission Point Number: HTR-1
Make Tulsa Heaters	Model SHO Series Size 3500	Installation or manufacture date November 2015 Startup: September 2016
Capacity (manufacturer's or designer's guaranteed maximum) 46.00 MMBtu/hr (maximum capacity)	Operating Capacity (specific units) 40.00 MMBtu/hr (rated capacity)	
Brief description of operation of unit or process: Circulation system combustion heater		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	Alternative Emission Point:	

SECTION B – OPERATING SCHEDULE

Are you agreeing to a limit on the operating schedule for this unit? ☐Yes ☒No				
Hours Per Day 24	Days Per Week 7	Weeks Per Year 52	Peak Production Season (if any)	Dates of Annual Shutdown

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

Are you agreeing to a limit on the production for this unit? ☐Yes ☒No (If No, show normal operating schedule.)				
Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	
N/A				

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.

Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
NSPS Dc		Monthly fuel consumption records	Startup notification		
ACP-18195 v1.0		Maintain gas analysis records verifying natural gas meets sulfur specification		Initial stack test (NO_X and CO)	NO_X: 1.52 lb/hr CO: 1.89 lb/hr Opacity: 20% (60% for 6-min period/hr) Combust only gas with ≤ 2 gr S/100 scf

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

Has emission unit testing been done at the facility? ☒Yes ☐No			
Emission Unit ID	Last Date when a Testing Program was Completed	If Program is Continuous, Give Approximate Testing Frequency	Regulation requiring frequency (NSPS, MACT, Permit Requirement-list permit number)
HTR-1	CO, NO_X: 3/13/2019	N/A	One time (State)

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

Include all, even those not usable because they do not meet specifications					
Material	Hourly Process Weight (Pounds Per Hour)			Average Annual (Specify Units)	Intermittent Operation Only (Average Hours Per Week)
	Average	Maximum	Minimum		
N/A					

SECTION F – FUELS USED

Coal (Tons/Yr)	% Sulfur	% Ash	Oil (Gal/Yr)	% Sulfur	Grade No.
N/A	N/A	N/A	N/A	N/A	N/A
Natural Gas (Thousand CF/Yr) N/A		LP Gas (Gal/Yr) N/A		Other (Specify) 350,120 thousand CF/yr Fuel gas from plant residue, piped connection	

SECTION G – STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
All pollutants	31.4	3.0	16,325 (wet)	509	272.09 (avg)
Stack Base UTM Coordinate X: 635422.65			Stack Base UTM Coordinate Y: 5302174.73		

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION I – AIR CONTAMINANTS EMITTED

Known or Suspected - Use emission rates after control equipment.			
Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
NOx	1.518	6.649	Manufacturer's Specification
CO	1.886	8.261	Manufacturer's Specification
VOC	1.380	6.044	Manufacturer's Specification
PM	0.343	1.501	AP-42 Section 1.4, Table 1.4-2
PM_{10}	0.343	1.501	AP-42 Section 1.4, Table 1.4-2

Known or Suspected - Use emission rates after control equipment.			
Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
$PM_{2.5}$	0.343	1.501	AP-42 Section 1.4, Table 1.4-2
SO_2	0.027	0.119	AP-42 Section 1.4, Table 1.4-2
Total HAPs (see Appendix B for speciated HAPs)	0.085	0.372	AP-42 Section 1.4, Table 1.4-3
CO_2e	5,386.512	23,592.923	40 CFR Part 98, Subpart C, Tables C-1 and C-2

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT

Type: ☐Cyclone ☐Multiclone ☐Baghouse ☐Electrostatic Precipitator

☐Wet Scrubber ☐Spray Dryer ☒None

☐Other – Specify:

Name of Manufacturer	Model Number	Date to Be Installed

Application: ☐Boiler ☐Kiln ☐Engine

☐Other – Specify:_____

Pollutants Removed				
Design Efficiency (%)				
Operating Efficiency (%)				

Describe method used to determine operating efficiency:

SECTION J2 – GAS CONDITIONS – N/A

Gas Conditions	Inlet		Outlet	
Gas Volume (SCFM; 68°F; 14.7 psia)				
Gas Temperature (°F)				
Gas Pressure (in. H_2O)				
Gas Velocity (ft/sec)				
Pollutant Concentration (Specify pollutant and unit of concentration)	Pollutant	Unit of Concentration	Inlet	Outlet

Pressure drop through gas cleaning device (in. H_2O)

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SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.) Hot Oil Heater (H4021)	Emission Unit Number: HTR-7	Emission Point Number: HTR-7
Make Tulsa Heaters	Model SHO Series 5000 SHOS.Model SHOS1110	Installation or manufacture date 12/8/2018
Capacity (manufacturer's or designer's guaranteed maximum) 86.58 MMBtu/hr	Operating Capacity (specific units) 86.58 MMBtu/hr	
Brief description of operation of unit or process: Gas horizontally fired		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	Alternative Emission Point:	

SECTION B – OPERATING SCHEDULE

Are you agreeing to a limit on the operating schedule for this unit? ☐Yes ☒No				
Hours Per Day 24	Days Per Week 7	Weeks Per Year 52	Peak Production Season (if any)	Dates of Annual Shutdown

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

Are you agreeing to a limit on the production for this unit? ☐Yes ☒No (If No, show normal operating schedule.)				
Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.

Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
NSPS Dc		Monthly fuel consumption records	Startup notification		
ACP-18195 v1.0		Maintain gas analysis records verifying natural gas meets sulfur specification		Initial stack test (NO_X and CO)	NO_X: 2.04 lb/hr CO: 3.53 lb/hr Opacity: 20% (60% for 6 min period/hr) Combust only gas with ≤ 2 gr S/100 scf

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

Has emission unit testing been done at the facility? ☒Yes ☐No			
Emission Unit ID	Last Date when a Testing Program was Completed	If Program is Continuous, Give Approximate Testing Frequency	Regulation requiring frequency (NSPS, MACT, Permit Requirement-list permit number)
HTR-7	NO_X, CO: 3/14/2019	N/A	One time (State)

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

Include all, even those not usable because they do not meet specifications					
Material	Hourly Process Weight (Pounds Per Hour)			Average Annual (Specify Units)	Intermittent Operation Only (Average Hours Per Week)
	Average	Maximum	Minimum		
N/A					

SECTION F – FUELS USED

Coal (Tons/Yr)	% Sulfur	% Ash	Oil (Gal/Yr)	% Sulfur	Grade No.
N/A	N/A	N/A	N/A	N/A	N/A
Natural Gas (Thousand CF/Yr) N/A		LP Gas (Gal/Yr) N/A		Other (Specify) 658,990 thousand CF/yr (fuel gas)	

SECTION G – STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
All	32.67	4.0	17,700	500	23.4
Stack Base UTM Coordinate X: 635408.03			Stack Base UTM Coordinate Y: 5302286.19		

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION I – AIR CONTAMINANTS EMITTED

Known or Suspected - Use emission rates after control equipment.			
Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
NOx	3.463	15.169	Manufacturer's Specification
CO	3.550	15.548	Manufacturer's Specification
VOC	1.645	7.205	Manufacturer's Specification
PM	0.645	2.826	AP-42 Section 1.4, Table 1.4-2
PM_{10}	0.645	2.826	AP-42 Section 1.4, Table 1.4-2

Known or Suspected - Use emission rates after control equipment.			
Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
$PM_{2.5}$	0.645	2.826	AP-42 Section 1.4, Table 1.4-2
SO_2	0.051	0.223	AP-42 Section 1.4, Table 1.4-2
Total HAPs (see Appendix B for speciated HAPs)	0.160	0.700	AP-42 Section 1.4, Table 1.4-3
CO_2e	10,138.353	44,405.984	40 CFR Part 98, Subpart C, Tables C-1 and C-2

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT

Type: ☐Cyclone ☐Multiclone ☐Baghouse ☐Electrostatic Precipitator

☐Wet Scrubber ☐Spray Dryer ☒None

☐Other – Specify:

Name of Manufacturer	Model Number	Date to Be Installed

Application: ☐Boiler ☐Kiln ☐Engine

☐Other – Specify:_____

Pollutants Removed				
Design Efficiency (%)				
Operating Efficiency (%)				

Describe method used to determine operating efficiency:

SECTION J2 – GAS CONDITIONS – N/A

Gas Conditions	Inlet		Outlet	
Gas Volume (SCFM; 68°F; 14.7 psia)				
Gas Temperature (°F)				
Gas Pressure (in. H_2O)				
Gas Velocity (ft/sec)				
Pollutant Concentration (Specify pollutant and unit of concentration)	Pollutant	Unit of Concentration	Inlet	Outlet

Pressure drop through gas cleaning device (in. H_2O)

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SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.)	Emission Unit Number:	Emission Point Number:
Flare	E-1	E-1
Make	Model	Installation or manufacture date
John Zink	PLA-42	November 2015
Capacity (manufacturer's or designer's guaranteed maximum) 1.5 MMscf/day	Operating Capacity (specific units) 1.5 MMscf/day	
Brief description of operation of unit or process: The Plant 1 flare (FL-101; EU E-1) is used to control the pressure relief valves throughout the plant, compressor blow downs, and overhead vapors from the flare knockout drum		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	Alternative Emission Point:	

SECTION B – OPERATING SCHEDULE

Are you agreeing to a limit on the operating schedule for this unit? ☐Yes ☒No Emergency use only				
Hours Per Day	Days Per Week	Weeks Per Year	Peak Production Season (if any)	Dates of Annual Shutdown
24	7	52		

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

Are you agreeing to a limit on the production for this unit? ☐Yes ☒No (If No, show normal operating schedule.)				
Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	
N/A				

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.					
Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
ACP-18195 v1.0 (NDAC 33.1-15-07-02)	Flame presence monitored by thermocouple				Flare equipped and operated with continuous pilot
ACP-18195 v1.0					Opacity: 20% (60% for 6 min period/hr)

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

Has emission unit testing been done at the facility? ☐Yes ☒No			
Emission Unit ID	Last Date when a Testing Program was Completed	If Program is Continuous, Give Approximate Testing Frequency	Regulation requiring frequency (NSPS, MACT, Permit Requirement-list permit number)

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

Include all, even those not usable because they do not meet specifications					
Material	Hourly Process Weight (Pounds Per Hour)			Average Annual (Specify Units)	Intermittent Operation Only (Average Hours Per Week)
	Average	Maximum	Minimum		
N/A					

SECTION F – FUELS USED

Coal (Tons/Yr)	% Sulfur	% Ash	Oil (Gal/Yr)	% Sulfur	Grade No.
N/A	N/A	N/A	N/A	N/A	N/A
Natural Gas (Thousand CF/Yr)		LP Gas (Gal/Yr)		Other (Specify)	
7,630.3		N/A		N/A	

SECTION G – STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
All	115	3.5	87,990	1,341	131.23
Stack Base UTM Coordinate X: 635531.49			Stack Base UTM Coordinate Y: 5302265.08		

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION I – AIR CONTAMINANTS EMITTED

Known or Suspected - Use emission rates after control equipment.			
Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
NOx	0.069	0.301	AP-42 Section 13.5, Tables 13.5-1 and 13.5-2
CO	0.313	1.390	AP-42 Section 13.5, Tables 13.5-1 and 13.5-2
VOC	0.005	0.022	AP-42 Section 1.4, Tables 1.4-1 and 1.4-2 Manufacturer's Specifications
PM	0.008	0.033	AP-42 Section 1.4, Tables 1.4-1 and 1.4-2
PM_{10}	0.008	0.033	AP-42 Section 1.4, Tables 1.4-1 and 1.4-2
$PM_{2.5}$	3.935E-04	0.002	AP-42 Section 1.4, Tables 1.4-1 and 1.4-2
SO_2	5.943E-04	2.46E-03	AP-42 Section 1.4, Tables 1.4-1 and 1.4-2
Total HAPs (see Appendix B for speciated HAPs)	0.002	0.008	AP-42 Section 1.4, Table 1.4-3 Manufacturer's Specifications
CO_2e	118.862	492.616	AP-42 Section 1.4, Tables 1.4-1 and 1.4-2

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT

Type: ☐Cyclone ☐Multiclone ☐Baghouse ☐Electrostatic Precipitator

☐Wet Scrubber ☐Spray Dryer ☒None

☐Other – Specify:

Name of Manufacturer	Model Number	Date to Be Installed

Application: ☐Boiler ☐Kiln ☐Engine

☐Other – Specify:_____

Pollutants Removed				
Design Efficiency (%)				
Operating Efficiency (%)				

Describe method used to determine operating efficiency:

SECTION J2 – GAS CONDITIONS – N/A

Gas Conditions	Inlet		Outlet	
Gas Volume (SCFM; 68°F; 14.7 psia)				
Gas Temperature (°F)				
Gas Pressure (in. H_2O)				
Gas Velocity (ft/sec)				
Pollutant Concentration (Specify pollutant and unit of concentration)	Pollutant	Unit of Concentration	Inlet	Outlet

Pressure drop through gas cleaning device (in. H_2O)

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SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.) Flare	Emission Unit Number: FLR-1	Emission Point Number: FLR-1
Make Azola	Model F-7203	Installation or manufacture date Startup: 12/8/2018
Capacity (manufacturer's or designer's guaranteed maximum) 3.5 MMscf/day	Operating Capacity (specific units) 3.5 MMscf/day	
Brief description of operation of unit or process: The Plant 2 flare (FL-7023; EU FLR-1) is used to control the pressure relief valves throughout the plant, compressor blow downs, and overhead vapors from the flare knockout drum.		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	Alternative Emission Point:	

SECTION B – OPERATING SCHEDULE

Are you agreeing to a limit on the operating schedule for this unit? ☐Yes ☒No Emergency use only

Hours Per Day	Days Per Week	Weeks Per Year	Peak Production Season (if any)	Dates of Annual Shutdown
24	7	52		

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

Are you agreeing to a limit on the production for this unit? ☐Yes ☒No (If No, show normal operating schedule.)

Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	
N/A				

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.

Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
ACP-18195 v1.0 (NDAC 33.1-15-07-02)	Flame presence monitored by thermocouple				Flare equipped and operated with continuous pilot
ACP-18195 v1.0					Opacity: 20% (60% for 6 min period/hr)

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

Has emission unit testing been done at the facility? ☐Yes ☒No

Emission Unit ID	Last Date when a Testing Program was Completed	If Program is Continuous, Give Approximate Testing Frequency	Regulation requiring frequency (NSPS, MACT, Permit Requirement-list permit number)

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

Include all, even those not usable because they do not meet specifications

Material	Hourly Process Weight (Pounds Per Hour)			Average Annual (Specify Units)	Intermittent Operation Only (Average Hours Per Week)
	Average	Maximum	Minimum		
N/A					

SECTION F – FUELS USED

Coal (Tons/Yr)	% Sulfur	% Ash	Oil (Gal/Yr)	% Sulfur	Grade No.
N/A	N/A	N/A	N/A	N/A	N/A
Natural Gas (Thousand CF/Yr)		LP Gas (Gal/Yr)		Other (Specify)	
21,466		N/A		N/A	

SECTION G – STACK PARAMETERS

List each pollutant separately.

Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
All	150	3.5	37,425	1,341	131.23
Stack Base UTM Coordinate X: 635533.77			Stack Base UTM Coordinate Y: 5302203.35		

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.

Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION I – AIR CONTAMINANTS EMITTED

Known or Suspected - Use emission rates after control equipment.

Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
NOx	0.196	0.859	AP-42 Section 13.5, Tables 13.5-1 and 13.5-2
CO	0.894	4.173	AP-42 Section 13.5, Tables 13.5-1 and 13.5-2
VOC	0.010	0.045	AP-42 Section 1.4, Tables 1.4-1 and 1.4-2 Manufacturer's Specifications
PM	0.021	0.086	AP-42 Section 1.4, Tables 1.4-1 and 1.4-2
PM_{10}	0.021	0.086	AP-42 Section 1.4, Tables 1.4-1 and 1.4-2
$PM_{2.5}$	0.020	0.032	AP-42 Section 1.4, Tables 1.4-1 and 1.4-2
SO_2	1.696E-03	0.003	AP-42 Section 1.4, Tables 1.4-1 and 1.4-2
Total HAPs (see Appendix B for speciated HAPs)	0.005	0.023	AP-42 Section 1.4, Table 1.4-3 Manufacturer's Specifications
CO_2e	339.152	1,485.485	AP-42 Section 1.4, Tables 1.4-1 and 1.4-2

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT

Type: ☐Cyclone ☐Multiclone ☐Baghouse ☐Electrostatic Precipitator

☐Wet Scrubber ☐Spray Dryer ☒None

☐Other – Specify:

Name of Manufacturer	Model Number	Date to Be Installed

Application: ☐Boiler ☐Kiln ☐Engine

☐Other – Specify:_____

Pollutants Removed				
Design Efficiency (%)				
Operating Efficiency (%)				

Describe method used to determine operating efficiency:

SECTION J2 – GAS CONDITIONS – N/A

Gas Conditions	Inlet		Outlet	
Gas Volume (SCFM; 68°F; 14.7 psia)				
Gas Temperature (°F)				
Gas Pressure (in. H_2O)				
Gas Velocity (ft/sec)				
Pollutant Concentration (Specify pollutant and unit of concentration)	Pollutant	Unit of Concentration	Inlet	Outlet

Pressure drop through gas cleaning device (in. H_2O)

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SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.) Fugitive emissions from component leaks	Emission Unit Number: FUG-1	Emission Point Number: FUG-1
Make N/A	Model N/A	Installation or manufacture date November 2015 Startup: September 2016
Capacity (manufacturer's or designer's guaranteed maximum) N/A	Operating Capacity (specific units) N/A	
Brief description of operation of unit or process: Fugitive emissions from Gas Plants 1 and 2 (natural gas processing)		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	Alternative Emission Point:	

SECTION B – OPERATING SCHEDULE

Are you agreeing to a limit on the operating schedule for this unit? ☐Yes ☒No				
Hours Per Day	Days Per Week	Weeks Per Year	Peak Production Season (if any)	Dates of Annual Shutdown
24	7	52		

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

Are you agreeing to a limit on the production for this unit? ☐Yes ☒No (If No, show normal operating schedule.)				
Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	
N/A				

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.

Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
NSPS OOOOa (NSPS VVa by reference in NSPS OOOOa)	Monitoring (using Method 21) requirements: - Quarterly (and w/in 5 days of pressure relief) for pressure relief devices; - Monthly (and weekly visual inspection) for pumps, monthly for valves; and - Every 12 months for connectors. Repairs attempted within 5 days and complete w/in 15 days of leak detection.	Records of monitoring, repairs and reports; monitoring plan including identification of difficult to monitor components and equipment designated for no detectable emissions (for pressure relief)	Annual compliance reports through CEDRI Semi-annual compliance report for pressure relief devices at NG processing plants	None	The following readings indicate a leak: - 500 ppm or greater for pressure relief devices in gas service, valves in gas or light liquid service, and connectors in gas or light liquid service; - 10,000 ppm for pumps, valves, and connectors in heavy liquid service and pressure relief devices in liquid service. Each open-ended valve or line shall be equipped with a cap, blind flange, plug, or second valve. Each sampling connection system shall be equipped with a closed-purge, closed-loop, or closed-vent system.

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

Has emission unit testing been done at the facility? ☐Yes ☒No			
Emission Unit ID	Last Date when a Testing Program was Completed	If Program is Continuous, Give Approximate Testing Frequency	Regulation requiring frequency (NSPS, MACT, Permit Requirement-list permit number)

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

Include all, even those not usable because they do not meet specifications					
Material	Hourly Process Weight (Pounds Per Hour)			Average Annual (Specify Units)	Intermittent Operation Only (Average Hours Per Week)
	Average	Maximum	Minimum		
N/A					

SECTION F – FUELS USED

Coal (Tons/Yr)	% Sulfur	% Ash	Oil (Gal/Yr)	% Sulfur	Grade No.
N/A	N/A	N/A	N/A	N/A	N/A
Natural Gas (Thousand CF/Yr) N/A		LP Gas (Gal/Yr) N/A		Other (Specify)	

SECTION G – STACK PARAMETERS – N/A

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION I – AIR CONTAMINANTS EMITTED

Known or Suspected - Use emission rates after control equipment.			
Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
VOC	7.891	34.562	EPA Document (EPA-453/R-95-017), Table 2-4 and gas analysis
Total HAPs (see Appendix B for speciated HAPs)	0.220	0.965	EPA Document (EPA-453/R-95-017), Table 2-4 and gas analysis
CO2e	280.500	1,228.589	EPA Document (EPA-453/R-95-017), Table 2-4 and gas analysis

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT

Type:	☐Cyclone	☐Multiclone	☐Baghouse	☐Electrostatic Precipitator
	☐Wet Scrubber	☐Spray Dryer	☒None	
	☐Other – Specify:			

Name of Manufacturer	Model Number	Date to Be Installed

Application: ☐Boiler ☐Kiln ☐Engine

☐Other – Specify:_____

Pollutants Removed				
Design Efficiency (%)				
Operating Efficiency (%)				

Describe method used to determine operating efficiency:

SECTION J2 – GAS CONDITIONS – N/A

Gas Conditions	Inlet		Outlet	
Gas Volume (SCFM; 68°F; 14.7 psia)				
Gas Temperature (°F)				
Gas Pressure (in. H_2O)				
Gas Velocity (ft/sec)				
Pollutant Concentration (Specify pollutant and unit of concentration)	Pollutant	Unit of Concentration	Inlet	Outlet

Pressure drop through gas cleaning device (in. H_2O)

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SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.) Tank	Emission Unit Number: CT-1	Emission Point Number: CT-1
Make N/A	Model N/A	Installation or manufacture date November 2015 Startup: 9/26/2016
Capacity (manufacturer's or designer's guaranteed maximum) 50,000 bbl working (60,000 bbl shell)	Operating Capacity (specific units) 50,000 bbl working (60,000 bbl shell)	
Brief description of operation of unit or process: 60,000 bbl internal floating roof crude storage tank		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	Alternative Emission Point:	

SECTION B – OPERATING SCHEDULE

Are you agreeing to a limit on the operating schedule for this unit? ☐Yes ☒No				
Hours Per Day 24	Days Per Week 7	Weeks Per Year 52	Peak Production Season (if any)	Dates of Annual Shutdown

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

Are you agreeing to a limit on the production for this unit? ☐Yes ☒No (If No, show normal operating schedule.)				
Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	
Stabilized crude oil			5,475,000	bbl

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.

Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
NSPS Kb	Visual inspection of the internal floating roof, the primary seal, and the secondary seal was completed prior to filling	Records of the visual inspections will be kept	A report that describes the control equipment meets the specifications of §60.112b(a)(1) and §60.113b(a)(1) is required		Use of internal floating roof tank
NDAC 33.1-15-07-01.3					All tanks shall be equipped with a submerged fill pipe

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

Has emission unit testing been done at the facility? ☐Yes ☒No			
Emission Unit ID	Last Date when a Testing Program was Completed	If Program is Continuous, Give Approximate Testing Frequency	Regulation requiring frequency (NSPS, MACT, Permit Requirement-list permit number)

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

Include all, even those not usable because they do not meet specifications					
Material	Hourly Process Weight (Pounds Per Hour)			Average Annual (Specify Units)	Intermittent Operation Only (Average Hours Per Week)
	Average	Maximum	Minimum		
N/A					

SECTION F – FUELS USED – N/A

Coal (Tons/Yr)	% Sulfur	% Ash	Oil (Gal/Yr)	% Sulfur	Grade No.
Natural Gas (Thousand CF/Yr)		LP Gas (Gal/Yr)		Other (Specify)	

SECTION G – STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION I – AIR CONTAMINANTS EMITTED

Known or Suspected - Use emission rates after control equipment.			
Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
VOC	1.810	1.537	AP-42 Section 7.1 / TANKS 4.09d
Total HAPs (see Appendix B for speciated HAPs)	0.052	0.045	AP-42 Section 7.1 / TANKS 4.09d; EPA Document (EPA-453/R-94-079a), Table 2-1

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT

Type: ☐Cyclone ☐Multiclone ☐Baghouse ☐Electrostatic Precipitator

☐Wet Scrubber ☐Spray Dryer ☒None

☐Other – Specify:

Name of Manufacturer	Model Number	Date to Be Installed

Application: ☐Boiler ☐Kiln ☐Engine

☐Other – Specify:_____

Pollutants Removed				
Design Efficiency (%)				
Operating Efficiency (%)				

Describe method used to determine operating efficiency:

SECTION J2 – GAS CONDITIONS – N/A

Gas Conditions	Inlet		Outlet	
Gas Volume (SCFM; 68°F; 14.7 psia)				
Gas Temperature (°F)				
Gas Pressure (in. H_2O)				
Gas Velocity (ft/sec)				
Pollutant Concentration (Specify pollutant and unit of concentration)	Pollutant	Unit of Concentration	Inlet	Outlet

Pressure drop through gas cleaning device (in. H_2O)

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SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.) Tank	Emission Unit Number: CT-2	Emission Point Number: CT-2
Make N/A	Model N/A	Installation or manufacture date November 2015 Startup: 10/8/2016
Capacity (manufacturer's or designer's guaranteed maximum) 100,000 bbl working (120,000 bbl shell)	Operating Capacity (specific units) 100,000 bbl working (120,000 bbl shell)	
Brief description of operation of unit or process: 120,000 bbl internal floating roof crude storage tank		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	Alternative Emission Point:	

SECTION B – OPERATING SCHEDULE

Are you agreeing to a limit on the operating schedule for this unit? ☐Yes ☒No				
Hours Per Day 24	Days Per Week 7	Weeks Per Year 52	Peak Production Season (if any)	Dates of Annual Shutdown

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

Are you agreeing to a limit on the production for this unit? ☐Yes ☒No (If No, show normal operating schedule.)				
Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	
Stabilized crude oil			5,475,000	bbl

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.

Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
NSPS Kb	Visual inspection of the internal floating roof, the primary seal, and the secondary seal was completed prior to filling	Records of the visual inspections will be kept	A report that describes the control equipment meets the specifications of §60.112b(a)(1) and §60.113b(a)(1) is required		Use of internal floating roof tank
NDAC 33.1-15-07-01.3					All tanks shall be equipped with a submerged fill pipe

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

Has emission unit testing been done at the facility? ☐Yes ☒No			
Emission Unit ID	Last Date when a Testing Program was Completed	If Program is Continuous, Give Approximate Testing Frequency	Regulation requiring frequency (NSPS, MACT, Permit Requirement-list permit number)

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

Include all, even those not usable because they do not meet specifications					
Material	Hourly Process Weight (Pounds Per Hour)			Average Annual (Specify Units)	Intermittent Operation Only (Average Hours Per Week)
	Average	Maximum	Minimum		
N/A					

SECTION F – FUELS USED – N/A

Coal (Tons/Yr)	% Sulfur	% Ash	Oil (Gal/Yr)	% Sulfur	Grade No.
Natural Gas (Thousand CF/Yr)		LP Gas (Gal/Yr)		Other (Specify)	

SECTION G – STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION I – AIR CONTAMINANTS EMITTED

Known or Suspected - Use emission rates after control equipment.			
Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
VOC	1.710	1.774	AP-42 Section 7.1 / TANKS 4.09d
Total HAPs (see Appendix B for speciated HAPs)	0.050	0.051	AP-42 Section 7.1 / TANKS 4.09d; EPA Document (EPA-453/R-94-079a), Table 2-1

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT

Type: ☐Cyclone ☐Multiclone ☐Baghouse ☐Electrostatic Precipitator

☐Wet Scrubber ☐Spray Dryer ☒None

☐Other – Specify:

Name of Manufacturer	Model Number	Date to Be Installed

Application: ☐Boiler ☐Kiln ☐Engine

☐Other – Specify:_____

Pollutants Removed				
Design Efficiency (%)				
Operating Efficiency (%)				

Describe method used to determine operating efficiency:

SECTION J2 – GAS CONDITIONS – N/A

Gas Conditions	Inlet		Outlet	
Gas Volume (SCFM; 68°F; 14.7 psia)				
Gas Temperature (°F)				
Gas Pressure (in. H_2O)				
Gas Velocity (ft/sec)				
Pollutant Concentration (Specify pollutant and unit of concentration)	Pollutant	Unit of Concentration	Inlet	Outlet
Pressure drop through gas cleaning device (in. H_2O)				

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SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.) Tank	Emission Unit Number: CT-3	Emission Point Number: CT-3
Make N/A	Model N/A	Installation or manufacture date Startup: 5/1/2017
Capacity (manufacturer's or designer's guaranteed maximum) 50,000 bbl working (60,000 bbl shell)	Operating Capacity (specific units) 50,000 bbl working (60,000 bbl shell)	
Brief description of operation of unit or process: 60,000 bbl internal floating roof crude storage tank		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	Alternative Emission Point:	

SECTION B – OPERATING SCHEDULE

Are you agreeing to a limit on the operating schedule for this unit? ☐Yes ☒No				
Hours Per Day 24	Days Per Week 7	Weeks Per Year 52	Peak Production Season (if any)	Dates of Annual Shutdown

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

Are you agreeing to a limit on the production for this unit? ☐Yes ☒No (If No, show normal operating schedule.)				
Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	
Stabilized crude oil			7,300,000	bbl

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.

Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
NSPS Kb	Visual inspection of the internal floating roof, the primary seal, and the secondary seal was completed prior to filling	Records of the visual inspections will be kept	A report that describes the control equipment meets the specifications of §60.112b(a)(1) and §60.113b(a)(1) is required		Use of internal floating roof tank
NDAC 33.1-15-07-01.3					All tanks shall be equipped with a submerged fill pipe

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

Has emission unit testing been done at the facility? ☐Yes ☒No			
Emission Unit ID	Last Date when a Testing Program was Completed	If Program is Continuous, Give Approximate Testing Frequency	Regulation requiring frequency (NSPS, MACT, Permit Requirement-list permit number)

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

Include all, even those not usable because they do not meet specifications					
Material	Hourly Process Weight (Pounds Per Hour)			Average Annual (Specify Units)	Intermittent Operation Only (Average Hours Per Week)
	Average	Maximum	Minimum		
N/A					

SECTION F – FUELS USED – N/A

Coal (Tons/Yr)	% Sulfur	% Ash	Oil (Gal/Yr)	% Sulfur	Grade No.
Natural Gas (Thousand CF/Yr)		LP Gas (Gal/Yr)		Other (Specify)	

SECTION G – STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION I – AIR CONTAMINANTS EMITTED

Known or Suspected - Use emission rates after control equipment.			
Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
VOC	2.330	1.923	AP-42 Section 7.1 / TANKS 4.09d
Total HAPs (see Appendix B for speciated HAPs)	0.068	0.056	AP-42 Section 7.1 / TANKS 4.09d; EPA Document (EPA-453/R-94-079a), Table 2-1

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT

Type: ☐Cyclone ☐Multiclone ☐Baghouse ☐Electrostatic Precipitator

☐Wet Scrubber ☐Spray Dryer ☒None

☐Other – Specify:

Name of Manufacturer	Model Number	Date to Be Installed

Application: ☐Boiler ☐Kiln ☐Engine

☐Other – Specify:_____

Pollutants Removed				
Design Efficiency (%)				
Operating Efficiency (%)				

Describe method used to determine operating efficiency:

SECTION J2 – GAS CONDITIONS – N/A

Gas Conditions	Inlet		Outlet	
Gas Volume (SCFM; 68°F; 14.7 psia)				
Gas Temperature (°F)				
Gas Pressure (in. H_2O)				
Gas Velocity (ft/sec)				
Pollutant Concentration (Specify pollutant and unit of concentration)	Pollutant	Unit of Concentration	Inlet	Outlet

Pressure drop through gas cleaning device (in. H_2O)

EMISSION UNIT FOR TITLE V PERMIT TO OPERATE

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
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SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.) Tank	Emission Unit Number: STC-1 to STC-6	Emission Point Number: STC-1 to STC-6 EC-2 (primary control) VRU-1 (secondary control)
Make N/A	Model N/A	Installation or manufacture date STC-1 to STC-6: 9/26/2016
Capacity (manufacturer's or designer's guaranteed maximum) 1,000 bbl	Operating Capacity (specific units) 1,000 bbl	
Brief description of operation of unit or process: 6 identical 1,000 bbl fixed roof stock tanks functioning as surge control vessels which are connected to a vapor combustor (EU EC-2) for primary control and a vapor recovery unit (EU VRU-1) as a backup		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	Alternative Emission Point:	

SECTION B – OPERATING SCHEDULE

Are you agreeing to a limit on the operating schedule for this unit? ☐Yes ☒No				
Hours Per Day 24	Days Per Week 7	Weeks Per Year 52	Peak Production Season (if any)	Dates of Annual Shutdown

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

Are you agreeing to a limit on the production for this unit? ☐Yes ☒No (If No, show normal operating schedule.)				
Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	
Crude oil			5,475,000	bbl (total for all 6 tanks)

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.					
Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
NDAC 33.1-15-07-01.3					All tanks shall be equipped with a submerged fill pipe

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

Has emission unit testing been done at the facility? ☐Yes ☒No			
Emission Unit ID	Last Date when a Testing Program was Completed	If Program is Continuous, Give Approximate Testing Frequency	Regulation requiring frequency (NSPS, MACT, Permit Requirement-list permit number)

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

Include all, even those not usable because they do not meet specifications					
Material	Hourly Process Weight (Pounds Per Hour)			Average Annual (Specify Units)	Intermittent Operation Only (Average Hours Per Week)
	Average	Maximum	Minimum		
N/A					

SECTION F – FUELS USED – N/A

Coal (Tons/Yr)	% Sulfur	% Ash	Oil (Gal/Yr)	% Sulfur	Grade No.
Natural Gas (Thousand CF/Yr)		LP Gas (Gal/Yr)		Other (Specify)	

SECTION G – STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION I – AIR CONTAMINANTS EMITTED Per tank

Known or Suspected - Use emission rates after control equipment.			
Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
VOC	10.343	0.451	AP-42 Section 7.1
Total HAPs (see Appendix B for speciated HAPs)	0.300	0.013	AP-42 Section 7.1 / TANKS 4.09d; EPA Document (EPA-453/R-94-079a), Table 2-1

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT

Type: ☐Cyclone ☐Multiclone ☐Baghouse ☐Electrostatic Precipitator

☐Wet Scrubber ☐Spray Dryer ☐None

☒Other – Specify: Vapor combustor or vapor recovery unit

Name of Manufacturer	Model Number	Date to Be Installed

Application: ☐Boiler ☐Kiln ☐Engine

☒Other – Specify: Losses from stock tanks and truck loading

Pollutants Removed	VOC	HAPs	BTEX	
Design Efficiency (%)	98% VCU 95% VRU	98% VCU 95% VRU	98% VCU 95% VRU	
Operating Efficiency (%)	98% VCU 95% VRU	98% VCU 95% VRU	98% VCU 95% VRU	

Describe method used to determine operating efficiency:

Vapors to the VCU are collected with 98% efficiency and controlled with 98% DRE.
A 95% capture efficiency was conservatively assumed for the vapor recovery unit's capture and control.

SECTION J2 – GAS CONDITIONS

Gas Conditions	Inlet		Outlet	
Gas Volume (SCFM; 68°F; 14.7 psia)				
Gas Temperature (°F)				
Gas Pressure (in. H_2O)				
Gas Velocity (ft/sec)				
Pollutant Concentration (Specify pollutant and unit of concentration)	Pollutant	Unit of Concentration	Inlet	Outlet

Pressure drop through gas cleaning device (in. H_2O)

EMISSION UNIT FOR TITLE V PERMIT TO OPERATE

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SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.) Process Heater	Emission Unit Number: HTR-2A/B, HTR-3A/B, HTR-5A/B	Emission Point Number: HTR-2a to 2f, HTR-3a to 3f, HTR-5a to 5f
Make Power Services, Inc.	Model N/A	Installation or manufacture date HTR-2A/B, HTR-3A/B startup: September 2016 HTR-5A/B startup: May 2017
Capacity (manufacturer's or designer's guaranteed maximum) Two 5.0 MMBtu/hr line heaters each (total of 10.00 MMBtu/hr per HTR-2, HTR-3, HTR-5)	Operating Capacity (specific units) Two 5.0 MMBtu/hr line heaters each (total of 10.00 MMBtu/hr per HTR-2, HTR-3, HTR-5)	
Brief description of operation of unit or process: Three identical crude stabilizer medium heaters. Each heater has two line heaters (A and B), each with a rating of 5 MMBtu/hr, and each line heater has three stacks (A-F). Line heater A will vent to stacks A-C and line heater B will vent to stacks D-F.		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	Alternative Emission Point:	

SECTION B – OPERATING SCHEDULE

Are you agreeing to a limit on the operating schedule for this unit? ☐Yes ☒No				
Hours Per Day 24	Days Per Week 7	Weeks Per Year 52	Peak Production Season (if any)	Dates of Annual Shutdown

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

Are you agreeing to a limit on the production for this unit? ☐Yes ☒No (If No, show normal operating schedule.)				
Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	
N/A				

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.					
Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
ACP-18195 v1.0		Maintain gas analysis records verifying natural gas meets sulfur specification			Opacity: 20% (60% for 6-min period/hr) Combust only gas with ≤ 2 gr S/100 scf

HTR-2a to 2f
HTR-3a to 3f
HTR-5a to 5f

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

Has emission unit testing been done at the facility? ☐Yes ☒No			
Emission Unit ID	Last Date when a Testing Program was Completed	If Program is Continuous, Give Approximate Testing Frequency	Regulation requiring frequency (NSPS, MACT, Permit Requirement-list permit number)

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

Include all, even those not usable because they do not meet specifications

Material	Hourly Process Weight (Pounds Per Hour)			Average Annual (Specify Units)	Intermittent Operation Only (Average Hours Per Week)
	Average	Maximum	Minimum		
N/A					

SECTION F – FUELS USED Per heater

Coal (Tons/Yr)	% Sulfur	% Ash	Oil (Gal/Yr)	% Sulfur	Grade No.
N/A	N/A	N/A	N/A	N/A	N/A
Natural Gas (Thousand CF/Yr)		LP Gas (Gal/Yr)		Other (Specify)	
0.228		N/A			

SECTION G – STACK PARAMETERS – There are 6 identical stacks per heater, one for each burner

List each pollutant separately.

Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
All pollutants	19.5	1.5	11,728	350	110.6

Stack Base UTM Coordinate X:

HTR-2a	635255.84
HTR-2b	635255.84
HTR-2c	635256.53
HTR-2d	635257.45
HTR-2e	635258.34
HTR-2f	635259.15
HTR-3a	635256.42
HTR-3b	635256.57
HTR-3c	635257.31
HTR-3d	635258.12
HTR-3e	635259.38
HTR-3f	635259.30
HTR-5a	635257.45
HTR-5b	635257.38
HTR-5c	635258.19
HTR-5d	635257.67
HTR-5e	635259.01
HTR-5f	635259.23

Stack Base UTM Coordinate Y:

HTR-2a	5302121.34
HTR-2b	5302120.75
HTR-2c	5302121.00
HTR-2d	5302111.70
HTR-2e	5302112.39
HTR-2f	5302110.91
HTR-3a	5302103.22
HTR-3b	5302102.26
HTR-3c	5302102.93
HTR-3d	5302093.69
HTR-3e	5302094.13
HTR-3f	5302092.28
HTR-5a	5302078.76
HTR-5b	5302078.09
HTR-5c	5302078.61
HTR-5d	5302089.62
HTR-5e	5302090.36
HTR-5f	5302088.44

HTR-2a to 2f
HTR-3a to 3f
HTR-5a to 5f

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.

Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					

Stack Base UTM Coordinate X:	Stack Base UTM Coordinate Y:

SECTION I – AIR CONTAMINANTS EMITTED Per heater

Known or Suspected - Use emission rates after control equipment.

Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
NOx	0.990	4.336	AP-42 Section 1.4, Table 1.4-1
CO	2.471	10.821	AP-42 Section 1.4, Table 1.4-1
VOC	0.162	0.709	AP-42 Section 1.4, Table 1.4-2
PM	0.224	0.979	AP-42 Section 1.4, Table 1.4-2
PM_{10}	0.224	0.979	AP-42 Section 1.4, Table 1.4-2
$PM_{2.5}$	0.224	0.979	AP-42 Section 1.4, Table 1.4-2
SO_2	0.018	0.077	AP-42 Section 1.4, Table 1.4-2
Total HAPs (see Appendix B for speciated HAPs)	0.055	0.242	AP-42 Section 1.4, Table 1.4-3
CO_2e	3,512.943	15,386.689	40 CFR Part 98, Subpart C, Tables C-1 and C-2

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT

Type: ☐Cyclone ☐Multiclone ☐Baghouse ☐Electrostatic Precipitator

☐Wet Scrubber ☐Spray Dryer ☒None

☐Other – Specify:

Name of Manufacturer	Model Number	Date to Be Installed

Application: ☐Boiler ☐Kiln ☐Engine

☐Other – Specify:_____

Pollutants Removed				
Design Efficiency (%)				
Operating Efficiency (%)				

Describe method used to determine operating efficiency:

HTR-2a to 2f
HTR-3a to 3f
HTR-5a to 5f

SECTION J2 – GAS CONDITIONS – N/A

Gas Conditions	Inlet		Outlet	
Gas Volume (SCFM; 68°F; 14.7 psia)				
Gas Temperature (°F)				
Gas Pressure (in. H_2O)				
Gas Velocity (ft/sec)				
Pollutant Concentration (Specify pollutant and unit of concentration)	Pollutant	Unit of Concentration	Inlet	Outlet
Pressure drop through gas cleaning device (in. H_2O)				

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SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.) Vapor Recovery Unit	Emission Unit Number: VRU-1	Emission Point Number: VRU-1
Make N/A	Model N/A	Installation or manufacture date November 2015 Startup: September 2016
Capacity (manufacturer's or designer's guaranteed maximum) N/A	Operating Capacity (specific units) N/A	
Brief description of operation of unit or process: This is a backup control device for the stock tanks (STC-1 through STC-6), which are primarily controlled by a vapor combustor unit (EU EC-2).		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	Alternative Emission Point:	

SECTION B – OPERATING SCHEDULE

Are you agreeing to a limit on the operating schedule for this unit? ☐Yes ☒No				
Hours Per Day 24	Days Per Week 7	Weeks Per Year 52	Peak Production Season (if any)	Dates of Annual Shutdown

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

Are you agreeing to a limit on the production for this unit? ☐Yes ☒No (If No, show normal operating schedule.)				
Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.					
Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
N/A					

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

Has emission unit testing been done at the facility? ☐Yes ☒No			
Emission Unit ID	Last Date when a Testing Program was Completed	If Program is Continuous, Give Approximate Testing Frequency	Regulation requiring frequency (NSPS, MACT, Permit Requirement-list permit number)

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

Include all, even those not usable because they do not meet specifications					
Material	Hourly Process Weight (Pounds Per Hour)			Average Annual (Specify Units)	Intermittent Operation Only (Average Hours Per Week)
	Average	Maximum	Minimum		
N/A					

SECTION F – FUELS USED

Coal (Tons/Yr)	% Sulfur	% Ash	Oil (Gal/Yr)	% Sulfur	Grade No.
N/A	N/A	N/A	N/A	N/A	N/A
Natural Gas (Thousand CF/Yr) N/A		LP Gas (Gal/Yr) N/A		Other (Specify)	

SECTION G – STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION I – AIR CONTAMINANTS EMITTED

Known or Suspected - Use emission rates after control equipment.			
Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
VOC	--	--	
Total HAPs (see Appendix B for speciated HAPs)	--	--	

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT

Type: ☐Cyclone ☐Multiclone ☐Baghouse ☐Electrostatic Precipitator

☐Wet Scrubber ☐Spray Dryer ☐None

☒Other – Specify: VRU is a backup control device for losses from stock tanks and truck loading.

Name of Manufacturer	Model Number	Date to Be Installed

Application: ☐Boiler ☐Kiln ☐Engine

☒Other – Specify: Backup control device (vapor recovery unit) for stock tanks

Pollutants Removed	VOC	HAPs	BTEX	
Design Efficiency (%)	95%	95%	95%	
Operating Efficiency (%)	95%	95%	95%	

Describe method used to determine operating efficiency:

A 95% capture efficiency was conservatively assumed for the vapor recovery unit's capture and control.

SECTION J2 – GAS CONDITIONS – N/A

Gas Conditions	Inlet		Outlet	
Gas Volume (SCFM; 68°F; 14.7 psia)				
Gas Temperature (°F)				
Gas Pressure (in. H_2O)				
Gas Velocity (ft/sec)				
Pollutant Concentration (Specify pollutant and unit of concentration)	Pollutant	Unit of Concentration	Inlet	Outlet

Pressure drop through gas cleaning device (in. H_2O)

EMISSION UNIT FOR TITLE V PERMIT TO OPERATE

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SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.) Fugitive emissions from component leaks	Emission Unit Number: FUG-2	Emission Point Number: FUG-2
Make N/A	Model N/A	Installation or manufacture date November 2015 Startup: September 2016
Capacity (manufacturer's or designer's guaranteed maximum) N/A	Operating Capacity (specific units) N/A	
Brief description of operation of unit or process: Fugitive emissions from crude stabilization facility		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	Alternative Emission Point:	

SECTION B – OPERATING SCHEDULE

Are you agreeing to a limit on the operating schedule for this unit? ☐Yes ☒No				
Hours Per Day 24	Days Per Week 7	Weeks Per Year 52	Peak Production Season (if any)	Dates of Annual Shutdown

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

Are you agreeing to a limit on the production for this unit? ☐Yes ☒No (If No, show normal operating schedule.)				
Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	
N/A				

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.

Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
NSPS OOOOa (NSPS VVa by reference in NSPS OOOOa)	Monitoring (using Method 21) requirements: - Quarterly (and w/in 5 days of pressure relief) for pressure relief devices; - Monthly (and weekly visual inspection) for pumps, monthly for valves; and - Every 12 months for connectors. Repairs attempted within 5 days and complete w/in 15 days of leak detection.	Records of monitoring, repairs and reports; monitoring plan including identification of difficult to monitor components and equipment designated for no detectable emissions (for pressure relief)	Annual compliance reports through CEDRI Semi-annual compliance report for pressure relief devices at NG processing plants	None	The following readings indicate a leak: - 500 ppm or greater for pressure relief devices in gas service, valves in gas or light liquid service, and connectors in gas or light liquid service; - 10,000 ppm for pumps, valves, and connectors in heavy liquid service and pressure relief devices in liquid service. Each open-ended valve or line shall be equipped with a cap, blind flange, plug, or second valve. Each sampling connection system shall be equipped with a closed-purge, closed-loop, or closed-vent system.

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

Has emission unit testing been done at the facility? ☐Yes ☒No			
Emission Unit ID	Last Date when a Testing Program was Completed	If Program is Continuous, Give Approximate Testing Frequency	Regulation requiring frequency (NSPS, MACT, Permit Requirement-list permit number)

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

Include all, even those not usable because they do not meet specifications					
Material	Hourly Process Weight (Pounds Per Hour)			Average Annual (Specify Units)	Intermittent Operation Only (Average Hours Per Week)
	Average	Maximum	Minimum		
N/A					

SECTION F – FUELS USED

Coal (Tons/Yr)	% Sulfur	% Ash	Oil (Gal/Yr)	% Sulfur	Grade No.
N/A	N/A	N/A	N/A	N/A	N/A
Natural Gas (Thousand CF/Yr) N/A		LP Gas (Gal/Yr) N/A		Other (Specify)	

SECTION G – STACK PARAMETERS – N/A

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.					
Pollutant (use CAS for HAPs)	Stack Height (ft)	Stack Diameter (ft at top)	Gas Volume (ACFM)	Exit Temp (°F)	Gas Velocity (fps)
N/A					
Stack Base UTM Coordinate X:			Stack Base UTM Coordinate Y:		

SECTION I – AIR CONTAMINANTS EMITTED

Known or Suspected - Use emission rates after control equipment.			
Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
VOC	3.483	15.256	EPA Document (EPA-453/R-95-017), Table 2-4 and gas analysis
Total HAPs (see Appendix B for speciated HAPs)	0.096	0.514	EPA Document (EPA-453/R-95-017), Table 2-4 and gas analysis
CO2e	25.594	112.101	EPA Document (EPA-453/R-95-017), Table 2-4 and gas analysis

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT

Type:	☐Cyclone	☐Multiclone	☐Baghouse	☐Electrostatic Precipitator
	☐Wet Scrubber	☐Spray Dryer	☒None	
	☐Other – Specify:			

Name of Manufacturer	Model Number	Date to Be Installed

Application: ☐Boiler ☐Kiln ☐Engine

☐Other – Specify:_____

Pollutants Removed				
Design Efficiency (%)				
Operating Efficiency (%)				

Describe method used to determine operating efficiency:

SECTION J2 – GAS CONDITIONS – N/A

Gas Conditions	Inlet		Outlet	
Gas Volume (SCFM; 68°F; 14.7 psia)				
Gas Temperature (°F)				
Gas Pressure (in. H_2O)				
Gas Velocity (ft/sec)				
Pollutant Concentration (Specify pollutant and unit of concentration)	Pollutant	Unit of Concentration	Inlet	Outlet

Pressure drop through gas cleaning device (in. H_2O)

COMPLIANCE SCHEDULE AND PLAN FOR TITLE V PERMIT TO OPERATE

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SECTION A1 – COMPLIANCE SCHEDULE AND PLAN

Will your facility be in compliance with all applicable requirements effective at the time of permit issuance? ☒ Yes ☐ No		
If No, identify applicable requirement for which compliance is not achieved:		
If No, provide a narrative description of how compliance will be achieved with this applicable requirement:		
If No, provide a detailed schedule of compliance:		
Regulation/Condition not in compliance with	Action	Date Expected
Frequency for submittal of progress reports (6-month minimum):		Starting Date of Progress Reports

SECTION A2 – COMPLIANCE SCHEDULE AND PLAN

Will your facility be in compliance with all applicable requirements effective after the time of permit issuance? ☒ Yes ☐ No		
If No, identify applicable requirement for which compliance will not be compiled with:		
If No, provide a detailed schedule leading to compliance:		
Regulation/Condition not in compliance with	Action	Date Expected

SECTION A3 – COMPLIANCE CERTIFICATION (METHOD OF COMPLIANCE)

Compliance Method Type	Compliance Method is Based On:
☒ Monitoring ☒ Recordkeeping	☐ Compliance Assurance Monitoring (CAM) ☒ Applicable Requirement ☐ Gap-Filling Requirement

SECTION A4 –METHOD OF COMPLIANCE REFERENCE TEST METHOD

Reference Test Method:		
NO_X – Method 7E	CO – Method 10	VOC – Method 18
Formaldehyde – Method 18	BTEX – Method 18	Visual leak detection – Method 21
OR other approved methods		
Reference Test Method Citation:		
40 CFR §60.8 (Appendix A)		

SECTION A5 –METHOD OF COMPLIANCE MONITORING

Monitoring Device Type: ☒ Stack Test ☒ Parameter Monitoring ☒ CEM ☐ Ambient Monitoring	Monitor Location Description:
Regulated Air Pollutant(s) Monitored:	Monitoring frequency and duration of sampling: (Example: every 15 min, 1 min instantaneous readings are taken to produce an hourly average.)
ENG-1 through ENG-14 – NO_X, CO, VOC Stack Test (NSPS JJJJ)	Every 8,760 hours or 3 years; Average of 3 runs
ENG-1 through ENG-14 – CO or Formaldehyde Stack Test (MACT ZZZZ)	Semiannually (initially, then annual after one year unless deviation occurs); Average of 3 runs
ENG-1 through ENG-14 – Catalyst monitoring (MACT ZZZZ)	Continuous temperature monitoring (every 15 minutes) and monthly pressure drop measurements
ENG-1 through ENG-14 – Operating hours or months for rod packing replacement (NSPS OOOOa)	Continuous
HTR-1 and HTR-7 – NO_X and CO Stack Test (State)	One time; Average of 3 runs
E-1 and FLR-1 – Automatic ignitor or continuous burning pilot (State)	Automatic ignitor or continuous burning pilot (presence of a flame shall be monitored using a thermocouple or any other equivalent device)
FUG-1 and FUG-2 – Visual leak detection inspection and repairs (NSPS OOOOa)	Quarterly (and within 5 days of pressure relief) for pressure relief devices; Monthly (and weekly visual inspection) for pumps, monthly for valves; Every 12 months for connectors

SECTION B1 –METHOD OF COMPLIANCE RECORDKEEPING

Data (Parameter) Being Recorded	Frequency of Reporting (6 mo, quarterly, etc.)
Facility – On-shore Gas Processing Plant Pressure Relief Devices	Semi-annual NSPS OOOOa report
ENG-1 through ENG-14 – Rod packing replacement (NSPS OOOOa)	Annual NSPS OOOOa report – After first 26,000 hours OR 36 months after startup; every 26,000 hours (if continuously monitoring hours) OR every 36 months thereafter
HTR-1 and HTR-7 – Fuel consumption records (NSPS Dc)	N/A (monthly recordkeeping only)
DEHY-1 – Malfunctions (MACT HH)	N/A (recordkeeping only)
MT-1, LT-1 through LT-4, ST-1 through ST-4 – Submerged fill pipe records (State)	N/A
CT-1 through CT-3 – Visual inspection of internal floating roof and seals (NSPS Kb)	Initial NSPS Kb notification of control equipment specifications and fill notification
FUG-1 and FUG-2 – Visual leak detection inspection and repairs (NSPS OOOOa)	Quarterly surveys; annual NSPS OOOOa report

SECTION B2 –METHOD OF COMPLIANCE REPORTING

Data (Parameter) Being Recorded	Beginning Date (month/day/year)	Frequency of Reporting (6 mo, quarterly, etc.)
Facility – On-shore Gas Processing Plant Pressure Relief Devices Semi-annual Report (NSPS OOOOa)	Plant startup: 9/1/2016	Semi-annual NSPS OOOOa report
ENG-1 through ENG-14 – Operating hours OR months for rod packing replacement (NSPS OOOOa)	Startups: ENG-1 through ENG-7: 9/16/2016 through 12/22/2016 ENG-8 through ENG-14: 12/8/2018	Annual NSPS OOOOa report – After first 26,000 hours OR 26 months after startup; every 26,000 hours (if continuously monitoring hours) OR every 36 months thereafter.
CT-1 through CT-3 – Visual inspection of internal floating roof and seals (NSPS Kb)	Startups: CT-1: 9/26/2016 CT-2: 10/8/2016 CT-3: 5/1/2017	Initial NSPS Kb notification of control equipment specifications and fill notification
FUG-1 and FUG-2 – Visual leak detection inspection and repairs (NSPS OOOOa)	Startup: 9/15/2016	Quarterly surveys; annual NSPS OOOOa report

SECTION B3 –COMPLIANCE CERTIFICATION

Certification Parameter	Beginning Date (month/day/year)	Frequency of Submittal (6 mo, quarterly, etc.)
Facility – Construction notification (NSPS OOOOa)	Within 30 days of construction	One time
Facility – Initial notification (NSPS OOOOa)	Within 15 days of startup	One time (completed)
Facility – Notification of change with emission increase (NSPS OOOOa)	60 days prior to change	As needed
Facility – On-shore Gas Processing Plant Pressure Relief Devices Semi-annual Report (NSPS OOOOa)	Plant startup: 9/1/2016	Semi-annual NSPS OOOOa report
ENG-1 through ENG-14 – Construction notification (NSPS JJJJ)	Within 30 days of construction (purchase date)	One time (completed)
ENG-1 through ENG-14 – NO_X, CO, VOC stack test (NSPS JJJJ)	Startups: ENG-1 through ENG-7: 9/16/2016 through 12/22/2016 ENG-8 through ENG-14: 12/8/2018	Periodic test report submittals (every 8,760 hours or 3 years)
ENG-1 through ENG-14 – Operating hours (NSPS OOOOa)	Startups: ENG-1 through ENG-7: 9/16/2016 through 12/22/2016 ENG-8 through ENG-14: 12/8/2018	Annual NSPS OOOOa report
HTR-1 and HTR-7 – NO_X and CO stack test (State)	Completed: HTR-1: 3/13/2019 HTR-7: 3/14/2019	One time (completed)
HTR-1 and HTR-7 – Startup notification (NSPS Dc)	Within 15 days of startup	One time (completed)
CT-1 through CT-3 – Visual inspection of internal floating roof and seals (NSPS Kb)	Startups: CT-1: 9/26/2016 CT-2: 10/8/2016 CT-3: 5/1/2017	One-time initial report of control equipment specifications and fill notification (completed)
FUG-1 and FUG-2 – Visual leak detection inspection and repairs (NSPS OOOOa)	Startup: 9/15/2016	Quarterly surveys; annual NSPS OOOOa report

The air contaminant source identified in this application is in compliance with applicable monitoring and compliance certification requirements? ☒ Yes ☐ Not Applicable ☐ No – Describe Below:

APPENDIX B

FACILITY EQUIPMENT EMISSION CALCULATIONS

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Equipment List

Table 1. - Equipment List

Emission Unit	Type of Equipment	Rating/Capacity	Plant
ENG-01	Caterpillar G3608LE (4SLB) Engine	2370 hp	Gas Plant 1
ENG-02	Caterpillar G3608LE (4SLB) Engine	2370 hp	Gas Plant 1
ENG-03	Caterpillar G3608LE (4SLB) Engine	2370 hp	Gas Plant 1
ENG-04	Caterpillar G3608LE (4SLB) Engine	2370 hp	Gas Plant 1
ENG-05	Caterpillar G3608LE (4SLB) Engine	2370 hp	Gas Plant 1
ENG-06	Caterpillar G3608LE (4SLB) Engine	2370 hp	Gas Plant 1
ENG-07	Caterpillar G3608LE (4SLB) Engine	2370 hp	Gas Plant 1
ENG-08	Caterpillar G3616A4 (4SLB) Engine	5000 hp	Gas Plant 2
ENG-09	Caterpillar G3616A4 (4SLB) Engine	5000 hp	Gas Plant 2
ENG-10	Caterpillar G3616A4 (4SLB) Engine	5000 hp	Gas Plant 2
ENG-11	Caterpillar G3616A4 (4SLB) Engine	5000 hp	Gas Plant 2
ENG-12	Caterpillar G3616A4 (4SLB) Engine	5000 hp	Gas Plant 2
ENG-13	Caterpillar G3616A4 (4SLB) Engine	5000 hp	Gas Plant 2
ENG-14	Caterpillar G3616A4 (4SLB) Engine	5000 hp	Gas Plant 2
GEN-1	Generac Diesel Generator Engine	85 hp	Shared by all
HTR-1	Circulation System Combustion Heater	46 MMBtu/hr	Gas Plant 1
HTR-2	Crude Stabilizer Medium Line Heater w/6 stacks	30 MMBtu/hr	Crude Stab. Plant
HTR-3	Crude Stabilizer Medium Line Heater w/6 stacks	30 MMBtu/hr	Crude Stab. Plant
HTR-5	Crude Stabilizer Medium Line Heater w/6 stacks	30 MMBtu/hr	Crude Stab. Plant
HTR-7	Hot Oil Heater	86.58 MMBtu/hr	Gas Plant 2
DEHY-1	Triethylene Glycol Dehydration Unit	200 MMSCFD	Gas Plant 2
CT-1	Crude Oil IFR Tank No. 601	60000 bbls	Crude Stab. Plant
CT-2	Crude Oil IFR Tank No. 1201	120000 bbls	Crude Stab. Plant
CT-3	Crude Oil IFR Tank No. 602	60000 bbls	Crude Stab. Plant
STC-1	Crude Oil Fixed Roof Tank (SPCC Tank 4; P&ID T-103)	1000 bbls	Crude Stab. Plant
STC-2	Crude Oil Fixed Roof Tank (SPCC Tank 5; P&ID T-104)	1000 bbls	Crude Stab. Plant
STC-3	Crude Oil Fixed Roof Tank (SPCC Tank 6; P&ID T-105)	1000 bbls	Crude Stab. Plant
STC-4	Crude Oil Fixed Roof Tank (SPCC Tank 7; P&ID T-106)	1000 bbls	Crude Stab. Plant
STC-5	Crude Oil Fixed Roof Tank (SPCC Tank 8; P&ID T-107)	1000 bbls	Crude Stab. Plant
STC-6	Crude Oil Fixed Roof Tank (SPCC Tank 9; P&ID T-108)	1000 bbls	Crude Stab. Plant
MT-1	Methanol Tank (SPCC Tank N/A; P&ID TK-117)	500 gallons	Gas Plant 1
ST-1	Slop Water Tank (SPCC Tank 10; P&ID TK-101)	400 bbls	Gas Plant 1
LT-1	Lube Oil Tank (SPCC Tank 11; P&ID TK-102)	210 bbls	Gas Plant 1
WT-1	JW/Coolant Tank (SPCC Tank 12; P&ID TK-103)	202 bbls	Gas Plant 1
LT-2	Lube Oil Tank (SPCC Tank 13 -P&ID TK-7121)	210 bbls	Gas Plant 2
LT-3	Lube Oil Tank (SPCC Tank 14 - P&ID TK-7131)	210 bbls	Gas Plant 2
WT-2	JW/Coolant Tank (SPCC Tank 15 - P&ID TK-7133)	210 bbls	Gas Plant 2
GT-1	TEG Tank (SPCC Tank 16 - P&ID TK-6051)	210 bbls	Gas Plant 2
ST-3	Slop Oil Tank (SPCC Tank 18 - P&ID TK-7188)	400 bbls	Gas Plant 2
LT-4	Lube Oil Tank (SPCC Tank 19)	1990 bbls	Crude Stab. Plant
DT-2	Diesel Tank (SPCC Tank 20)	1000 gallons	Crude Stab. Plant
DT-1	Diesel Tank for Generator (SPCC Tank TBA)	62 Gallons	Shared by all
E-1	Plant 1 Flare	--	Gas Plant 1
FLR-1	Plant 2 Flare (FL-7203)	--	Gas Plant 2
EC-2	Crude Truck Unloading Tanks Combustor	--	Crude Stab. Plant
EC-3	Plant 2 TEG Dehydrator Combustor	--	Gas Plant 2
STL-1	Slop Truck Loading	--	Shared by GPs
WTL-1	MSS-Water Loadout	--	Crude Stab. Plant

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Equipment List

Table 1. - Equipment List

Emission Unit	Type of Equipment	Rating/Capacity	Plant
VRU-1	Vapor Recovery Unit	--	Crude Stab. Plant
FUG-1	Fugitives at Gas Processing Plant	--	Shared by GPs
FUG-2	Fugitives at Crude Oil Stabilization Facility	--	Crude Stab. Plant
MSS-PIG	MSS-Pigging	--	Shared by GPs
MSS-Comp	MSS-Compressor Blowdowns	--	Shared by GPs
MSS-Vessel1	MSS-Vessel Blowdowns (Inlet)	--	Shared by GPs
MSS-Vessel2	MSS-Vessel Blowdowns (Residue)	--	Shared by GPs
MSS-Tank Cleaning	MSS-Tank Cleaning Venting	--	Crude Stab. Plant
MSS-IFR Tanks	MSS-Tank Roof Landings/Cleaning/Venting	--	Crude Stab. Plant

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Emissions Summary

Table 2.a. - Summary of Facility Potential-to-Emit in Pounds per Hour

Emission Unit	Plant	Type of Equipment	Potential to Emit (lb/hr)								
			CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$	VOC	Total HAP	Formaldehyde	CO_2e
ENG-01	Gas Plant 1	Caterpillar G3608LE (4SLB) Engine	0.993	2.612	0.009	0.157	0.157	1.411	0.126	0.104	1,839.678
ENG-02	Gas Plant 1	Caterpillar G3608LE (4SLB) Engine	0.993	2.612	0.009	0.157	0.157	1.411	0.126	0.104	1,839.678
ENG-03	Gas Plant 1	Caterpillar G3608LE (4SLB) Engine	0.993	2.612	0.009	0.157	0.157	1.411	0.126	0.104	1,839.678
ENG-04	Gas Plant 1	Caterpillar G3608LE (4SLB) Engine	0.993	2.612	0.009	0.157	0.157	1.411	0.126	0.104	1,839.678
ENG-05	Gas Plant 1	Caterpillar G3608LE (4SLB) Engine	0.993	2.612	0.009	0.157	0.157	1.411	0.126	0.104	1,839.678
ENG-06	Gas Plant 1	Caterpillar G3608LE (4SLB) Engine	0.993	2.612	0.009	0.157	0.157	1.411	0.126	0.104	1,839.678
ENG-07	Gas Plant 1	Caterpillar G3608LE (4SLB) Engine	0.993	2.612	0.009	0.157	0.157	1.411	0.126	0.104	1,839.678
ENG-08	Gas Plant 2	Caterpillar G3616A4 (4SLB) Engine	2.205	3.307	0.022	0.374	0.374	2.976	0.316	0.220	4,386.449
ENG-09	Gas Plant 2	Caterpillar G3616A4 (4SLB) Engine	2.205	3.307	0.022	0.374	0.374	2.976	0.316	0.220	4,386.449
ENG-10	Gas Plant 2	Caterpillar G3616A4 (4SLB) Engine	2.205	3.307	0.022	0.374	0.374	2.976	0.316	0.220	4,386.449
ENG-11	Gas Plant 2	Caterpillar G3616A4 (4SLB) Engine	2.205	3.307	0.022	0.374	0.374	2.976	0.316	0.220	4,386.449
ENG-12	Gas Plant 2	Caterpillar G3616A4 (4SLB) Engine	2.205	3.307	0.022	0.374	0.374	2.976	0.316	0.220	4,386.449
ENG-13	Gas Plant 2	Caterpillar G3616A4 (4SLB) Engine	2.205	3.307	0.022	0.374	0.374	2.976	0.316	0.220	4,386.449
ENG-14	Gas Plant 2	Caterpillar G3616A4 (4SLB) Engine	2.205	3.307	0.022	0.374	0.374	2.976	0.316	0.220	4,386.449
GEN-1	Shared by all	Generac Diesel Generator Engine	0.699	0.608	0.174	0.056	0.056	0.049	0.002	0.001	98.083
HTR-1	Gas Plant 1	Circulation System Combustion Heater	1.886	1.518	0.027	0.343	0.343	1.380	0.085	0.003	5,386.512
HTR-2	Crude Stab. Plant	Crude Stabilizer Medium Line Heater w/6 stacks	2.471	0.990	0.018	0.224	0.224	0.162	0.055	0.002	3,512.943
HTR-3	Crude Stab. Plant	Crude Stabilizer Medium Line Heater w/6 stacks	2.471	0.990	0.018	0.224	0.224	0.162	0.055	0.002	3,512.943
HTR-5	Crude Stab. Plant	Crude Stabilizer Medium Line Heater w/6 stacks	2.471	0.990	0.018	0.224	0.224	0.162	0.055	0.002	3,512.943
HTR-7	Gas Plant 2	Hot Oil Heater	3.550	3.463	0.051	0.645	0.645	1.645	0.160	0.006	10,138.353
DEHY-1	Gas Plant 2	Triethylene Glycol Dehydration Unit	-	-	-	-	-	2.594	0.354	-	17.032
CT-1	Crude Stab. Plant	Crude Oil IFR Tank No. 601	-	-	-	-	-	1.810	0.052	-	0.000
CT-2	Crude Stab. Plant	Crude Oil IFR Tank No. 1201	-	-	-	-	-	1.710	0.050	-	0.000
CT-3	Crude Stab. Plant	Crude Oil IFR Tank No. 602	-	-	-	-	-	2.330	0.068	-	0.000
STC-1	Crude Stab. Plant	Crude Oil Fixed Roof Tank (SPCC Tank 4; P&ID T-103)	-	-	-	-	-	10.343	0.300	-	0.000
STC-2	Crude Stab. Plant	Crude Oil Fixed Roof Tank (SPCC Tank 5; P&ID T-104)	-	-	-	-	-	10.343	0.300	-	0.000
STC-3	Crude Stab. Plant	Crude Oil Fixed Roof Tank (SPCC Tank 6; P&ID T-105)	-	-	-	-	-	10.343	0.300	-	0.000
STC-4	Crude Stab. Plant	Crude Oil Fixed Roof Tank (SPCC Tank 7; P&ID T-106)	-	-	-	-	-	10.343	0.300	-	0.000
STC-5	Crude Stab. Plant	Crude Oil Fixed Roof Tank (SPCC Tank 8; P&ID T-107)	-	-	-	-	-	10.343	0.300	-	0.000
STC-6	Crude Stab. Plant	Crude Oil Fixed Roof Tank (SPCC Tank 9; P&ID T-108)	-	-	-	-	-	10.343	0.300	-	0.000
MT-1	Gas Plant 1	Methanol Tank (SPCC Tank N/A; P&ID TK-117)	-	-	-	-	-	1.460	neg.	-	neg.
ST-1	Gas Plant 1	Slop Water Tank (SPCC Tank 10; P&ID TK-101)	-	-	-	-	-	0.748	0.033	-	3.191
LT-1	Gas Plant 1	Lube Oil Tank (SPCC Tank 11; P&ID TK-102)	-	-	-	-	-	0.010	neg.	-	neg.
WT-1	Gas Plant 1	JW/Coolant Tank (SPCC Tank 12; P&ID TK-103)	-	-	-	-	-	3.767E-05	neg.	-	neg.
LT-2	Gas Plant 2	Lube Oil Tank (SPCC Tank 13 -P&ID TK-7121)	-	-	-	-	-	0.010	neg.	-	neg.
LT-3	Gas Plant 2	Lube Oil Tank (SPCC Tank 14 - P&ID TK-7131)	-	-	-	-	-	0.010	neg.	-	neg.
WT-2	Gas Plant 2	JW/Coolant Tank (SPCC Tank 15 - P&ID TK-7133)	-	-	-	-	-	3.767E-05	neg.	-	neg.
GT-1	Gas Plant 2	TEG Tank (SPCC Tank 16 - P&ID TK-6051)	-	-	-	-	-	1.000E-04	neg.	-	neg.
ST-3	Gas Plant 2	Slop Oil Tank (SPCC Tank 18 - P&ID TK-7188)	-	-	-	-	-	0.748	0.033	-	3.191
LT-4	Crude Stab. Plant	Lube Oil Tank (SPCC Tank 19)	-	-	-	-	-	0.010	neg.	-	neg.
DT-2	Crude Stab. Plant	Diesel Tank (SPCC Tank 20)	-	-	-	-	-	0.060	neg.	-	neg.
DT-1	Shared by all	Diesel Tank for Generator (SPCC Tank TBA)	-	-	-	-	-	neg.	neg.	-	neg.
E-1	Gas Plant 1	Plant 1 Flare	0.313	0.069	5.943E-04	0.008	0.000	0.005	0.002	7.429E-05	118.862
FLR-1	Gas Plant 2	Plant 2 Flare (FL-7203)	0.894	0.196	1.696E-03	0.021	0.020	0.010	0.005	2.120E-04	339.152
EC-2	Crude Stab. Plant	Crude Truck Unloading Tanks Combustor	19.639	4.308	0.037	0.472	0.354	4.034E-04	0.117	4.658E-03	7,453.061
EC-3	Gas Plant 2	Plant 2 TEG Dehydrator Combustor	1.079	0.237	2.048E-03	0.026	0.019	4.034E-04	0.006	2.560E-04	798.355
STL-1	Shared by GPs	Slop Truck Loading	-	-	-	-	-	51.121	2.271	-	218.238
WTL-1	Crude Stab. Plant	MSS-Water Loadout	-	-	-	-	-	1.587	0.046	-	0.000
VRU-1	Crude Stab. Plant	Vapor Recovery Unit									
FUG-1	Shared by GPs	Fugitives at Gas Processing Plant	-	-	-	-	-	7.891	0.220	-	280.500
FUG-2	Crude Stab. Plant	Fugitives at Crude Oil Stabilization Facility	-	-	-	-	-	3.483	0.096	-	25.594
MSS-PIG	Shared by GPs	MSS-Pigging	-	-	-	-	-	12.552	0.336	-	526.315
MSS-Comp	Shared by GPs	MSS-Compressor Blowdowns	-	-	-	-	-	4.851	0.003	-	4.829
MSS-Vessel1	Shared by GPs	MSS-Vessel Blowdowns (Inlet)	-	-	-	-	-	1,740.324	46.678	-	71,728.101
MSS-Vessel2	Shared by GPs	MSS-Vessel Blowdowns (Residue)	-	-	-	-	-	124.285	0.066	-	79,962.953
MSS-Tank Cleaning	Crude Stab. Plant	MSS-Tank Cleaning Venting	-	-	-	-	-	458.286	13.290	-	0.000
MSS-IFR Tanks	Crude Stab. Plant	MSS-Tank Roof Landings/Cleaning/Venting						2,083.870	60.432	-	0.000
		Total	**57.85**	**54.80**	**0.57**	**5.96**	**5.82**	**2,512.22**	**69.03**	**2.30**	**231,224.04**

Note: slop water tank ST-4 has been taken out of service.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Emissions Summary

Table 2.b. - Summary of Facility Potential-to-Emit in Tons per Year

Emission Unit	Plant	Type of Equipment	Potential to Emit (tons/year)								
			CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$	VOC	Total HAP	Formaldehyde	CO_2e
ENG-01	Gas Plant 1	Caterpillar G3608LE (4SLB) Engine	3.748	9.864	0.035	0.592	0.592	5.327	0.476	0.395	6,946.097
ENG-02	Gas Plant 1	Caterpillar G3608LE (4SLB) Engine	3.748	9.864	0.035	0.592	0.592	5.327	0.476	0.395	6,946.097
ENG-03	Gas Plant 1	Caterpillar G3608LE (4SLB) Engine	3.748	9.864	0.035	0.592	0.592	5.327	0.476	0.395	6,946.097
ENG-04	Gas Plant 1	Caterpillar G3608LE (4SLB) Engine	3.748	9.864	0.035	0.592	0.592	5.327	0.476	0.395	6,946.097
ENG-05	Gas Plant 1	Caterpillar G3608LE (4SLB) Engine	3.748	9.864	0.035	0.592	0.592	5.327	0.476	0.395	6,946.097
ENG-06	Gas Plant 1	Caterpillar G3608LE (4SLB) Engine	3.748	9.864	0.035	0.592	0.592	5.327	0.476	0.395	6,946.097
ENG-07	Gas Plant 1	Caterpillar G3608LE (4SLB) Engine	3.748	9.864	0.035	0.592	0.592	5.327	0.476	0.395	6,946.097
ENG-08	Gas Plant 2	Caterpillar G3616A4 (4SLB) Engine	9.656	14.484	0.096	1.639	1.639	13.036	1.382	0.966	19,212.648
ENG-09	Gas Plant 2	Caterpillar G3616A4 (4SLB) Engine	9.656	14.484	0.096	1.639	1.639	13.036	1.382	0.966	19,212.648
ENG-10	Gas Plant 2	Caterpillar G3616A4 (4SLB) Engine	9.656	14.484	0.096	1.639	1.639	13.036	1.382	0.966	19,212.648
ENG-11	Gas Plant 2	Caterpillar G3616A4 (4SLB) Engine	9.656	14.484	0.096	1.639	1.639	13.036	1.382	0.966	19,212.648
ENG-12	Gas Plant 2	Caterpillar G3616A4 (4SLB) Engine	9.656	14.484	0.096	1.639	1.639	13.036	1.382	0.966	19,212.648
ENG-13	Gas Plant 2	Caterpillar G3616A4 (4SLB) Engine	9.656	14.484	0.096	1.639	1.639	13.036	1.382	0.966	19,212.648
ENG-14	Gas Plant 2	Caterpillar G3616A4 (4SLB) Engine	9.656	14.484	0.096	1.639	1.639	13.036	1.382	0.966	19,212.648
GEN-1	Shared by all	Generac Diesel Generator Engine	0.035	0.030	0.009	0.003	0.003	0.002	1.128E-04	3.511E-05	4.904
HTR-1	Gas Plant 1	Circulation System Combustion Heater	8.261	6.649	0.119	1.501	1.501	6.044	0.372	0.015	23,592.923
HTR-2	Crude Stab. Plant	Crude Stabilizer Medium Line Heater w/6 stacks	10.821	4.336	0.077	0.979	0.979	0.709	0.242	0.010	15,386.689
HTR-3	Crude Stab. Plant	Crude Stabilizer Medium Line Heater w/6 stacks	10.821	4.336	0.077	0.979	0.979	0.709	0.242	0.010	15,386.689
HTR-5	Crude Stab. Plant	Crude Stabilizer Medium Line Heater w/6 stacks	10.821	4.336	0.077	0.979	0.979	0.709	0.242	0.010	15,386.689
HTR-7	Gas Plant 2	Hot Oil Heater	15.548	15.169	0.223	2.826	2.826	7.205	0.700	0.028	44,405.984
DEHY-1	Gas Plant 2	Triethylene Glycol Dehydration Unit	-	-	-	-	-	11.363	1.552	-	74.601
CT-1	Crude Stab. Plant	Crude Oil IFR Tank No. 601	-	-	-	-	-	1.537	0.045	-	0.000
CT-2	Crude Stab. Plant	Crude Oil IFR Tank No. 1201	-	-	-	-	-	1.774	0.051	-	0.000
CT-3	Crude Stab. Plant	Crude Oil IFR Tank No. 602	-	-	-	-	-	1.923	0.056	-	0.000
STC-1	Crude Stab. Plant	Crude Oil Fixed Roof Tank (SPCC Tank 4; P&ID T-103)	-	-	-	-	-	0.451	0.013	-	0.000
STC-2	Crude Stab. Plant	Crude Oil Fixed Roof Tank (SPCC Tank 5; P&ID T-104)	-	-	-	-	-	0.451	0.013	-	0.000
STC-3	Crude Stab. Plant	Crude Oil Fixed Roof Tank (SPCC Tank 6; P&ID T-105)	-	-	-	-	-	0.451	0.013	-	0.000
STC-4	Crude Stab. Plant	Crude Oil Fixed Roof Tank (SPCC Tank 7; P&ID T-106)	-	-	-	-	-	0.451	0.013	-	0.000
STC-5	Crude Stab. Plant	Crude Oil Fixed Roof Tank (SPCC Tank 8; P&ID T-107)	-	-	-	-	-	0.451	0.013	-	0.000
STC-6	Crude Stab. Plant	Crude Oil Fixed Roof Tank (SPCC Tank 9; P&ID T-108)	-	-	-	-	-	0.451	0.013	-	0.000
MT-1	Gas Plant 1	Methanol Tank (SPCC Tank N/A; P&ID TK-117)	-	-	-	-	-	0.008	neg.	-	neg.
ST-1	Gas Plant 1	Slop Water Tank (SPCC Tank 10; P&ID TK-101)	-	-	-	-	-	0.214	0.009	-	0.912
LT-1	Gas Plant 1	Lube Oil Tank (SPCC Tank 11; P&ID TK-102)	-	-	-	-	-	4.700E-04	neg.	-	neg.
WT-1	Gas Plant 1	JW/Coolant Tank (SPCC Tank 12; P&ID TK-103)	-	-	-	-	-	1.650E-04	neg.	-	neg.
LT-2	Gas Plant 2	Lube Oil Tank (SPCC Tank 13 -P&ID TK-7121)	-	-	-	-	-	4.700E-04	neg.	-	neg.
LT-3	Gas Plant 2	Lube Oil Tank (SPCC Tank 14 - P&ID TK-7131)	-	-	-	-	-	4.700E-04	neg.	-	neg.
WT-2	Gas Plant 2	JW/Coolant Tank (SPCC Tank 15 - P&ID TK-7133)	-	-	-	-	-	1.650E-04	neg.	-	neg.
GT-1	Gas Plant 2	TEG Tank (SPCC Tank 16 - P&ID TK-6051)	-	-	-	-	-	5.000E-06	neg.	-	neg.
ST-3	Gas Plant 2	Slop Oil Tank (SPCC Tank 18 - P&ID TK-7188)	-	-	-	-	-	0.398	0.018	-	1.698
LT-4	Crude Stab. Plant	Lube Oil Tank (SPCC Tank 19)	-	-	-	-	-	4.720E-03	neg.	-	neg.
DT-2	Crude Stab. Plant	Diesel Tank (SPCC Tank 20)	-	-	-	-	-	neg.	neg.	-	neg.
DT-1	Shared by all	Diesel Tank for Generator (SPCC Tank TBA)	-	-	-	-	-	2.950E-04	neg.		neg.
E-1	Gas Plant 1	Plant 1 Flare	1.390	0.301	0.000	0.033	0.002	0.022	0.008	3.254E-04	492.616
FLR-1	Gas Plant 2	Plant 2 Flare (FL-7203)	4.173	0.859	0.003	0.032	0.086	0.045	0.023	9.284E-04	1,485.485
EC-2	Crude Stab. Plant	Crude Truck Unloading Tanks Combustor	0.957	0.210	0.002	0.023	0.015	0.002	0.006	2.029E-04	363.186
EC-3	Gas Plant 2	Plant 2 TEG Dehydrator Combustor	4.727	1.037	0.009	0.114	0.083	0.002	0.028	1.097E-03	1,794.028
STL-1	Shared by GPs	Slop Truck Loading	-	-	-	-	-	3.353	0.149	-	14.281
WTL-1	Crude Stab. Plant	MSS-Water Loadout	-	-	-	-	-	0.023	0.001	-	0.000
FUG-1	Shared by GPs	Fugitives at Gas Processing Plant	-	-	-	-	-	34.562	0.965	-	1,228.589
FUG-2	Crude Stab. Plant	Fugitives at Crude Oil Stabilization Facility	-	-	-	-	-	15.256	0.514	-	112.101
MSS-PIG	Shared by GPs	MSS-Pigging	-	-	-	-	-	0.326	0.009	-	13.684
MSS-Comp	Shared by GPs	MSS-Compressor Blowdowns	-	-	-	-	-	0.425	0.011	-	21.150
MSS-Vessel1	Shared by GPs	MSS-Vessel Blowdowns (Inlet)	-	-	-	-	-	0.870	0.023	-	35.864
MSS-Vessel2	Shared by GPs	MSS-Vessel Blowdowns (Residue)	-	-	-	-	-	0.062	0.000	-	39.981
MSS-Tank Cleaning	Crude Stab. Plant	MSS-Tank Cleaning Venting	-	-	-	-	-	0.682	0.020	-	0.000
MSS-IFR Tanks	Crude Stab. Plant	MSS-Tank Roof Landings/Cleaning/Venting	-	-	-	-	-	6.070	0.176	-	0.000
		Total	**161.39**	**207.70**	**1.52**	**23.09**	**23.07**	**219.48**	**18.37**	**9.60**	**302,953.27**

Note: slop water tank ST-4 has been taken out of service.

Compositional Analysis			Inlet Gas				Standard Fuel Gas/Residue				Fuel Gas				Condensate				Mid-South Condensate				E&P Tanks W&S Gas Emission				Stabilizer Reboiler Condensate			
Species	Formula	MW	Mol Percent	Mol Fraction	Weight Fraction	Molecular Weight Contribution	Mol Percent	Mol Fraction	Weight Fraction	Molecular Weight Contribution	Mol Percent	Mol Fraction	Weight Fraction	Molecular Weight Contribution	Mol Percent	Mol Fraction	Weight Fraction	Molecular Weight Contribution	Mol Percent	Mol Fraction	Weight Fraction	Molecular Weight Contribution	Mol Percent	Mol Fraction	Weight Fraction	Molecular Weight Contribution	Mol Percent	Mol Fraction	Weight Fraction	Molecular Weight Contribution
Hydrogen sulfide	H2S	34.8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00000	0.00000	0.00	0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000	0.0000	0.00000	0.00000	0.000000		0.00000	0.00000	0.000000
Methane	C1	16.04	67.6696	0.6767	0.46111	10.85420	75.4507	0.7545	0.61276	12.10229	76.58	0.76583	0.62860	12.28387	0.0056	0.00006	0.00001	0.00090	0.04900	0.00049	0.00008	0.00786	25.0806	0.25081	0.10590	4.022928		0.00000	0.00000	0.000000
Ethane	C2	30.07	17.1271	0.1713	0.21879	5.15012	20.2277	0.2023	0.30796	6.08247	20.26	0.20261	0.31176	6.09233	0.0868	0.00087	0.00027	0.02610	0.47220	0.00472	0.00143	0.14199	32.7326	0.32733	0.25910	9.842693		0.00000	0.00000	0.000000
Propane	C3	44.1	7.3161	0.0732	0.13707	3.22640	1.0564	0.0106	0.02359	0.46587	0.51	0.00508	0.01147	0.22420	0.5386	0.00539	0.00246	0.23752	2.17310	0.02173	0.00964	0.95834	19.9160	0.19916	0.23120	8.782956	0.0085	0.00009	0.00004	0.003749
iso-Butane	iC4	58.12	0.8992	0.0090	0.02220	0.52262	0.0018	0.0000	0.00005	0.00105	5.00E-04	0.00001	0.00001	0.00029	0.4688	0.00469	0.00282	0.27247	1.05050	0.01051	0.00614	0.61055	2.7950	0.02795	0.04276	1.624454	0.0021	0.00002	0.00001	0.001221
n-Butane	nC4	58.12	2.4703	0.0247	0.06099	1.43574	0.0053	0.0001	0.00016	0.00308	3.00E-04	0.00000	0.00001	0.00017	3.4954	0.03495	0.02100	2.03153	5.09990	0.05100	0.02982	2.96406	7.9162	0.07916	0.12111	4.600895	0.0128	0.00013	0.00008	0.007439
Neopentane	C5H12	72.15		0.0000	0.00000	0.00000		0.0000	0.00000	0.00000	0.00	0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.000000		0.00000	0.00000	0.000000
iso-Pentane	iC5	71.99	0.4961	0.0050	0.01517	0.35714	0.0006	0.0000	0.00002	0.00043	0.00	0.00000	0.00000	0.00000	4.1354	0.04135	0.03078	2.97707	3.24260	0.03243	0.02349	2.33435	1.8929	0.01893	0.03587	1.362699	0.1566	0.00157	0.00114	0.112736
n-Pentane	nC5	71.99	0.6941	0.0069	0.02123	0.49968	0.0005	0.0000	0.00002	0.00036	0.00	0.00000	0.00000	0.00000	9.2783	0.09278	0.06905	6.67945	6.96820	0.06968	0.05047	5.01641	2.8869	0.02887	0.05471	2.078279	1.1152	0.01115	0.00813	0.802832
2,2-Dimethylbutane	C6H14	86.17		0.0000	0.00000	0.00000		0.0000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.000000		0.00000	0.00000	0.000000
2,3-Dimethylbutane	C6H14	86.18		0.0000	0.00000	0.00000		0.0000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.000000		0.00000	0.00000	0.000000
2-Methylpentane	C6H14	86.18		0.0000	0.00000	0.00000		0.0000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.000000		0.00000	0.00000	0.000000
3-Methylpentane	C6H14	86.2		0.0000	0.00000	0.00000		0.0000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.000000		0.00000	0.00000	0.000000
n-Hexane	C6H14	86.18	0.1603	0.0016	0.00587	0.13815	0.0002	0.0000	0.00001	0.00019	4.94E-08	0.00000	0.00000	0.00000	10.2069	0.10207	0.09093	8.79631	6.75790	0.06758	0.05859	5.82396	1.0298	0.01030	0.02336	0.887482	15.5677	0.15568	0.13581	13.416244
Hexanes	C6	86.18	0.2119	0.0021	0.00776	0.18262		0.0000	0.00000	0.00000		0.00000	0.00000	0.00000	8.8773	0.08877	0.07909	7.65046	5.67060	0.05671	0.04917	4.88692	2.9470	0.02947	0.06686	2.539725	12.0802	0.12080	0.10538	10.410716
Heptanes	C7	99.26	0.1124	0.0011	0.00474	0.11157	0.0000	0.0000	0.00000	0.00000	0.00	0.00000	0.00000	0.00000	30.6186	0.30619	0.31417	30.39202	25.81430	0.25814	0.25779	25.62327	1.1715	0.01172	0.03061	1.162831	43.7457	0.43746	0.43954	43.421982
Octanes	C8	111.47	0.0197	0.0002	0.00093	0.02196	0.0000	0.0000	0.00000	0.00000		0.00000	0.00000	0.00000	13.1517	0.13152	0.15155	14.66020	14.57860	0.14579	0.16349	16.25077	0.3490	0.00349	0.01024	0.389030	12.9333	0.12933	0.14593	14.416750
Nonanes	C9	126.54		0.0000	0.00000	0.00000	0.0000	0.0000	0.00000	0.00000		0.00000	0.00000	0.00000	6.2035	0.06204	0.08115	7.84991	9.19540	0.09195	0.11706	11.63586	0.0505	0.00051	0.00168	0.063903	4.4299	0.04430	0.05674	5.605595
Decanes	C10+	137.27		0.0000	0.00000	0.00000		0.0000	0.00000	0.00000		0.00000	0.00000	0.00000	5.8736	0.05874	0.08335	8.06269	10.92400	0.10924	0.15086	14.99537	0.0070	0.00007	0.00025	0.009609	1.9829	0.01983	0.02755	2.721927
Nitrogen	N2	28.01	1.5869	0.0159	0.01888	0.44449	2.1154	0.0212	0.03000	0.59252	1.40	0.01402	0.02010	0.39270		0.00000	0.00000	0.00000	0.01220	0.00012	0.00003	0.00342		0.00000	0.00000	0.000000		0.00000	0.00000	0.000000
Carbon dioxide	CO2	44.01	1.1234	0.0112	0.02100	0.49441	1.1413	0.0114	0.02543	0.50229	1.25	0.01246	0.02805	0.54819		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000	1.0381	0.01038	0.01203	0.456868		0.00000	0.00000	0.000000
Oxygen	O2	32		0.0000	0.00000	0.00000		0.0000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.000000		0.00000	0.00000	0.000000
Water	H2O	18.02		0.0000	0.00000	0.00000		0.0000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.000000		0.00000	0.00000	0.000000
TEG	C6H14O4	150.17		0.0000	0.00000	0.00000		0.0000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.000000		0.00000	0.00000	0.000000
Benzene	C6H6	78.11	0.0256	0.0003	0.00085	0.02000	3.60E-05	3.60E-07	1.42E-06	2.81E-05		0.00E+00	0.00E+00	0.00E+00	0.9668	0.00967	0.00781	0.75517	0.69710	0.00697	0.00548	0.54450	0.0912	0.00091	0.00188	0.071236	1.5483	0.01548	0.01224	1.209377
Toluene	C7H8	92.14	0.0098	0.0001	0.00038	0.00903	1.38E-05	1.38E-07	6.43E-07	1.27E-05		0.00E+00	0.00E+00	0.00E+00	1.7322	0.01732	0.01650	1.59605	1.68720	0.01687	0.01564	1.55459	0.0673	0.00067	0.00163	0.062010	2.2741	0.02274	0.02121	2.095356
Ethylbenzene	C8H10	106.17	0.0000	0.0000	0.00000	0.00000	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00E+00	0.00E+00	0.2530	0.00253	0.00278	0.26861	0.34390	0.00344	0.00367	0.36512	0.0022	0.00002	0.00006	0.002336	0.1950	0.00195	0.00210	0.207032
Xylenes	C8H10	106.17	0.0025	0.0000	0.00011	0.00265	3.52E-06	3.52E-08	1.89E-07	3.73E-06		0.00E+00	0.00E+00	0.00E+00	2.6380	0.02638	0.02895	2.80076	4.11520	0.04115	0.04396	4.36911	0.0219	0.00022	0.00061	0.023251	1.9011	0.01901	0.02043	2.018398
2,2,4-Trimethylpentane	C8H18	114.23	0.0062	0.0001	0.00030	0.00708	8.72E-06	8.72E-08	5.05E-07	9.96E-06		0.00E+00	0.00E+00	0.00E+00	1.4697	0.01470	0.01735	1.67884	1.14750	0.01148	0.01319	1.31079	0.0042	0.00004	0.00013	0.004798	2.0464	0.02046	0.02366	2.337603
Cyclopentane	C5H10	70.13		0.0000	0.00000	0.00000		0.0000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.000000		0.00000	0.00000	0.000000
Cyclohexane	C6H12	84.16	0.0453	0.0005	0.00162	0.03812		0.0000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.000000		0.00000	0.00000	0.000000
Methylcyclohexane	C7H14	98.19	0.0235	0.0002	0.00098	0.02307		0.0000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.000000		0.00000	0.00000	0.000000
MDEA	C5H13O2N	119.163		0.0000	0.00000	0.00000		0.0000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.000000		0.00000	0.00000	0.000000
Piperazine	C4H10N2	86.136		0.0000	0.00000	0.00000		0.0000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.00000		0.00000	0.00000	0.000000		0.00000	0.00000	0.000000
Total:			**100.000000**	**1.000000**	**1.000000**	**23.53905**	**99.9999876**	**1.0000**	**1.0000**	**19.75061**	**100.000000**	**1.000000**	**1.000000**	**19.541756**	**100.000200**	**1.000002**	**1.000000**	**96.736052**	**99.999400**	**0.999994**	**1.000000**	**99.397233**	**99.999900**	**0.999999**	**1.000000**	**37.987983**	**99.999800**	**0.999998**	**1.000000**	**98.788956**

	Mol Fraction
C6+	0.0003

Stable Oil Vapor Speciation Summary

Parameter								
Total Methane (CH4)	0.4611	0.6128	0.6286	0.0000	0.0001	0.1059	0.0000	
Total Carbon Dioxide (CO2)	0.0210	0.0254	0.0281	0.0000	0.0000	0.0120	0.0000	
Total Benzene (C6H6)	0.0008	1.4245E-06	0.0000	0.0078	0.0055	0.0019	0.0122	
Total Hazardous Air Pollutants (HAPs)	0.0075	1.2603E-05	0.0000	0.1643	0.1405	0.0277	0.2154	
Total Volatile Organic Compounds (VOCs)	0.2802	0.0238	0.0115	0.9997	0.9985	0.6230	1.0000	
Total Hydrogen Sulfide (H2S)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
HHV (Btu/scf)	1,400.90	1,153.00	1,150.91	5,276.50	5,494.10	2,154.30	5,313.70	

Crude Oil Tank Speciation

Parameter	Weight % of Losses, tpy [1]
VOC [2]	100%
Total CO_2e	0.00%
CH_4 (Methane)	0.00%
CO_2	0.00%
Total HAPs	2.90%
Benzene	0.25%
Toluene	0.48%
Ethylbenzene	0.12%
Xylene	0.55%
n-C6 (n-Hexane)	1.50%
2,2,4-Trimethylper	0.00%
H_2S	0.00%

[1] Speciated HAP emissions were estimated using the HAP composition of crude oil from EPA Document (EPA-453/R-94-079a), National Emission Standards for Hazardous Air Pollutants for Source Categories: Oil and Natural Gas Production and Natural Gas Transmission and Storage - Background Information for Proposed Standards, Table 2-1 (Average HAP Composition of Extracted Streams and Recovered Products).

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Compressor Engines (ENG-01 - ENG-07)

Table 3.a. - Caterpillar 3608LE

Parameter	Value
Number of Engines	7
Horsepower (hp)	2,370
Fuel	Natural Gas
Annual Hours of Operation per Engine (hr) [1]	8,760
Total Annual Hours of Operation for All Engines (hr) [1]	52,860
Fuel Heat Rating (Btu/hp-hr) [2]	6,629
Maximum Heat Input (MMBtu/hr) [2]	15.71
Annual Fuel Consumption (MMBtu/year)	137,625.99

[1] 6 of the 7 engines will operate a maximum of 8,760 hours per year. A 7th engine is a standby engine that will operate a maximum of 300 hours per year. Which engine of engines ENG-01 thru ENG-07 is the standby engine can vary. Total operating hours for all Caterpillar 3608LE engines will not exceed 52,860 hours ((6 x 8,760) + 300).

[2] Value taken from Caterpillar 3608 A4 technical data.

Table 3.b. - Caterpillar 3608LE Uncontrolled Emissions

Component	Emission Factor, g/bhp-hr [1]	Emission Factor, lb/MMBtu [2]	Emission Rate, lb/hr	Emission Rate per Engine, tpy	Total Annual Emissions, tpy
NO_X	0.5000	-	2.61	**9.86**	**69.05**
CO	2.7500	-	14.37	**54.25**	**379.76**
VOCs	0.6300	-	3.29	**12.43**	**87.00**
Formaldehyde	0.2600	-	1.36	**5.13**	**35.90**
$PM_{2.5}$	-	0.0100	0.16	**0.59**	**4.15**
PM_{10}	-	0.0100	0.16	**0.59**	**4.15**
PM	-	0.0100	0.16	**0.59**	**4.15**
SO_2	-	0.0006	0.01	**0.03**	**0.24**
CH_4 [3]	-	0.0022	0.03	**0.13**	**0.92**
N_2O [3]	-	0.0002	0.00	**0.01**	**0.09**
CO_2 [4]	-	116.9761	1,837.78	**6,938.93**	**48,572.51**
CO_2e [5]	-	117.0969	1,839.68	**6,946.10**	**48,622.68**

[1] The pre-catalyst emission factors for CO, NOx, CH_2O, and VOC are based on the gram per brake-horsepower-hour (g/bhp-hr) rates from the engine specification sheet.

[2] PM, PM_{10}, $PM_{2.5}$, and SO_2 emission factors from AP-42 Chapter 3 Section 2 – Natural Gas-fired Reciprocating Engines Table 3.2-2 Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines. Emission factors are expressed in lb/MMBtu.

[3] CH_4 and N_2O emission factors from 40 CFR 98 Subpart C, Table C-2 for natural gas.

[4] CO_2 emission factor obtained from 40 CFR 98 Subpart C, Table C-1 for natural gas.

[5] Global warming potentials obtained from Table A-1 to Subpart 98 - Global Warming Potentials Equation A-1:

$CO_2e = \sum GHGi \times GWPi$

Where:

CO_2e = Carbon dioxide equivalent (tons/year)

GHGi = Mass emissions of each GHG (tons/year)

GWPi = Global warming potential for each GHG (1 for CO_2; 25 for CH_4; 298 for N_2O)

Table 3.c. - Caterpillar 3608LE Catalyst-Controlled Emissions

Component	Emission Factor, g/bhp-hr [1]	Emission Factor, lb/MMBtu [2]	Emission Rate, lb/hr	Emission Rate per Engine, tpy	Total Annual Emissions, tpy
NO_X	0.5000	-	2.61	**9.86**	**69.05**
CO	0.1900	-	0.99	**3.75**	**26.24**
VOCs	0.2500	-	1.41	**5.33**	**37.29**
Formaldehyde	0.0200	-	0.10	**0.39**	**2.76**
$PM_{2.5}$	-	0.0100	0.16	**0.59**	**4.15**
PM_{10}	-	0.0100	0.16	**0.59**	**4.15**
PM	-	0.0100	0.16	**0.59**	**4.15**
SO_2	-	0.0006	0.01	**0.03**	**0.24**
CH_4 [3]	-	0.0022	0.03	**0.13**	**0.92**
N_2O [3]	-	0.0002	0.00	**0.01**	**0.09**
CO_2 [4]	-	116.9761	1,837.78	**6,938.93**	**48,572.51**
CO_2e [5]	-	117.0969	1,839.68	**6,946.10**	**48,622.68**

[1] The post-catalyst emission factors for CO, NOx, VOC, and CH_2O are based on the gram per brake-horsepower-hour (g/bhp-hr) rates that the catalyst vendor will guarantee, with a safety factor where appropriate. See catalyst specs from Emit Technologies.

[2] PM, PM_{10}, $PM_{2.5}$, SO_2 emission factors from AP-42 Chapter 3 Section 2 – Natural Gas-fired Reciprocating Engines Table 3.2-2 Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines. Emission factors are expressed in lb/MMBtu.

[3] CH_4 and N_2O emission factors from 40 CFR 98 Subpart C, Table C-2 for natural gas.

[4] CO_2 emission factor obtained from 40 CFR 98 Subpart C, Table C-1 for natural gas.

[5] Global warming potentials obtained from Table A-1 to Subpart 98 - Global Warming Potentials Equation A-1:

$CO_2e = \sum GHGi \times GWPi$

Where:

CO_2e = Carbon dioxide equivalent (tons/year)

GHGi = Mass emissions of each GHG (tons/year)

GWPi = Global warming potential for each GHG (1 for CO_2; 25 for CH_4; 298 for N_2O)

Table 3.d. - Caterpillar 3608LE Emissions - HAP Emissions

Component	Emission Factor, lb/MMBtu [1]	Controlled Emission Factor, lb/MMBtu [2]	Emission Rate, lb/hr	Emission Rate per Engine, tpy	Total Annual Emissions, tpy
1,1,2,2-Tetrachloroethane	4.00E-05	3.08E-06	4.83E-05	1.83E-04	0.001
1,1,2-Trichloroethane	3.18E-05	2.45E-06	3.84E-05	1.45E-04	0.001
1,1-Dichloroethane	2.36E-05	1.82E-06	2.85E-05	1.08E-04	0.001
1,3-Butadiene	2.67E-04	2.05E-05	0.0003	0.001	0.009
1,3-Dichloropropene	2.64E-05	2.03E-06	3.19E-05	1.20E-04	0.001
Acetaldehyde	8.36E-03	6.43E-04	0.0101	0.038	0.267
Acrolein	5.14E-03	3.95E-04	0.0062	0.023	0.164
Benzene	4.40E-04	3.38E-05	0.0005	0.002	0.014
Carbon Tetrachloride	3.67E-05	2.82E-06	4.44E-05	1.67E-04	0.001
Chlorobenzene	3.04E-05	2.34E-06	3.67E-05	1.39E-04	0.001
Chloroform	2.85E-05	2.19E-06	3.44E-05	1.30E-04	0.001
Ethylbenzene	3.97E-05	3.05E-06	4.80E-05	1.81E-04	0.001
Ethylene Dibromide	4.43E-05	3.41E-06	0.0001	2.02E-04	0.001
Methanol	2.50E-03	1.92E-04	0.0030	0.011	0.080
Methylene Chloride	2.00E-05	1.54E-06	2.42E-05	9.13E-05	0.001
Naphthalene	7.44E-05	5.72E-06	0.0001	3.39E-04	0.002
PAH	2.69E-05	2.07E-06	3.25E-05	1.23E-04	0.001
Styrene	2.36E-05	1.82E-06	2.85E-05	1.08E-04	0.001
Toluene	4.08E-04	3.14E-05	0.0005	0.002	0.013
Vinyl Chloride	1.49E-05	1.15E-06	1.80E-05	6.80E-05	4.76E-04
Xylene	1.84E-04	1.42E-05	0.0002	0.001	0.006
Total HAPs [3]	**0.018**		**0.126**	**0.476**	**3.329**

[1] Emission factors from AP-42 Chapter 3 Section 2 – Natural Gas-fired Reciprocating Engines Table 3.2-2 Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines. Emission factors are expressed in lb/MMBtu.

[2] The controlled emission factors were calculated by applying the control factor for formaldehyde provided in the catalyst specs to the AP-42 emission factors.

[3] Total HAPs emissions include formaldehyde emissions from Table 3.c.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Compressor Engines (ENG-08 - ENG-14)

Table 4.a. - Caterpillar 3616A4

Parameter	Value
Number of Engines	7
Horsepower (hp) [1]	5,000
Fuel	Natural Gas
Annual Hours of Operation (hr)	8,760
Fuel Heat Rating (Btu/hp-hr) [1]	7,492
Maximum Heat Input (MMBtu/hr) [1]	37.46
Annual Fuel Consumption (MMBtu/year)	328,149.60

[1] Value taken from Caterpillar 3616 A4 technical data.

Table 4.b. - Caterpillar 3616A4 Uncontrolled Emissions

Component	Emission Factor, g/bhp-hr [1]	Emission Factor, lb/MMBtu [2]	Emission Rate, lb/hr	Emission Rate per Engine, tpy	Total Annual Emissions, tpy
NO_X	0.3000	-	3.31	**14.48**	**101.39**
CO	2.7000	-	29.76	**130.36**	**912.52**
VOCs	0.2500	-	2.76	**12.07**	**84.49**
Formaldehyde	0.1400	-	1.54	**6.76**	**47.32**
$PM_{2.5}$	-	0.0100	0.37	**1.64**	**11.47**
PM_{10}	-	0.0100	0.37	**1.64**	**11.47**
PM	-	0.0100	0.37	**1.64**	**11.47**
SO_2	-	0.0006	0.02	**0.10**	**0.68**
CH_4 [3]	-	0.0022	0.08	**0.36**	**2.53**
N_2O [3]	-	0.0002	0.01	**0.04**	**0.25**
CO_2 [4]	-	116.9761	4,381.92	**19,192.83**	**134,349.78**
CO_2e [5]	-	117.0969	4,386.45	**19,212.65**	**134,488.54**

[1] The pre-catalyst emission factors for CO, NOx, CH_2O, and VOC are based on the gram per brake-horsepower-hour (g/bhp-hr) rates from the engine specification sheet.

[2] PM, PM_{10}, $PM_{2.5}$, and SO_2 emission factors from AP-42 Chapter 3 Section 2 – Natural Gas-fired Reciprocating Engines Table 3.2-2 Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines. Emission factors are expressed in lb/MMBtu.

[3] CH_4 and N_2O emission factors from 40 CFR 98 Subpart C, Table C-2 for natural gas.

[4] CO_2 emission factor obtained from 40 CFR 98 Subpart C, Table C-1 for natural gas.

[5] Global warming potentials obtained from Table A-1 to Subpart 98 - Global Warming Potentials Equation A-1:

$CO_2e = \sum GHGi \times GWPi$

Where:

CO_2e = Carbon dioxide equivalent (tons/year)

GHGi = Mass emissions of each GHG (tons/year)

GWPi = Global warming potential for each GHG (1 for CO_2; 25 for CH_4; 298 for N_2O)

Table 4.c. - Caterpillar 3616A4 Catalyst-Controlled Emissions

Component	Emission Factor, g/bhp-hr [1]	Emission Factor, lb/MMBtu [2]	Emission Rate, lb/hr	Emission Rate per Engine, tpy	Total Annual Emissions, tpy
NO_X	0.3000	-	3.31	**14.48**	**101.39**
CO	0.2000	-	2.20	**9.66**	**67.59**
VOCs	0.2500	-	2.98	**13.04**	**91.25**
Formaldehyde	0.0200	-	0.22	**0.97**	**6.76**
$PM_{2.5}$	-	0.0100	0.37	**1.64**	**11.47**
PM_{10}	-	0.0100	0.37	**1.64**	**11.47**
PM	-	0.0100	0.37	**1.64**	**11.47**
SO_2	-	0.0006	0.02	**0.10**	**0.68**
CH_4 [3]	-	0.0022	0.08	**0.36**	**2.53**
N_2O [3]	-	0.0002	0.01	**0.04**	**0.25**
CO_2 [4]	-	116.9761	4,381.92	**19,192.83**	**134,349.78**
CO_2e [5]	-	117.0969	4,386.45	**19,212.65**	**134,488.54**

[1] The post-catalyst emission factors for CO, NOx, VOC, and CH_2O are based on the gram per brake-horsepower-hour (g/bhp-hr) rates that the catalyst vendor will guarantee, with a safety factor where appropriate. See catalyst specs from Emit Technologies.

[2] PM, PM_{10}, $PM_{2.5}$, SO_2 emission factors from AP-42 Chapter 3 Section 2 – Natural Gas-fired Reciprocating Engines Table 3.2-2 Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines. Emission factors are expressed in lb/MMBtu.

[3] CH_4 and N_2O emission factors from 40 CFR 98 Subpart C, Table C-2 for natural gas.

[4] CO_2 emission factor obtained from 40 CFR 98 Subpart C, Table C-1 for natural gas.

[5] Global warming potentials obtained from Table A-1 to Subpart 98 - Global Warming Potentials Equation A-1:
$CO_2e = \sum GHGi \times GWPi$
Where:
CO_2e = Carbon dioxide equivalent (tons/year)
GHGi = Mass emissions of each GHG (tons/year)
GWPi = Global warming potential for each GHG (1 for CO_2; 25 for CH_4; 298 for N_2O)

Table 4.d. - Caterpillar 3616A4 Catalyst-Controlled Emissions

Component	Emission Factor, lb/MMBtu [1]	Controlled Emission Factor, lb/MMBtu [2]	Emission Rate, lb/hr	Emission Rate per Engine, tpy	Total Annual Emissions, tpy
1,1,2,2-Tetrachloroethane	4.00E-05	5.71E-06	0.0002	0.001	0.007
1,1,2-Trichloroethane	3.18E-05	4.54E-06	0.0002	0.001	0.005
1,1-Dichloroethane	2.36E-05	3.37E-06	0.0001	0.001	0.004
1,3-Butadiene	2.67E-04	3.81E-05	0.0014	0.006	0.044
1,3-Dichloropropene	2.64E-05	3.77E-06	0.0001	0.001	0.004
Acetaldehyde	8.36E-03	1.19E-03	0.0447	0.196	1.372
Acrolein	5.14E-03	7.34E-04	0.0275	0.120	0.843
Benzene	4.40E-04	6.29E-05	0.0024	0.010	0.072
Carbon Tetrachloride	3.67E-05	5.24E-06	0.0002	0.001	0.006
Chlorobenzene	3.04E-05	4.34E-06	0.0002	0.001	0.005
Chloroform	2.85E-05	4.07E-06	0.0002	0.001	0.005
Ethylbenzene	3.97E-05	5.67E-06	0.0002	0.001	0.007
Ethylene Dibromide	4.43E-05	6.33E-06	0.0002	0.001	0.007
Methanol	2.50E-03	3.57E-04	0.0134	0.059	0.410
Methylene Chloride	2.00E-05	2.86E-06	0.0001	4.69E-04	0.003
Naphthalene	7.44E-05	1.06E-05	0.0004	0.002	0.012
PAH	2.69E-05	3.84E-06	0.0001	0.001	0.004
Styrene	2.36E-05	3.37E-06	0.0001	0.001	0.004
Toluene	4.08E-04	5.83E-05	0.0022	0.010	0.067
Vinyl Chloride	1.49E-05	2.13E-06	0.0001	3.49E-04	0.002
Xylene	1.84E-04	2.63E-05	0.0010	0.004	0.030
Total HAPs [3]	**0.018**		**0.316**	**1.382**	**9.673**

[1] Emission factors from AP-42 Chapter 3 Section 2 – Natural Gas-fired Reciprocating Engines Table 3.2-2 Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines. Emission factors are expressed in lb/MMBtu.

[2] The controlled emission factors were calculated by applying the control factor for formaldehyde provided in the catalyst specs to the AP-42 emission factors.

[3] Total HAPs emissions include formaldehyde emissions from Table 4.c.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Emergency Generator (GEN-1)

Table 5.a. - Back-up Generator

Parameter	Value
Number of Engines	1
Horsepower (hp)	85
Fuel	Diesel
Annual Hours of Operation (hr) [1]	100

[1] Per 40 CFR §60.4243(d)(1)-(2) , there is no time limit on the use of emergency stationary internal combustion engines in emergency situations; operation for non-emergency uses is limited to 100 hours per calendar year.

Table 5.b. - Back-up Generator Uncontrolled Emissions

Component	Emission Factor, lb/bhp-hr [1]	Emission Rate, lb/hr	Emission Rate per Engine, tpy	Total Annual Emissions, tpy
NO_X [2]	0.0072	0.61	**0.03**	**0.03**
CO [2]	0.0082	0.70	**0.03**	**0.03**
VOCs [2]	5.7662E-04	0.05	**2.45E-03**	**2.45E-03**
Formaldehyde	8.26E-06	7.02E-04	**3.51E-05**	**3.51E-05**
$PM_{2.5}$	0.0007	0.06	**2.79E-03**	**2.79E-03**
PM_{10}	0.0007	0.06	**2.79E-03**	**2.79E-03**
PM [2]	0.0007	0.06	**2.79E-03**	**2.79E-03**
SO_2	0.0021	0.17	**8.71E-03**	**8.71E-03**
CH_4 [3]	4.63E-05	3.94E-03	**1.97E-04**	**1.97E-04**
N_2O [3]	9.26E-06	7.87E-04	**3.94E-05**	**3.94E-05**
CO_2	1.1500	97.75	**4.89**	**4.89**
CO_2e [4]	1.1539	98.08	**4.90**	**4.90**

[1] The emission factors are from AP-42 Table 3.3-1 unless otherwise noted.

[2] The emission factors for NOx, VOC, CO, and PM come from Table 3 to Appendix I to Part 1039 (c): Tier 3 Emission Standards because the engine is subject to NSPS IIII and therefore is required to meet the Tier III emission standards. It is assumed PM = PM_{10} = $PM_{2.5}$.

[3] Emission factors for CH_4 and N_2O from 40 CFR Part 98 Subpart C, Table C-2. Emission factors are in kg/MMBtu. AP-42 Chapter 3 Section 3 – Gasoline and Diesel Industrial Engines provides diesel fuel brake-specific fuel consumption of 7,000 Btu/hp-hr. Emission factors were converted to g/hr per the following equations:

3.0×10^{-3} kg / MMBtu CH_4 EF x 7,000 btu/hp-hr x 1 MMBtu/1,000,000 Btu x 1,000 g/kg x horsepower of the generator

6.0×10^{-4} kg / MMBtu N_2O EF x 7,000 btu/hp-hr x 1 MMBtu/1,000,000 Btu x 1,000 g/kg x horsepower of the generator

[5] Global warming potentials obtained from Table A-1 to Subpart 98 - Global Warming Potentials Equation A-1:

$CO_2e = \sum GHGi \times GWPi$

Where:

CO_2e = Carbon dioxide equivalent (tons/year)

GHGi = Mass emissions of each GHG (tons/year)

GWPi = Global warming potential for each GHG (1 for CO_2; 25 for CH_4; 298 for N_2O)

Table 5.c. - Back-up Generator Controlled Emissions

Component	Emission Factor, lb/bhp-hr [1]	Emission Rate, lb/hr	Emission Rate per Engine, tpy	Total Annual Emissions, tpy
NO_X [2]	0.0072	0.61	**0.03**	**0.03**
CO [2]	0.0082	0.70	**0.03**	**0.03**
VOCs [2]	0.0006	0.05	**2.45E-03**	**2.45E-03**
Formaldehyde	8.26E-06	7.02E-04	**3.51E-05**	**3.51E-05**
$PM_{2.5}$	0.0007	0.06	**2.79E-03**	**2.79E-03**
PM_{10}	0.0007	0.06	**2.79E-03**	**2.79E-03**
PM [2]	0.0007	0.06	**2.79E-03**	**2.79E-03**
SO_2	0.0021	0.17	**8.71E-03**	**8.71E-03**
CH_4 [3]	4.63E-05	3.94E-03	**1.97E-04**	**1.97E-04**
N_2O [3]	9.26E-06	7.87E-04	**3.94E-05**	**3.94E-05**
CO_2	1.1500	97.75	**4.89**	**4.89**
CO_2e [4]	1.1539	98.08	**4.90**	**4.90**

[1] The emission factors are from AP-42 Table 3.3-1 unless otherwise noted.

[2] The emission factors for NOx, VOC, CO, and PM come from Table 3 to Appendix I to Part 1039 (c): Tier 3 Emission Standards because the engine is subject to NSPS IIII and therefore is required to meet the Tier III emission standards. It is assumed PM = PM_{10} = $PM_{2.5}$.

[3] Emission factors for CH_4 and N_2O from 40 CFR Part 98 Subpart C, Table C-2. Emission factors are in kg/MMBtu. AP-42 Chapter 3 Section 3 – Gasoline and Diesel Industrial Engines provides diesel fuel brake-specific fuel consumption of 7,000 Btu/hp-hr. Emission factors were converted to g/hr per the following equations:

3.0×10^{-3} kg / MMBtu CH_4 EF x 7,000 btu/hp-hr x 1 MMBtu/1,000,000 Btu x 1,000 g/kg x horsepower of the generator

6.0×10^{-4} kg / MMBtu N_2O EF x 7,000 btu/hp-hr x 1 MMBtu/1,000,000 Btu x 1,000 g/kg x horsepower of the generator

[5] Global warming potentials obtained from Table A-1 to Subpart 98 - Global Warming Potentials Equation A-1:

$CO_2e = \sum GHGi \times GWPi$

Where:

CO_2e = Carbon dioxide equivalent (tons/year)

GHGi = Mass emissions of each GHG (tons/year)

GWPi = Global warming potential for each GHG (1 for CO_2; 25 for CH_4; 298 for N_2O)

Table 5.d. - Back-up Generator HAP Emissions

Component	Emission Factor, lb/bhp-hr [1]	Emission Rate, lb/hr	Emission Rate per Engine, tpy	Total Annual Emissions, tpy
1,3-Butadiene	2.74E-07	2.3265E-05	1.16E-06	1.16E-06
Acetaldehyde	5.37E-06	4.5637E-04	2.28E-05	2.28E-05
Acrolein	6.48E-07	5.5038E-05	2.75E-06	2.75E-06
Benzene	6.53E-06	5.5514E-04	2.78E-05	2.78E-05
Naphthalene	5.94E-07	5.0456E-05	2.52E-06	2.52E-06
Toluene	2.86E-06	2.4336E-04	1.22E-05	1.22E-05
Xylene	2.00E-06	1.6958E-04	8.48E-06	8.48E-06
Total HAPs [2]	**2.653E-05**	**0.002**	**1.128E-04**	**1.128E-04**

[1] Emission factors from AP-42 Chapter 3 Section 3 – Gasoline and Diesel Industrial Engines Table 3.3-2 Speciated Organic Compound Emission Factors for Uncontrolled Diesel Engines and footnote a of Table 3.3-1.

[2] Total HAPs emissions include formaldehyde emissions from Table 5.c.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Crude Oil Tank (CT-1)

Table 6.a. - Crude Oil Tank Characteristics

Parameter	Value	Units
Tank Capacity	60,000	barrels
Control Efficiency	0%	%
Product Stored	Crude Oil	
Shell Height	48.00	ft
Tank Diameter	96.00	ft
Daily Throughput per Tank	15,000	barrels/day/tank
Annual Throughput per Tank	5,475,000	barrels/year/tank
Quantity	1	tank(s)
Total Estimated Working and Breathing Emissions [1]	1.54	ton/yr
Total Estimated Working and Breathing Emissions [1, 2]	1.81	lb/hr

[1] Working and breathing emissions are calculated in a separate spreadsheet.

[2] Maximum hourly tank emissions are based on TCEQ Guidance document APDG 6419 - Short Term Emissions Rates from Floating Roof Storage Tanks dated February 2020. AP-42 methodologies are not appropriate to use to determine emission rates at timescales less than monthly.

Table 6.b. - Crude Oil Tank Emissions

Parameter	Weight % of Losses, tpy [1]	Uncontrolled		Controlled	
		Emissions per Tank, lb/hr [1]	Emissions per Tank, tpy [1]	Emissions per Tank, lb/hr [1]	Emissions per Tank, tpy [1]
VOC [2]	100%	1.81	1.54	1.81	1.54
Total CO_2e [3]	0.00%	0.00	0.00	0.00	0.00
CH_4 (Methane)	0.00%	0.00	0.00	0.00	0.00
CO_2	0.00%	0.00	0.00	0.00	0.00
Total HAPs	2.90%	0.05	0.04	0.05	0.04
Benzene	0.25%	4.53E-03	3.84E-03	4.53E-03	3.84E-03
Toluene	0.48%	0.01	0.01	0.01	0.01
Ethylbenzene	0.12%	2.17E-03	1.84E-03	2.17E-03	1.84E-03
Xylene	0.55%	0.01	0.01	0.01	0.01
n-C6 (n-Hexane)	1.50%	0.03	0.02	0.03	0.02
2,2,4-Trimethylpentane	0.00%	0.00	0.00	0.00	0.00
H_2S	0.00%	0.00	0.00	0.00	0.00

[1] Speciated HAP emissions were estimated using the HAP composition of crude oil from EPA Document (EPA-453/R-94-079a), National Emission Standards for Hazardous Air Pollutants for Source Categories: Oil and Natural Gas Production and Natural Gas Transmission and Storage - Background Information for Proposed Standards, Table 2-1 (Average HAP Composition of Extracted Streams and Recovered Products).

[2] Non-methane, non-ethane VOC emissions.

[3] GHG emissions are assumed to be negligible since the crude oil has undergone 3-phase separation prior to receipt by truck or pipeline.

CT-1
Rough Rider Operating, LLC
Tank Indentification and Physical Characteristics

Identification

Identification No.	CT-1
Description	60,000 bbl Crude Tank
State	North Dakota
City	Watford City
Nearest Major City	Williston, ND
Company	Rough Rider Operating, LLC

Physical Characteristics - Tank Characteristics

Diameter	96	ft
Tank Shell Height (optional)	48	ft
Tank Volume	2,520,000	gal
Maximum Pump Rate	157,500	gal/hr
Worst Case Liquid Surface Temp	83	°F
Net Throughput	229,950,000	gal/yr
Net Throughput January	19,530,000	gal/mo
Net Throughput February	17,640,000	gal/mo
Net Throughput March	19,530,000	gal/mo
Net Throughput April	18,900,000	gal/mo
Net Throughput May	19,530,000	gal/mo
Net Throughput June	18,900,000	gal/mo
Net Throughput July	19,530,000	gal/mo
Net Throughput August	19,530,000	gal/mo
Net Throughput September	18,900,000	gal/mo
Net Throughput October	19,530,000	gal/mo
Net Throughput November	18,900,000	gal/mo
Net Throughput December	19,530,000	gal/mo
Self Supporting Roof?	No	
Number of Columns	1	Typically 6 columns
Efective Column Diameter	1	
Internal Shell Condition	Light Rust	
Paint Color/Shade	Beige	
Paint Condition	Average	

Physical Characteristics - Tank Construction and Rim-Seal System

Fitting Seals	Average
Tank Construction	Welded
Primary Seal	Mechanical-shoe seal
Secondary Seal	Rim-mounted secondary

Physical Characteristics - Deck Characteristics

Deck Type	Welded
Length of Deck Seams (optional)	

Fittings

Fitting Type	Typical (Table 7.1-12)	User Input	Internal Floating Roof - Table 7.1-12 Notes
Access hatch, bolted cover, gasketed	User Input	1	
Access hatch, unbolted cover, ungasketed	User Input	0	Typically 1
Access hatch, unbolted cover, gasketed			
Fixed roof support column well, round pipe, ungasketed sliding cover			
Fixed roof support column well, round pipe, gasketed sliding cover	User Input	1	
Fixed roof support column well, round pipe, flexible fabric sleeve seal			
Fixed roof support column well, built-up col.-sliding cover, ungasketed	User Input	0	Typically 6 column wells. However, column and ladder wells are not typically used with self-supporting roofs
Fixed roof support column well, built-up col.-sliding cover, gasketed			
Unslotted guide-pole well, ungasketed sliding cover			
Unslotted guide-pole well, ungasketed sliding cover w/pole sleeve			
Unslotted guide-pole well, gasketed sliding cover			
Unslotted guide-pole well, gasketed sliding cover w/pole wiper			
Unslotted guide-pole well, gasketed sliding cover w/pole sleeve			
Slotted guide-pole/sample well, ungasketed or gasketed sliding cover			
Slotted guide-pole/sample well, ungasketed or gasketed sliding cover, with float			
Slotted guide-pole/sample well, gasketed sliding cover, with pole wiper			
Slotted guide-pole/sample well, gasketed sliding cover, with pole sleeve			
Slotted guide-pole/sample well, gasketed sliding cover, with pole sleeve and pole wiper			
Slotted guide-pole/sample well, gasketed sliding cover, with float and pole wiper			
Slotted guide-pole/sample well, gasketed sliding cover, with float, pole sleeve, and pole wiper			
Slotted guide-pole/sample well, flexible enclosure			
Automatic gauge float well, unbolted cover, ungasketed	User Input	0	Typically 1
Automatic gauge float well, unbolted cover, gasketed			
Automatic gauge float well, bolted cover, gasketed	User Input	1	
Gauge-hatch/sample well, weighted mechanical actuation, gasketed	User Input	1	
Gauge-hatch/sample well, weighted mechanical actuation, ungasketed			

Sample pipe or well, slit fabric seal 10% open	User Input	0	Typically 1
Vacuum breaker, weighted mechanical actuation, ungasketed			
Vacuum breaker, weighted mechanical actuation, gasketed	User Input	0	Typically 1
Deck drain (3-in. diameter), open			
Deck drain (3-in. diameter), 90% closed			
Stub drain (1-in. diameter),			Typically 74 - for bolted decks, however, not used on welded contact internal floating decks.
Deck leg, IFR-type (total sleeve length approx. 12 inches), adjustable	User Input	0	Typically 30 deck legs
Deck leg, EFR-type (pontoon area of pontoon roofs; total sleeve length approx. 30 inches), adjustable - ungasketed	User Input	13	
Deck leg, EFR-type (pontoon area of pontoon roofs; total sleeve length approx. 30 inches), adjustable - gasketed			
Deck leg, EFR-type (pontoon area of pontoon roofs; total sleeve length approx. 30 inches), adjustable - sock			
Deck leg, EFR-type (double-deck roofs and center area of pontoon roofs, total sleeve length approx. 48 inches), adjustable - ungasketed	User Input	25	
Deck leg, EFR-type (double-deck roofs and center area of pontoon roofs, total sleeve length approx. 48 inches), adjustable - gasketed			
Deck leg, EFR-type (double-deck roofs and center area of pontoon roofs, total sleeve length approx. 48 inches), adjustable - sock			
Deck leg or hanger (no opening through deck), fixed			Typically 0
Rim vent, weighted mechanical actuation, gasketed	User Input	10	Typically 1 (mechanical-shoe seals only)
Rim vent, weighted mechanical actuation, ungasketed			
Ladder well sliding cover, ungasketed	User Input	0	Typically 1 - However, not used for self supporting roofs.
Ladder well sliding cover, gasketed	User Input	1	
Ladder-slotted guidepole combination well sliding cover, ungasketed			
Ladder sleeve, ungasketed sliding cover			
Ladder sleeve, gasketed sliding cover			

Roof Landing Loss Characteristics

Liquid Heel Information	Full	
Landed Roof height	6.5	ft
Height of liquid at tank shell	1.0	ft
Vertical distance from bottom of shell to liquid surface in cone-down bottom		ft
Tank cone bottom slope	0	ft/ft
Cone bottom height	0	ft
Effective height of stock liquid (h_{le})	1.0	ft
Hours roof was landed and tank standing idle (prior to cleaning/degassing) per event	24	hours
Refilling rate	157,500	gal/hr
Tank Cleaned prior to refilling?	Yes	
Is forced ventilation continuous (e.g., if continuous venting ceases overnight and occurs over multiple days, then no).	Yes	
Average ventilation rate during forced ventilation	1,000	ft^3/min
Duration of continued forced ventilation (per event)	1	days
Daily period of forced ventilation (per event)	3	hr/day
Vapor concentration during continued forced ventilation	10,000	ppm
Calibration gas molecular weight (if known - optional)		lb/lb-mole
Depth of sludge (optional)		inch

Number and Type of MSS Events

Type of Event	Landing Events	Filling Events	Cleaning/Degassing Events	Unit
Events per year	1	1	1	event
Events per month - January				event
Events per month - February				event
Events per month - March				event
Events per month - April				event
Events per month - May				event
Events per month - June				event
Events per month - July	1	1	1	event
Events per month - August				event
Events per month - September				event
Events per month - October				event
Events per month - November				event
Events per month - December				event

CT-1
Rough Rider Operating, LLC
Liquid Contents of Storage Tank

Chemical Category of Liquid	Petroleum_Liquid	
Single/Multiple	Single	
Chemical Subtype	Midcontinent Crude	
Vapor Pressure Calculation Method	Figure 7.1-16	
Chemical Name	Crude Oil	
Average Liquid Surface Temperature, T_{LA}	44.80	F
Vapor Pressure at Liquid Surface Temperature	6.96	psia
Liquid Molecular Weight	207.000	lb/lb-mole
Vapor Molecular Weight	50.000	lb/lb-mole
Liquid Density	7.10	lb./gal
RVP	11	

Results Summary - Crude Oil Routine Emissions

Month	Rim Seal Loss lb/month	Deck Fitting Loss lb/month	Deck Seam Loss lb/month	Withdrawal Loss lb/month	Total Losses lb/month	Vapor Pressure @ Daily Average Surface Temp	Average Liquid Surface Temp °F	Liquid Bulk Temp °F
January	7.39	17.90	0.00	196.61	221.90	3.58	11.36	10.86
February	7.91	19.15	0.00	177.58	204.64	4.14	18.80	17.95
March	11.72	28.39	0.00	196.61	236.72	5.24	31.63	30.19
April	16.32	39.53	0.00	190.27	246.12	6.88	47.22	45.15
May	22.15	53.62	0.00	196.61	272.38	8.26	58.24	55.77
June	27.88	67.51	0.00	190.27	285.66	9.64	67.98	65.28
July	36.09	87.39	0.00	196.61	320.09	10.80	75.36	72.46
August	34.08	82.52	0.00	196.61	313.21	10.51	73.58	71.14
September	23.07	55.86	0.00	190.27	269.19	8.65	61.07	59.30
October	16.14	39.08	0.00	196.61	251.82	6.67	45.37	44.27
November	10.70	25.90	0.00	190.27	226.87	5.01	29.06	28.46
December	8.27	20.03	0.00	196.61	224.91	3.95	16.31	15.89
Total Annual lb or avg parameter	221.72	536.87	0.00	2,314.91	3,073.51	6.96	44.80	43.20
Ozone Season lb or Ozone Season average param.	143.27	346.90	0.00	970.36	1,460.53	9.58	67.28	64.82
Ozone Season lb/day	0.94	2.27	0.00	6.34	9.55	-	-	-

Results Summary - Crude Oil MSS Emissions

Month	Standing Idle Loss lb/month	Filling Loss lb/month	Vapor Space Purge lb/month	Continued Forced Ventilation lb/month	Total Losses lb/month
January	0.00	0.00	0.00	0.00	0.00
February	0.00	0.00	0.00	0.00	0.00
March	0.00	0.00	0.00	0.00	0.00
April	0.00	0.00	0.00	0.00	0.00
May	0.00	0.00	0.00	0.00	0.00
June	0.00	0.00	0.00	0.00	0.00
July	580.23	520.97	2,083.87	192.28	3,377.36
August	0.00	0.00	0.00	0.00	0.00
September	0.00	0.00	0.00	0.00	0.00
October	0.00	0.00	0.00	0.00	0.00
November	0.00	0.00	0.00	0.00	0.00
December	0.00	0.00	0.00	0.00	0.00
Total Annual lb or avg parameter	580.23	520.97	2,083.87	192.28	3,377.36
Ozone Season lb or Ozone Season average param.	580.23	520.97	2,083.87	192.28	3,377.36
Ozone Season lb/day	3.79	3.41	13.62	1.26	22.07

Hourly Emissions	lb/hr	Vapor Pressure at Max Liquid Surface Temp psia	Maximum Liquid Bulk Temp °F
Crude Oil Routine	1.81	12.1	83
Crude Oil MSS	2083.87	-	-

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Crude Oil Tank (CT-2)

Table 7.a. - Crude Oil Tank Characteristics

Parameter	Value	Units
Tank Capacity	120,000	barrels
Control Efficiency	0%	%
Product Stored	Crude Oil	
Shell Height	48.00	ft
Tank Diameter	135.00	ft
Daily Throughput per Tank	15,000	barrels/day/tank
Annual Throughput per Tank	5,475,000	barrels/year/tank
Quantity	1	tank(s)
Total Estimated Working and Breathing Emissions [1]	1.77	ton/yr
Total Estimated Working and Breathing Emissions [2]	1.71	lb/hr

[1] Working and breathing emissions are calculated in a separate spreadsheet.

[2] Maximum hourly tank emissions are based on TCEQ Guidance document APDG 6419 - Short Term Emissions Rates from Floating Roof Storage Tanks dated February 2020. AP-42 methodologies are not appropriate to use to determine emission rates at timescales less than monthly.

Table 7.b. - Crude Oil Tank Emissions

Parameter	Weight % of Losses, tpy [1]	Uncontrolled		Controlled	
		Emissions per Tank, lb/hr [1]	Emissions per Tank, tpy [1]	Emissions per Tank, lb/hr [1]	Emissions per Tank, tpy [1]
VOC [2]	100%	1.71	1.77	1.71	1.77
Total CO_2e [3]	0.00%	0.00	0.00	0.00	0.00
CH_4 (Methane)	0.00%	0.00	0.00	0.00	0.00
CO_2	0.00%	0.00	0.00	0.00	0.00
Total HAPs	2.90%	0.05	0.05	0.05	0.05
Benzene	0.25%	4.28E-03	4.44E-03	4.28E-03	4.44E-03
Toluene	0.48%	0.01	0.01	0.01	0.01
Ethylbenzene	0.12%	2.05E-03	2.13E-03	2.05E-03	2.13E-03
Xylene	0.55%	0.01	0.01	0.01	0.01
n-C6 (n-Hexane)	1.50%	0.03	0.03	0.03	0.03
2,2,4-Trimethylpentane	0.00%	0.00	0.00	0.00	0.00
H_2S	0.00%	0.00	0.00	0.00	0.00

[1] Speciated HAP emissions were estimated using the HAP composition of crude oil from EPA Document (EPA-453/R-94-079a), National Emission Standards for Hazardous Air Pollutants for Source Categories: Oil and Natural Gas Production and Natural Gas Transmission and Storage - Background Information for Proposed Standards, Table 2-1 (Average HAP Composition of Extracted Streams and Recovered Products).

[2] Non-methane, non-ethane VOC emissions.

[3] GHG emissions are assumed to be negligible since the crude oil has undergone 3-phase separation prior to receipt by truck or pipeline.

CT-2
Rough Rider Operating, LLC
Tank Indentification and Physical Characteristics

Identification

Identification No.	CT-2
Description	120,000 bbl Crude Tank
State	North Dakota
City	Watford City
Nearest Major City	Williston, ND
Company	Rough Rider Operating, LLC

Physical Characteristics - Tank Characteristics

Diameter	135 ft	
Tank Shell Height (optional)	48 ft	
Tank Volume	5,040,000 gal	
Maximum Pump Rate	157,500 gal/hr	
Worst Case Liquid Surface Temp	83 °F	
Net Throughput	229,950,000 gal/yr	
Net Throughput January	19,530,000 gal/mo	
Net Throughput February	17,640,000 gal/mo	
Net Throughput March	19,530,000 gal/mo	
Net Throughput April	18,900,000 gal/mo	
Net Throughput May	19,530,000 gal/mo	
Net Throughput June	18,900,000 gal/mo	
Net Throughput July	19,530,000 gal/mo	
Net Throughput August	19,530,000 gal/mo	
Net Throughput September	18,900,000 gal/mo	
Net Throughput October	19,530,000 gal/mo	
Net Throughput November	18,900,000 gal/mo	
Net Throughput December	19,530,000 gal/mo	
Self Supporting Roof?	No	
Number of Columns	8	Typically 8 columns
Efective Column Diameter	1	
Internal Shell Condition	Light Rust	
Paint Color/Shade	Beige	
Paint Condition	Average	

Physical Characteristics - Tank Construction and Rim-Seal System

Fitting Seals	Average
Tank Construction	Welded
Primary Seal	Mechanical-shoe seal
Secondary Seal	Rim-mounted secondary

Physical Characteristics - Deck Characteristics

Deck Type	Welded
Length of Deck Seams (optional)	

Fittings

Fitting Type	Typical (Table 7.1-12)	User Input	Internal Floating Roof - Table 7.1-12 Notes
Access hatch, bolted cover, gasketed	User Input	1	
Access hatch, unbolted cover, ungasketed	User Input	0	Typically 1
Access hatch, unbolted cover, gasketed			
Fixed roof support column well, round pipe, ungasketed sliding cover			
Fixed roof support column well, round pipe, gasketed sliding cover			
Fixed roof support column well, round pipe, flexible fabric sleeve seal			
Fixed roof support column well, built-up col.-sliding cover, ungasketed	User Input	0	Typically 8 column wells. However, column and ladder wells are not typically used with self-supporting roofs
Fixed roof support column well, built-up col.-sliding cover, gasketed	User Input	8	
Unslotted guide-pole well, ungasketed sliding cover			
Unslotted guide-pole well, ungasketed sliding cover w/pole sleeve			
Unslotted guide-pole well, gasketed sliding cover			
Unslotted guide-pole well, gasketed sliding cover w/pole wiper			
Unslotted guide-pole well, gasketed sliding cover w/pole sleeve			
Slotted guide-pole/sample well, ungasketed or gasketed sliding cover			
Slotted guide-pole/sample well, ungasketed or gasketed sliding cover, with float			
Slotted guide-pole/sample well, gasketed sliding cover, with pole wiper			
Slotted guide-pole/sample well, gasketed sliding cover, with pole sleeve			
Slotted guide-pole/sample well, gasketed sliding cover, with pole sleeve and pole wiper			
Slotted guide-pole/sample well, gasketed sliding cover, with float and pole wiper			
Slotted guide-pole/sample well, gasketed sliding cover, with float, pole sleeve, and pole wiper			
Slotted guide-pole/sample well, flexible enclosure			
Automatic gauge float well, unbolted cover, ungasketed	User Input	0	Typically 1
Automatic gauge float well, unbolted cover, gasketed			
Automatic gauge float well, bolted cover, gasketed	User Input	1	
Gauge-hatch/sample well, weighted mechanical actuation, gasketed	User Input	1	
Gauge-hatch/sample well, weighted mechanical actuation, ungasketed			

Sample pipe or well, slit fabric seal 10% open	1		Typically 1
Vacuum breaker, weighted mechanical actuation, ungasketed			
Vacuum breaker, weighted mechanical actuation, gasketed	User Input	0	Typically 1
Deck drain (3-in. diameter), open			
Deck drain (3-in. diameter), 90% closed			
Stub drain (1-in. diameter),			Typically 146 - for bolted decks, however, not used on welded contact internal floating decks.
Deck leg, IFR-type (total sleeve length approx. 12 inches), adjustable	User Input	0	Typically 49 deck legs
Deck leg, EFR-type (pontoon area of pontoon roofs; total sleeve length approx. 30 inches), adjustable - ungasketed	User Input	13	
Deck leg, EFR-type (pontoon area of pontoon roofs; total sleeve length approx. 30 inches), adjustable - gasketed			
Deck leg, EFR-type (pontoon area of pontoon roofs; total sleeve length approx. 30 inches), adjustable - sock			
Deck leg, EFR-type (double-deck roofs and center area of pontoon roofs, total sleeve length approx. 48 inches), adjustable - ungasketed	User Input	25	
Deck leg, EFR-type (double-deck roofs and center area of pontoon roofs, total sleeve length approx. 48 inches), adjustable - gasketed			
Deck leg, EFR-type (double-deck roofs and center area of pontoon roofs, total sleeve length approx. 48 inches), adjustable - sock			
Deck leg or hanger (no opening through deck), fixed			Typically 0
Rim vent, weighted mechanical actuation, gasketed	User Input	10	Typically 1 (mechanical-shoe seals only)
Rim vent, weighted mechanical actuation, ungasketed			
Ladder well sliding cover, ungasketed	User Input	0	Typically 1 - However, not used for self supporting roofs.
Ladder well sliding cover, gasketed	User Input	1	
Ladder-slotted guidepole combination well sliding cover, ungasketed			
Ladder sleeve, ungasketed sliding cover			
Ladder sleeve, gasketed sliding cover			

Roof Landing Loss Characteristics

Liquid Heel Information	Full	
Landed Roof height	6.5	ft
Height of liquid at tank shell	1.0	ft
Vertical distance from bottom of shell to liquid surface in cone-down bottom		ft
Tank cone bottom slope	0	ft/ft
Cone bottom height	0	ft
Effective height of stock liquid (h_{le})	1.0	ft
Hours roof was landed and tank standing idle (prior to cleaning/degassing) per event	24	hours
Refilling rate	157,500	gal/hr
Tank Cleaned prior to refilling?	Yes	
Is forced ventilation continuous (e.g., if continuous venting ceases overnight and occurs over multiple days, then no).	Yes	
Average ventilation rate during forced ventilation	1,000	ft^3/min
Duration of continued forced ventilation (per event)	1	days
Daily period of forced ventilation (per event)	5	hr/day
Vapor concentration during continued forced ventilation	10,000	ppm
Calibration gas molecular weight (if known - optional)		lb/lb-mole
Depth of sludge (optional)		inch

Number and Type of MSS Events

Type of Event	Landing Events	Filling Events	Cleaning/Degassing Events	Unit
Events per year	1	1	1	event
Events per month - January				event
Events per month - February				event
Events per month - March				event
Events per month - April				event
Events per month - May				event
Events per month - June				event
Events per month - July	1	1	1	event
Events per month - August				event
Events per month - September				event
Events per month - October				event
Events per month - November				event
Events per month - December				event

CT-2
Rough Rider Operating, LLC
Liquid Contents of Storage Tank

Chemical Category of Liquid	Petroleum_Liquid	
Single/Multiple	Single	
Chemical Subtype	Midcontinent Crude	
Vapor Pressure Calculation Method	Figure 7.1-16	
Chemical Name	Crude Oil	
Average Liquid Surface Temperature, T_{LA}	44.92	F
Vapor Pressure at Liquid Surface Temperature	6.98	psia
Liquid Molecular Weight	207.000	lb/lb-mole
Vapor Molecular Weight	50.000	lb/lb-mole
Liquid Density	7.10	lb./gal
RVP	11	

Results Summary - Crude Oil Routine Emissions

Month	Rim Seal Loss lb/month	Deck Fitting Loss lb/month	Deck Seam Loss lb/month	Withdrawal Loss lb/month	Total Losses lb/month	Vapor Pressure @ Daily Average Surface Temp	Average Liquid Surface Temp °F	Liquid Bulk Temp °F
January	10.40	50.15	0.00	146.57	207.13	3.59	11.40	10.86
February	11.14	53.68	0.00	132.39	197.20	4.14	18.86	17.95
March	16.53	79.66	0.00	146.57	242.76	5.25	31.73	30.19
April	23.04	111.06	0.00	141.84	275.94	6.90	47.37	45.15
May	31.29	150.82	0.00	146.57	328.68	8.28	58.42	55.77
June	39.43	190.07	0.00	141.84	371.35	9.67	68.18	65.28
July	51.11	246.36	0.00	146.57	444.03	10.84	75.57	72.46
August	48.19	232.33	0.00	146.57	427.09	10.54	73.76	71.14
September	32.55	156.91	0.00	141.84	331.30	8.66	61.19	59.30
October	22.74	109.60	0.00	146.57	278.91	6.68	45.45	44.27
November	15.06	72.59	0.00	141.84	229.49	5.01	29.10	28.46
December	11.64	56.12	0.00	146.57	214.33	3.95	16.34	15.89
Total Annual lb or avg parameter	313.11	1,509.36	0.00	1,725.73	3,548.20	6.98	44.92	43.20
Ozone Season lb or Ozone Season average param.	202.57	976.49	0.00	723.39	1,902.44	9.61	67.46	64.82
Ozone Season lb/day	1.32	6.38	0.00	4.73	12.43	-	-	-

Results Summary - Crude Oil MSS Emissions

Month	Standing Idle Loss lb/month	Filling Loss lb/month	Vapor Space Purge lb/month	Continued Forced Ventilation lb/month	Total Losses lb/month
January	0.00	0.00	0.00	0.00	0.00
February	0.00	0.00	0.00	0.00	0.00
March	0.00	0.00	0.00	0.00	0.00
April	0.00	0.00	0.00	0.00	0.00
May	0.00	0.00	0.00	0.00	0.00
June	0.00	0.00	0.00	0.00	0.00
July	1,147.43	1,030.24	4,120.94	380.25	6,678.85
August	0.00	0.00	0.00	0.00	0.00
September	0.00	0.00	0.00	0.00	0.00
October	0.00	0.00	0.00	0.00	0.00
November	0.00	0.00	0.00	0.00	0.00
December	0.00	0.00	0.00	0.00	0.00
Total Annual lb or avg parameter	1,147.43	1,030.24	4,120.94	380.25	6,678.85
Ozone Season lb or Ozone Season average param.	1,147.43	1,030.24	4,120.94	380.25	6,678.85
Ozone Season lb/day	7.50	6.73	26.93	2.49	43.65

Hourly Emissions	lb/hr	Vapor Pressure at Max Liquid Surface Temp psia	Maximum Liquid Bulk Temp °F
Crude Oil Routine	1.71	12.1	83
Crude Oil MSS	4120.94	-	-

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Crude Oil Tank (CT-3)

Table 8.a. - Crude Oil Tank Characteristics

Parameter	Value	Units
Tank Capacity	60,000	barrels
Control Efficiency	0%	%
Product Stored	Crude Oil	
Shell Height	48.00	ft
Tank Diameter	96.00	ft
Daily Throughput per Tank	20,000	barrels/day/tank
Annual Throughput per Tank	7,300,000	barrels/year/tank
Quantity	1	tank(s)
Total Estimated Working and Breathing Emissions [1]	1.92	ton/yr
Total Estimated Working and Breathing Emissions [2]	2.33	lb/hr

[1] Working and breathing emissions are calculated in a separate spreadsheet.

[2] Maximum hourly tank emissions are based on TCEQ Guidance document APDG 6419 - Short Term Emissions Rates from Floating Roof Storage Tanks dated February 2020. AP-42 methodologies are not appropriate to use to determine emission rates at timescales less than monthly.

Table 8.b. - Crude Oil Tank Emissions

Parameter	Weight % of Losses, tpy [1]	Uncontrolled		Controlled	
		Emissions per Tank, lb/hr [1]	Emissions per Tank, tpy [1]	Emissions per Tank, lb/hr [1]	Emissions per Tank, tpy [1]
VOC [2]	100%	2.33	1.92	2.33	1.92
Total CO_2e [3]	0.00%	0.00	0.00	0.00	0.00
CH_4 (Methane)	0.00%	0.00	0.00	0.00	0.00
CO_2	0.00%	0.00	0.00	0.00	0.00
Total HAPs	2.90%	0.07	0.06	0.07	0.06
Benzene	0.25%	0.01	4.81E-03	0.01	4.81E-03
Toluene	0.48%	0.01	0.01	0.01	0.01
Ethylbenzene	0.12%	2.80E-03	2.31E-03	2.80E-03	2.31E-03
Xylene	0.55%	0.01	0.01	0.01	0.01
n-C6 (n-Hexane)	1.50%	0.03	0.03	0.03	0.03
2,2,4-Trimethylpentane	0.00%	0.00	0.00	0.00	0.00
H_2S	0.00%	0.00	0.00	0.00	0.00

[1] Speciated HAP emissions were estimated using the HAP composition of crude oil from EPA Document (EPA-453/R-94-079a), National Emission Standards for Hazardous Air Pollutants for Source Categories: Oil and Natural Gas Production and Natural Gas Transmission and Storage - Background Information for Proposed Standards, Table 2-1 (Average HAP Composition of Extracted Streams and Recovered Products).

[2] Non-methane, non-ethane VOC emissions.

[3] GHG emissions are assumed to be negligible since the crude oil has undergone 3-phase separation prior to receipt by truck or pipeline.

CT-3
Rough Rider Operating, LLC
Tank Indentification and Physical Characteristics

Identification

Identification No.	CT-3
Description	60,000 bbl Crude Tank
State	North Dakota
City	Watford City
Nearest Major City	Williston, ND
Company	Rough Rider Operating, LLC

Physical Characteristics - Tank Characteristics

Diameter	96	ft
Tank Shell Height (optional)	48	ft
Tank Volume	2,520,000	gal
Maximum Pump Rate	210,000	gal/hr
Worst Case Liquid Surface Temp	83	°F
Net Throughput	306,600,000	gal/yr
Net Throughput January	26,040,000	gal/mo
Net Throughput February	23,520,000	gal/mo
Net Throughput March	26,040,000	gal/mo
Net Throughput April	25,200,000	gal/mo
Net Throughput May	26,040,000	gal/mo
Net Throughput June	25,200,000	gal/mo
Net Throughput July	26,040,000	gal/mo
Net Throughput August	26,040,000	gal/mo
Net Throughput September	25,200,000	gal/mo
Net Throughput October	26,040,000	gal/mo
Net Throughput November	25,200,000	gal/mo
Net Throughput December	26,040,000	gal/mo
Self Supporting Roof?	No	
Number of Columns	1	Typically 6 columns
Efective Column Diameter	1	
Internal Shell Condition	Light Rust	
Paint Color/Shade	Beige	
Paint Condition	Average	

Physical Characteristics - Tank Construction and Rim-Seal System

Fitting Seals	Average
Tank Construction	Welded
Primary Seal	Mechanical-shoe seal
Secondary Seal	Rim-mounted secondary

Physical Characteristics - Deck Characteristics

Deck Type	Welded
Length of Deck Seams (optional)	

Fittings

Fitting Type	Typical (Table 7.1-12)	User Input	Internal Floating Roof - Table 7.1-12 Notes
Access hatch, bolted cover, gasketed	User Input	1	
Access hatch, unbolted cover, ungasketed	User Input	0	Typically 1
Access hatch, unbolted cover, gasketed			
Fixed roof support column well, round pipe, ungasketed sliding cover			
Fixed roof support column well, round pipe, gasketed sliding cover	User Input	1	
Fixed roof support column well, round pipe, flexible fabric sleeve seal			
Fixed roof support column well, built-up col.-sliding cover, ungasketed	User Input	0	Typically 6 column wells. However, column and ladder wells are not typically used with self-supporting roofs
Fixed roof support column well, built-up col.-sliding cover, gasketed			
Unslotted guide-pole well, ungasketed sliding cover			
Unslotted guide-pole well, ungasketed sliding cover w/pole sleeve			
Unslotted guide-pole well, gasketed sliding cover			
Unslotted guide-pole well, gasketed sliding cover w/pole wiper			
Unslotted guide-pole well, gasketed sliding cover w/pole sleeve			
Slotted guide-pole/sample well, ungasketed or gasketed sliding cover			
Slotted guide-pole/sample well, ungasketed or gasketed sliding cover, with float			
Slotted guide-pole/sample well, gasketed sliding cover, with pole wiper			
Slotted guide-pole/sample well, gasketed sliding cover, with pole sleeve			
Slotted guide-pole/sample well, gasketed sliding cover, with pole sleeve and pole wiper			
Slotted guide-pole/sample well, gasketed sliding cover, with float and pole wiper			
Slotted guide-pole/sample well, gasketed sliding cover, with float, pole sleeve, and pole wiper			
Slotted guide-pole/sample well, flexible enclosure			
Automatic gauge float well, unbolted cover, ungasketed	User Input	0	Typically 1
Automatic gauge float well, unbolted cover, gasketed			
Automatic gauge float well, bolted cover, gasketed	User Input	1	
Gauge-hatch/sample well, weighted mechanical actuation, gasketed	User Input	1	
Gauge-hatch/sample well, weighted mechanical actuation, ungasketed			

Sample pipe or well, slit fabric seal 10% open	User Input	0	Typically 1
Vacuum breaker, weighted mechanical actuation, ungasketed			
Vacuum breaker, weighted mechanical actuation, gasketed	User Input	0	Typically 1
Deck drain (3-in. diameter), open			
Deck drain (3-in. diameter), 90% closed			
Stub drain (1-in. diameter),			Typically 74 - for bolted decks, however, not used on welded contact internal floating decks.
Deck leg, IFR-type (total sleeve length approx. 12 inches), adjustable	User Input	0	Typically 30 deck legs
Deck leg, EFR-type (pontoon area of pontoon roofs; total sleeve length approx. 30 inches), adjustable - ungasketed	User Input	13	
Deck leg, EFR-type (pontoon area of pontoon roofs; total sleeve length approx. 30 inches), adjustable - gasketed			
Deck leg, EFR-type (pontoon area of pontoon roofs; total sleeve length approx. 30 inches), adjustable - sock			
Deck leg, EFR-type (double-deck roofs and center area of pontoon roofs, total sleeve length approx. 48 inches), adjustable - ungasketed	User Input	25	
Deck leg, EFR-type (double-deck roofs and center area of pontoon roofs, total sleeve length approx. 48 inches), adjustable - gasketed			
Deck leg, EFR-type (double-deck roofs and center area of pontoon roofs, total sleeve length approx. 48 inches), adjustable - sock			
Deck leg or hanger (no opening through deck), fixed			Typically 0
Rim vent, weighted mechanical actuation, gasketed	User Input	10	Typically 1 (mechanical-shoe seals only)
Rim vent, weighted mechanical actuation, ungasketed			
Ladder well sliding cover, ungasketed	User Input	0	Typically 1 - However, not used for self supporting roofs.
Ladder well sliding cover, gasketed	User Input	1	
Ladder-slotted guidepole combination well sliding cover, ungasketed			
Ladder sleeve, ungasketed sliding cover			
Ladder sleeve, gasketed sliding cover			

Roof Landing Loss Characteristics

Liquid Heel Information	Full	
Landed Roof height	6.5	ft
Height of liquid at tank shell	1.0	ft
Vertical distance from bottom of shell to liquid surface in cone-down bottom		ft
Tank cone bottom slope	0	ft/ft
Cone bottom height	0	ft
Effective height of stock liquid (h_{le})	1.0	ft
Hours roof was landed and tank standing idle (prior to cleaning/degassing) per event	24	hours
Refilling rate	210,000	gal/hr
Tank Cleaned prior to refilling?	Yes	
Is forced ventilation continuous (e.g., if continuous venting ceases overnight and occurs over multiple days, then no).	Yes	
Average ventilation rate during forced ventilation	1,000	ft^3/min
Duration of continued forced ventilation (per event)	1	days
Daily period of forced ventilation (per event)	3	hr/day
Vapor concentration during continued forced ventilation	10,000	ppm
Calibration gas molecular weight (if known - optional)		lb/lb-mole
Depth of sludge (optional)		inch

Number and Type of MSS Events

Type of Event	Landing Events	Filling Events	Cleaning/Degassing Events	Unit
Events per year	1	1	1	event
Events per month - January				event
Events per month - February				event
Events per month - March				event
Events per month - April				event
Events per month - May				event
Events per month - June				event
Events per month - July	1	1	1	event
Events per month - August				event
Events per month - September				event
Events per month - October				event
Events per month - November				event
Events per month - December				event

CT-3
Rough Rider Operating, LLC
Liquid Contents of Storage Tank

Chemical Category of Liquid	Petroleum_Liquid	
Single/Multiple	Single	
Chemical Subtype	Midcontinent Crude	
Vapor Pressure Calculation Method	Figure 7.1-16	
Chemical Name	Crude Oil	
Average Liquid Surface Temperature, T_{LA}	44.80	F
Vapor Pressure at Liquid Surface Temperature	6.96	psia
Liquid Molecular Weight	207.000	lb/lb-mole
Vapor Molecular Weight	50.000	lb/lb-mole
Liquid Density	7.10	lb./gal
RVP	11	

Results Summary - Crude Oil Routine Emissions

Month	Rim Seal Loss lb/month	Deck Fitting Loss lb/month	Deck Seam Loss lb/month	Withdrawal Loss lb/month	Total Losses lb/month	Vapor Pressure @ Daily Average Surface Temp	Average Liquid Surface Temp °F	Liquid Bulk Temp °F
January	7.39	17.90	0.00	262.15	287.44	3.58	11.36	10.86
February	7.91	19.15	0.00	236.78	263.83	4.14	18.80	17.95
March	11.72	28.39	0.00	262.15	302.26	5.24	31.63	30.19
April	16.32	39.53	0.00	253.69	309.54	6.88	47.22	45.15
May	22.15	53.62	0.00	262.15	337.92	8.26	58.24	55.77
June	27.88	67.51	0.00	253.69	349.08	9.64	67.98	65.28
July	36.09	87.39	0.00	262.15	385.63	10.80	75.36	72.46
August	34.08	82.52	0.00	262.15	378.75	10.51	73.58	71.14
September	23.07	55.86	0.00	253.69	332.61	8.65	61.07	59.30
October	16.14	39.08	0.00	262.15	317.36	6.67	45.37	44.27
November	10.70	25.90	0.00	253.69	290.29	5.01	29.06	28.46
December	8.27	20.03	0.00	262.15	290.45	3.95	16.31	15.89
Total Annual lb or avg parameter	221.72	536.87	0.00	3,086.55	3,845.15	6.96	44.80	43.20
Ozone Season lb or Ozone Season average param.	143.27	346.90	0.00	1,293.81	1,783.99	9.58	67.28	64.82
Ozone Season lb/day	0.94	2.27	0.00	8.46	11.66	-	-	-

Results Summary - Crude Oil MSS Emissions

Month	Standing Idle Loss lb/month	Filling Loss lb/month	Vapor Space Purge lb/month	Continued Forced Ventilation lb/month	Total Losses lb/month
January	0.00	0.00	0.00	0.00	0.00
February	0.00	0.00	0.00	0.00	0.00
March	0.00	0.00	0.00	0.00	0.00
April	0.00	0.00	0.00	0.00	0.00
May	0.00	0.00	0.00	0.00	0.00
June	0.00	0.00	0.00	0.00	0.00
July	580.23	520.97	2,083.87	192.28	3,377.36
August	0.00	0.00	0.00	0.00	0.00
September	0.00	0.00	0.00	0.00	0.00
October	0.00	0.00	0.00	0.00	0.00
November	0.00	0.00	0.00	0.00	0.00
December	0.00	0.00	0.00	0.00	0.00
Total Annual lb or avg parameter	580.23	520.97	2,083.87	192.28	3,377.36
Ozone Season lb or Ozone Season average param.	580.23	520.97	2,083.87	192.28	3,377.36
Ozone Season lb/day	3.79	3.41	13.62	1.26	22.07

Hourly Emissions	lb/hr	Vapor Pressure at Max Liquid Surface Temp psia	Maximum Liquid Bulk Temp °F
Crude Oil Routine	2.33	12.1	83
Crude Oil MSS	2083.87	-	-

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
LACT Crude Oil Tanks (STC-1 — STC-6)

Table 9.a. - LACT Crude Oil Tank Characteristics

Parameter	Value	Units
Tank Capacity	1,000	barrels
Maximum Liquid Height	29.00	ft
Control Efficiency [1]	98%	%
Tank Working Capacity	40,934	gallons
Product Stored [2]	Crude Oil	
Shell Height	30.00	ft
Tank Diameter	15.50	ft
Daily Throughput per Tank	2,500	barrels/day/tank
Annual Throughput per Tank	912,500	barrels/year/tank
Quantity	6	tank(s)
Total Estimated Working and Breathing Emissions (per Tank) [2]	22.55	ton/yr
Total Estimated Working and Breathing Emissions (per Tank) [2, 3]	517.15	lb/hr

[1] Combustor EC-2 is being permitted as the primary emission control device for these tanks.

[2] Working and breathing emissions are calculated in a separate spreadsheet.

[3] Maximum hourly tank emissions are based on TCEQ Guidance document APDG 6419 - Short Term Emissions Rates from Floating Roof Storage Tanks dated February 2020. AP-42 methodologies are not appropriate to use to determine emission rates at timescales less than monthly.

Table 9.b. - LACT Crude Oil Tank Emissions

Parameter	Weight Percent of Losses, tpy [1]	Uncontrolled				Controlled			
		Emissions per Tank, lb/hr [1]	Emissions per Tank, tpy [1]	Total Emissions, lb/hr [1]	Total Emissions, tpy [1]	Emissions per Tank, lb/hr [1]	Emissions per Tank, tpy [1]	Total Emissions, lb/hr [1]	Total Emissions, tpy [1]
VOC [2]	100%	517.15	22.55	3,102.90	135.31	10.34	0.45	62.06	2.71
Total CO_2e [3]	0.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH_4 (Methane)	0.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	0.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total HAPs	2.90%	15.00	0.65	89.98	3.92	0.30	0.01	1.80	0.08
Benzene	0.25%	1.29	0.06	7.76	0.34	0.03	1.13E-03	0.16	0.01
Toluene	0.48%	2.48	0.11	14.89	0.65	0.05	2.17E-03	0.30	0.01
Ethylbenzene	0.12%	0.62	0.03	3.72	0.16	0.01	5.41E-04	0.07	3.25E-03
Xylene	0.55%	2.84	0.12	17.07	0.74	0.06	2.48E-03	0.34	0.01
n-C6 (n-Hexane)	1.50%	7.76	0.34	46.54	2.03	0.16	0.01	0.93	0.04
2,2,4-Trimethylpentane	0.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H_2S	0.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

[1] Speciated HAP emissions were estimated using the HAP composition of crude oil from EPA Document (EPA-453/R-94-079a), National Emission Standards for Hazardous Air Pollutants for Source Categories: Oil and Natural Gas Production and Natural Gas Transmission and Storage - Background Information for Proposed Standards, Table 2-1 (Average HAP Composition of Extracted Streams and Recovered Products).

[2] Non-methane, non-ethane VOC emissions.

[3] GHG emissions are assumed to be negligable since the crude oil has undergone 3-phase separation prior to receipt by truck or pipeline.

Table 9.c. - LACT Crude Oil Tank Emissions Data

Parameter	Value
Stream	W&S Gas
Heating Value (Btu/scf) [1]	4,128
Vapor Molecular Weight [1]	75.28
Uncontrolled Annual VOC Emissions per Tank (tpy)	22.55
Uncontrolled Annual VOC Emissions for All Stabilized Crude Oil Tanks (tpy)	135.31
Uncontrolled Hourly VOC Emissions per Tank (lb/hr)	517.15
Uncontrolled Hourly VOC Emissions for All Stabilized Crude Oil Tanks (lb/hr)	3,102.90
Annual Volume of Vapor Sent to Combustor for All Tanks [2] (Mscf/yr)	1,337.00
Maximum Hourly Volume of Vapor Sent to Combustor for All Tanks [3] (Mscf/hr)	15.33

[1] Heating Value and Vapor Molecular Weight obtained from an E&P Tanks run based on a sample of condensate received by truck.

[2] Annual Volume of Vapor Emitted (Mscf/yr) = $\frac{\text{Annual Emissions (tpy)} * 2000 \text{ (lb/ton)} * \text{Density of Natural Gas (379.5 scf/lb-mol)} * \text{Control Efficiency}}{\text{Vapor Molecular Weight (lb/lb-mol)} * (1000 \text{ scf/Mscf})}$

[3] Maximum Hourly Volume of Vapor Emitted (Mscf/yr) = $\frac{\text{Hourly Emissions (lb/hr)} * \text{Density of Natural Gas (379.5 scf/lb-mol)} * \text{Control Efficiency}}{\text{Vapor Molecular Weight (lb/lb-mol)} * (1000 \text{ scf/Mscf})}$

STC-1 - STC-6 (each Tank)
Rough Rider Operating, LLC
Tank Indentification and Physical Characteristics

Identification

Identification No.	STC-1 - STC-6 (each Tank)
Description	1,000 bbl crude oil stock tanks
State	North Dakota
City	Watford City
Nearest Major City	Williston, ND
Company	Rough Rider Operating, LLC

Physical Characteristics - Tank Characteristics

Diameter	15.5	ft		
Shell Length/Height	30	ft		
Maximum Liquid height	29	ft		
Avg. Liquid height	15	ft		
Minimum Liquid height	1	ft		
Tank Volume	42,000	gal		
Maximum short-term filling rate	42,000	gal/hr		
Worst Case liquid Surface Temp	83	°F		
Net annual throughput	38,325,000	gal/yr		
Net Throughput January	3,255,000	gal/mo	**Turnovers**	82.35
Net Throughput February	2,940,000	gal/mo	**Turnovers**	74.38
Net Throughput March	3,255,000	gal/mo	**Turnovers**	82.35
Net Throughput April	3,150,000	gal/mo	**Turnovers**	79.69
Net Throughput May	3,255,000	gal/mo	**Turnovers**	82.35
Net Throughput June	3,150,000	gal/mo	**Turnovers**	79.69
Net Throughput July	3,255,000	gal/mo	**Turnovers**	82.35
Net Throughput August	3,255,000	gal/mo	**Turnovers**	82.35
Net Throughput September	3,150,000	gal/mo	**Turnovers**	79.69
Net Throughput October	3,255,000	gal/mo	**Turnovers**	82.35
Net Throughput November	3,150,000	gal/mo	**Turnovers**	79.69
Net Throughput December	3,255,000	gal/mo	**Turnovers**	82.35
Tank Type	Vertical			
Paint Color/Shade	Beige			
Paint Condition	Average			

Physical Characteristics - Roof Characteristics

Roof Type	Dome

Breather vent pressure setting	0.03	psia
Breather vent vacuum setting	-0.03	psia
Tank has Flash?	N	DO NOT LEAVE BLANK

STC-1 - STC-6 (each Tank)
Rough Rider Operating, LLC
Liquid Contents of Storage Tank

Chemical Category of Liquid	Petroleum_Liquid	
Single/Multiple		
Chemical subtype	Midcontinent Crude	
Vapor Pressure Calculation Method	Figure 7.1-16	
Chemical Name	Crude Oil	
Average Liquid Surface Temperature, T_{LA}	45.11	F
Vapor Pressure at Liquid Surface Temperature	6.122	psia
Liquid Molecular Weight Default	207.000	lb/lb-mole
Vapor Molecular Weight Default	50.000	lb/lb-mole
Liquid Density Default	7.10	lb./gal
Liquid Molecular Weight User Input		lb/lb-mole
Vapor Molecular Weight User Input		lb/lb-mole
Liquid Density User Input		lb./gal
RVP	10	

Mixture Properties

Compound	Mole Fraction	A	B	C	Mi	M_L

Results Summary - Crude Oil Emissions

Month	Standing lb/month	Working lb/month	Total lb/month	Vapor Pressure @ Daily Average Surface Temp	Average Liquid Surface Temp °F	Liquid Bulk Temp °F
January	62.90	1961.49	2024.39	3.08	11.45	10.86
February	72.02	2021.63	2093.65	3.57	18.96	17.95
March	124.53	2782.01	2906.54	4.56	31.90	30.19
April	211.22	3451.77	3662.99	6.05	47.61	45.15
May	311.30	4210.04	4521.34	7.30	58.70	55.77
June	414.29	4688.70	5102.99	8.56	68.49	65.28
July	613.23	5368.77	5982.00	9.62	75.90	72.46
August	540.26	5237.37	5777.62	9.34	74.04	71.14
September	298.43	4243.45	4541.88	7.63	61.40	59.30
October	161.87	3462.74	3624.61	5.84	45.57	44.27
November	83.80	2577.90	2661.70	4.34	29.17	28.46
December	63.48	2141.68	2205.15	3.40	16.39	15.89
Total Annual lb or avg parameter	2957.31	42147.56	45104.87	6.12	45.11	43.20
Ozone Season lb or Ozone Season average param.	2177.50	23748.33	25925.83	8.50	67.74	64.82
Ozone Season lb/day	14.23	155.22	169.45	-	-	-

Worst Case Hourly Emissions	lb/hr
Crude Oil	517.15

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Methanol Tank (MT-1)

Table 10.a. - Methanol Tank Characteristics

Parameter	Value	Units
Tank Capacity	12	barrels
Maximum Liquid Height	6.00	ft
Tank Working Capacity	652	gallons
Product Stored	Methanol	
Shell Height	6.00	ft
Tank Diameter	4.30	ft
Daily Throughput per Tank	0.39	barrels/day/tank
Annual Throughput per Tank	143	barrels/year/tank
Quantity	1	tank(s)

Table 10.b. - Methanol Storage Tank Emissions

Parameter	Weight Fraction of Working & Breathing Losses, tpy [1]	Uncontrolled	
		Total Emissions per Tank, lb/hr [2]	Working & Breathing Emissions per Tank, tpy [1]
VOC	1.00	1.46	0.01

[1] Working and breathing emissions are calculated in a separate spreadsheet. HAP and GHG emissions are assumed to be negligible.

MT-1
Rough Rider Operating, LLC
Tank Indentification and Physical Characteristics

Identification

Identification No.	MT-1
Description	500 gallon methanol tank
State	North Dakota
City	Watford City
Nearest Major City	Williston, ND
Company	Rough Rider Operating, LLC

Physical Characteristics - Tank Characteristics

Diameter	4.3	ft		
Shell Length/Height	6	ft		
Maximum Liquid height	3.4	ft		
Avg. Liquid height	2.2	ft		
Minimum Liquid height	0	ft		
Tank Volume	500	gal		
Maximum short-term filling rate	500	gal/hr		
Worst Case liquid Surface Temp	95	°F		
Net annual throughput	6,000	gal/yr		
Net Throughput January	510	gal/mo	**Turnovers**	0.78
Net Throughput February	460	gal/mo	**Turnovers**	0.70
Net Throughput March	510	gal/mo	**Turnovers**	0.78
Net Throughput April	493	gal/mo	**Turnovers**	0.75
Net Throughput May	510	gal/mo	**Turnovers**	0.78
Net Throughput June	493	gal/mo	**Turnovers**	0.75
Net Throughput July	510	gal/mo	**Turnovers**	0.78
Net Throughput August	510	gal/mo	**Turnovers**	0.78
Net Throughput September	493	gal/mo	**Turnovers**	0.75
Net Throughput October	510	gal/mo	**Turnovers**	0.78
Net Throughput November	493	gal/mo	**Turnovers**	0.75
Net Throughput December	510	gal/mo	**Turnovers**	0.78
Tank Type	Horizontal			
Paint Color/Shade	Beige			
Paint Condition	Average			

Physical Characteristics - Roof Characteristics

Roof Type	

Breather vent pressure setting	0.03	psia
Breather vent vacuum setting	-0.03	psia
Tank has Flash?	N	DO NOT LEAVE BLANK

MT-1
Rough Rider Operating, LLC
Liquid Contents of Storage Tank

Chemical Category of Liquid	Organic_Liquids	
Single/Multiple	Single	
Chemical subtype	Methyl alcohol {methanol}	
Vapor Pressure Calculation Method	Table 7.1-3	
Chemical Name	Crude Oil	
Average Liquid Surface Temperature, T_{LA}	45.11	F
Vapor Pressure at Liquid Surface Temperature	1.131	psia
Liquid Molecular Weight Default	32.040	lb/lb-mole
Vapor Molecular Weight Default	32.040	lb/lb-mole
Liquid Density Default	6.61	lb./gal
Liquid Molecular Weight User Input		lb/lb-mole
Vapor Molecular Weight User Input		lb/lb-mole
Liquid Density User Input		lb./gal
RVP		

Can add compounds on AP-42 tables page: Table 7.1-3

Mixture Properties

Compound	Mole Fraction	A	B	C	Mi	M_L

Results Summary - Crude Oil Emissions

Month	Standing lb/month	Working lb/month	Total lb/month	Vapor Pressure @ Daily Average Surface Temp	Average Liquid Surface Temp °F	Liquid Bulk Temp °F
January	0.09	0.12	0.21	0.27	11.45	10.86
February	0.12	0.14	0.26	0.36	18.96	17.95
March	0.28	0.24	0.52	0.58	31.90	30.19
April	0.66	0.38	1.04	0.99	47.61	45.15
May	1.16	0.55	1.71	1.42	58.70	55.77
June	1.70	0.71	2.41	1.91	68.49	65.28
July	2.57	0.90	3.47	2.38	75.90	72.46
August	2.27	0.86	3.12	2.25	74.04	71.14
September	1.14	0.58	1.73	1.54	61.40	59.30
October	0.48	0.37	0.85	0.93	45.57	44.27
November	0.18	0.21	0.39	0.53	29.17	28.46
December	0.10	0.14	0.24	0.33	16.39	15.89
Total Annual lb or avg parameter	10.74	5.21	15.94	1.13	45.11	43.20
Ozone Season lb or Ozone Season average param.	8.84	3.60	12.43	1.90	67.74	64.82
Ozone Season lb/day	0.06	0.02	0.08	-	-	-

Worst Case Hourly Emissions	lb/hr
Crude Oil	1.46

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Slop Tank (ST-1)

Table 11.a. - Slop Tank Characteristics

Parameter	Value	Units
Tank Capacity	400	barrels
Maximum Liquid Height	19.75	ft
Control Efficiency	0%	%
Tank Working Capacity	16,709	gallons
Product Stored [1]	Slop (Condensate & Water Mixture)	
Shell Height	20.00	ft
Tank Diameter	12.00	ft
Daily Throughput per Tank	150.00	barrels/day/tank
Annual Throughput per Tank	54,750	barrels/year/tank
Quantity	1	tank(s)

[1] Working and breathing emissions are calculated in a separate spreadsheet using 90% water and 10% gasoline RVP 10.

Table 11.b. - Slop Storage Tank Emissions

Parameter	Weight Fraction of Working & Breathing Losses [2]	Uncontrolled		Controlled	
		Total Emissions per Tank, lb/hr [3]	Working & Breathing Emissions, tpy [1]	Total Emissions per Tank, lb/hr [3]	Working & Breathing Emissions, tpy [1]
VOC [3]	0.62	0.75	0.21	0.75	0.21
Total CO_2e	2.66	3.19	0.91	3.19	0.91
CH_4 (Methane)	0.11	0.13	0.04	0.13	0.04
CO_2	0.01	0.01	4.12E-03	0.01	4.12E-03
Total HAPs	0.03	0.03	0.01	0.03	0.01
Benzene	1.88E-03	2.25E-03	6.43E-04	2.25E-03	6.43E-04
Toluene	1.63E-03	1.96E-03	5.60E-04	1.96E-03	5.60E-04
Ethylbenzene	6.15E-05	7.38E-05	2.11E-05	7.38E-05	2.11E-05
Xylene	6.12E-04	7.34E-04	2.10E-04	7.34E-04	2.10E-04
n-C6 (n-Hexane)	0.02	0.03	0.01	0.03	0.01
2,2,4-Trimethylpentane	1.26E-04	1.52E-04	4.33E-05	1.52E-04	4.33E-05
H_2S	0.00	0.00	0.00	0.00	0.00

[1] Working and breathing emissions are calculated in a separate spreadsheet. Speciated working and breathing tank emissions were calculated based on a representative weight percent speciation for condensate vapor.

[2] Average hourly tank emissions (not maximum hourly tank emissions) were calculated based on dividing modeled tpy value by 8,760 hours in a year and 2,000 pounds in a ton.

[3] Non-methane, non-ethane VOC emissions.

ST-1

Rough Rider Operating, LLC

Tank Indentification and Physical Characteristics

Identification

Identification No.	ST-1
Description	400 bbl slop tank
State	North Dakota
City	Watford City
Nearest Major City	Williston, ND
Company	Rough Rider Operating, LLC

Physical Characteristics - Tank Characteristics

Diameter	12	ft		
Shell Length/Height	20	ft		
Maximum Liquid height	19	ft		
Avg. Liquid height	10	ft		
Minimum Liquid height	1	ft		
Tank Volume	16,800	gal		
Maximum short-term filling rate	1,000	gal/hr		
Worst Case liquid Surface Temp	83	°F		
Net annual throughput	2,299,500	gal/yr		
Net Throughput January	195,300	gal/mo	**Turnovers**	12.82
Net Throughput February	176,400	gal/mo	**Turnovers**	11.58
Net Throughput March	195,300	gal/mo	**Turnovers**	12.82
Net Throughput April	189,000	gal/mo	**Turnovers**	12.41
Net Throughput May	195,300	gal/mo	**Turnovers**	12.82
Net Throughput June	189,000	gal/mo	**Turnovers**	12.41
Net Throughput July	195,300	gal/mo	**Turnovers**	12.82
Net Throughput August	195,300	gal/mo	**Turnovers**	12.82
Net Throughput September	189,000	gal/mo	**Turnovers**	12.41
Net Throughput October	195,300	gal/mo	**Turnovers**	12.82
Net Throughput November	189,000	gal/mo	**Turnovers**	12.41
Net Throughput December	195,300	gal/mo	**Turnovers**	12.82
Tank Type	Vertical			
Paint Color/Shade	Beige			
Paint Condition	Average			

Physical Characteristics - Roof Characteristics

Roof Type	Cone

Breather vent pressure setting	0.03	psia
Breather vent vacuum setting	-0.03	psia
Tank has Flash?	N	DO NOT LEAVE BLANK

ST-1
Rough Rider Operating, LLC
Liquid Contents of Storage Tank

Chemical Category of Liquid	Petroleum_Liquid	
Single/Multiple		
Chemical subtype	Motor Gasoline RVP 10	
Vapor Pressure Calculation Method	Table 7.1-2	
Chemical Name	Condensate/water mixture	
Average Liquid Surface Temperature, T_{LA}	45.11	F
Vapor Pressure at Liquid Surface Temperature	4.175	psia
Liquid Molecular Weight Default	92.000	lb/lb-mole
Vapor Molecular Weight Default	66.000	lb/lb-mole
Liquid Density Default	5.60	lb./gal
Liquid Molecular Weight User Input		lb/lb-mole
Vapor Molecular Weight User Input		lb/lb-mole
Liquid Density User Input		lb./gal
RVP		

Mixture Properties

Compound	Mole Fraction	A	B	C	Mi	M_L

Results Summary - Condensate/water mixture Emissions

% Water	90					
Month	Standing lb/month	Working lb/month	Total lb/month	Vapor Pressure @ Daily Average Surface Temp	Average Liquid Surface Temp °F	Liquid Bulk Temp °F
January	2.65	22.85	25.50	1.84	11.45	10.86
February	3.13	24.17	27.30	2.19	18.96	17.95
March	5.62	34.71	40.32	2.92	31.90	30.19
April	9.67	45.22	54.89	4.06	47.61	45.15
May	13.99	56.99	70.98	5.06	58.70	55.77
June	17.70	65.26	82.96	6.10	68.49	65.28
July	24.28	76.26	100.54	7.00	75.90	72.46
August	21.90	74.01	95.92	6.76	74.04	71.14
September	13.28	57.89	71.16	5.33	61.40	59.30
October	7.41	45.09	52.49	3.89	45.57	44.27
November	3.75	31.88	35.63	2.75	29.17	28.46
December	2.73	25.38	28.11	2.06	16.39	15.89
Total Annual lb or avg parameter	126.11	559.69	685.80	4.17	45.11	43.20
Ozone Season lb or Ozone Season average param.	91.16	330.40	421.56	6.06	67.74	64.82
Ozone Season lb/day	0.60	2.16	2.76	-	-	-

Worst Case Hourly Emissions	lb/hr
Condensate/water mixture	1.20

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Slop Water Storage Tanks (ST-3)

Table 12.a. - Slop Water Storage Tank Characteristics

Parameter	Value	Units
Tank Capacity	400	barrels
Maximum Liquid Height	19.75	ft
Control Efficiency	0%	%
Tank Working Capacity	16,709	gallons
Product Stored [1]	Slop (Condensate & Water Mixture)	
Shell Height	20.00	ft
Tank Diameter	12.00	ft
Daily Throughput per Tank	150.00	barrels/day/tank
Annual Throughput per Tank	54,750	barrels/year/tank
Quantity	1	tank(s)

[1] Working and breathing emissions are calculated in a separate spreadsheet using 90% water and 10% gasoline RVP 10.

Table 12.b. - Slop Water Storage Tank Emissions

Parameter	Weight Fraction of Working & Breathing Losses, tpy [1]	Uncontrolled		Controlled	
		Total Emissions per Tank, lb/hr [2]	Working & Breathing Emissions per Tank, tpy [1]	Total Emissions per Tank, lb/hr [2]	Working & Breathing Emissions per Tank, tpy [1]
VOC [3]	0.62	0.75	0.40	0.75	0.40
Total CO_2e	2.66	3.19	1.70	3.19	1.70
CH_4 (Methane)	0.11	0.13	0.07	0.13	0.07
CO_2	0.01	0.01	0.01	0.01	0.01
Total HAPs	0.03	0.03	0.02	0.03	0.02
Benzene	1.88E-03	2.25E-03	1.20E-03	2.25E-03	1.20E-03
Toluene	1.63E-03	1.96E-03	1.04E-03	1.96E-03	1.04E-03
Ethylbenzene	6.15E-05	7.38E-05	3.93E-05	7.38E-05	3.93E-05
Xylene	6.12E-04	7.34E-04	3.91E-04	7.34E-04	3.91E-04
n-C6 (n-Hexane)	0.02	0.03	0.01	0.03	0.01
2,2,4-Trimethylpentane	1.26E-04	1.52E-04	8.06E-05	1.52E-04	8.06E-05
H_2S	0.00	0.00	0.00	0.00	0.00

[1] Working and breathing emissions are calculated in a separate spreadsheet. Speciated working and breathing tank emissions were calculated based on a representative weight percent speciation for condensate vapor.

[2] Average hourly tank emissions (not maximum hourly tank emissions) were calculated based on dividing modeled tpy value by 8,760 hours in a year and 2,000 pounds in a ton.

[3] Non-methane, non-ethane VOC emissions.

ST-3
Rough Rider Operating, LLC
Tank Indentification and Physical Characteristics

Identification

Identification No.	ST-3
Description	1000 bbl slop tank
State	North Dakota
City	Watford City
Nearest Major City	Williston, ND
Company	Rough Rider Operating, LLC

Physical Characteristics - Tank Characteristics

Diameter	12	ft		
Shell Length/Height	20	ft		
Maximum Liquid height	19	ft		
Avg. Liquid height	10	ft		
Minimum Liquid height	1	ft		
Tank Volume	16,800	gal		
Maximum short-term filling rate	1,000	gal/hr		
Worst Case liquid Surface Temp	95	°F		
Net annual throughput	2,299,500	gal/yr		
Net Throughput January	195,300	gal/mo	**Turnovers**	12.82
Net Throughput February	176,400	gal/mo	**Turnovers**	11.58
Net Throughput March	195,300	gal/mo	**Turnovers**	12.82
Net Throughput April	189,000	gal/mo	**Turnovers**	12.41
Net Throughput May	195,300	gal/mo	**Turnovers**	12.82
Net Throughput June	189,000	gal/mo	**Turnovers**	12.41
Net Throughput July	195,300	gal/mo	**Turnovers**	12.82
Net Throughput August	195,300	gal/mo	**Turnovers**	12.82
Net Throughput September	189,000	gal/mo	**Turnovers**	12.41
Net Throughput October	195,300	gal/mo	**Turnovers**	12.82
Net Throughput November	189,000	gal/mo	**Turnovers**	12.41
Net Throughput December	195,300	gal/mo	**Turnovers**	12.82
Tank Type	Vertical			
Paint Color/Shade	Beige			
Paint Condition	Average			

Physical Characteristics - Roof Characteristics

Roof Type	Cone

Breather vent pressure setting	0.03	psia
Breather vent vacuum setting	-0.03	psia
Tank has Flash?	N	DO NOT LEAVE BLANK

ST-3
Rough Rider Operating, LLC
Liquid Contents of Storage Tank

Chemical Category of Liquid	Petroleum_Liquid	
Single/Multiple		
Chemical subtype	Motor Gasoline RVP 10	
Vapor Pressure Calculation Method	Table 7.1-2	
Chemical Name	Condensate/water mixture	
Average Liquid Surface Temperature, T_{LA}	45.11	F
Vapor Pressure at Liquid Surface Temperature	4.175	psia
Liquid Molecular Weight Default	92.000	lb/lb-mole
Vapor Molecular Weight Default	66.000	lb/lb-mole
Liquid Density Default	5.60	lb./gal
Liquid Molecular Weight User Input		lb/lb-mole
Vapor Molecular Weight User Input		lb/lb-mole
Liquid Density User Input		lb./gal
RVP		

Mixture Properties

Compound	Mole Fraction	A	B	C	Mi	M_L

Results Summary - Condensate/water mixture Emissions

% Water	90

Month	Standing lb/month	Working lb/month	Total lb/month	Vapor Pressure @ Daily Average Surface Temp	Average Liquid Surface Temp °F	Liquid Bulk Temp °F
January	2.65	22.85	25.50	1.84	11.45	10.86
February	3.13	24.17	27.30	2.19	18.96	17.95
March	5.62	34.71	40.32	2.92	31.90	30.19
April	9.67	45.22	54.89	4.06	47.61	45.15
May	13.99	56.99	70.98	5.06	58.70	55.77
June	17.70	65.26	82.96	6.10	68.49	65.28
July	24.28	76.26	100.54	7.00	75.90	72.46
August	21.90	74.01	95.92	6.76	74.04	71.14
September	13.28	57.89	71.16	5.33	61.40	59.30
October	7.41	45.09	52.49	3.89	45.57	44.27
November	3.75	31.88	35.63	2.75	29.17	28.46
December	2.73	25.38	28.11	2.06	16.39	15.89
Total Annual lb or avg parameter	126.11	559.69	685.80	4.17	45.11	43.20
Ozone Season lb or Ozone Season average param.	91.16	330.40	421.56	6.06	67.74	64.82
Ozone Season lb/day	0.60	2.16	2.76	-	-	-

Worst Case Hourly Emissions	lb/hr
Condensate/water mixture	1.45

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Jacket Water Storage Tanks (WT-1 & WT-2)

Table 13.a. - Jacket Water Storage Tank Characteristics

Parameter	Value	Units
Tank Capacity	210	barrels
Maximum Liquid Height	14.75	ft
Tank Working Capacity	8,666	gallons
Product Stored [1]	Jacket Water (Glycol & Water Mixture)	
Shell Height	15.00	ft
Tank Diameter	10.00	ft
Daily Throughput per Tank	7.00	barrels/day/tank
Annual Throughput per Tank	2,555	barrels/year/tank
Quantity	2	tank(s)

[1] To be conservative, the externally calculated emission calculations assume the tanks contain 100% propylene glycol.

Table 13.b. - Jacket Water Storage Tank Emissions

Parameter	Weight Fraction of Working & Breathing Losses, tpy [1]	Uncontrolled	
		Total Emissions per Tank, lb/hr	Working & Breathing Emissions per Tank, tpy
VOC	1.00	3.77E-05	1.65E-04

[1] Working and breathing emissions are calculated in a separate spreadsheet. HAP and GHG emissions are assumed to be negligible.

WT-1 and WT-2 (each)
Rough Rider Operating, LLC
Tank Indentification and Physical Characteristics

Identification

Identification No.	WT-1 and WT-2 (each)
Description	210-bbl coolant tanks
State	North Dakota
City	Watford City
Nearest Major City	Williston, ND
Company	Rough Rider Operating, LLC

Physical Characteristics - Tank Characteristics

Diameter	10	ft		
Shell Length/Height	15	ft		
Maximum Liquid height	14	ft		
Avg. Liquid height	7.5	ft		
Minimum Liquid height	1	ft		
Tank Volume	8,820	gal		
Maximum short-term filling rate	1,000	gal/hr		
Worst Case liquid Surface Temp	95	°F		
Net annual throughput	150,000	gal/yr		
Net Throughput January	12,740	gal/mo	**Turnovers**	1.67
Net Throughput February	11,507	gal/mo	**Turnovers**	1.51
Net Throughput March	12,740	gal/mo	**Turnovers**	1.67
Net Throughput April	12,329	gal/mo	**Turnovers**	1.61
Net Throughput May	12,740	gal/mo	**Turnovers**	1.67
Net Throughput June	12,329	gal/mo	**Turnovers**	1.61
Net Throughput July	12,740	gal/mo	**Turnovers**	1.67
Net Throughput August	12,740	gal/mo	**Turnovers**	1.67
Net Throughput September	12,329	gal/mo	**Turnovers**	1.61
Net Throughput October	12,740	gal/mo	**Turnovers**	1.67
Net Throughput November	12,329	gal/mo	**Turnovers**	1.61
Net Throughput December	12,740	gal/mo	**Turnovers**	1.67
Tank Type	Vertical			
Paint Color/Shade	Beige			
Paint Condition	Average			

Physical Characteristics - Roof Characteristics

Roof Type	Cone

Breather vent pressure setting	0.03	psia
Breather vent vacuum setting	-0.03	psia
Tank has Flash?	N	DO NOT LEAVE BLANK

WT-1 and WT-2 (each)
Rough Rider Operating, LLC
Liquid Contents of Storage Tank

Chemical Category of Liquid	Organic_Liquids	
Single/Multiple	Single	
Chemical subtype	Propylene glycol (1,2) {1,2 propanediol}	Can add compounds on AP-42 tables page: Table 7.1-3
Vapor Pressure Calculation Method	Table 7.1-3	
Chemical Name	Coolant	
Average Liquid Surface Temperature, T_{LA}	45.11	F
Vapor Pressure at Liquid Surface Temperature	0.001	psia
Liquid Molecular Weight Default	76.090	lb/lb-mole
Vapor Molecular Weight Default	76.090	lb/lb-mole
Liquid Density Default	8.65	lb./gal
Liquid Molecular Weight User Input		lb/lb-mole
Vapor Molecular Weight User Input		lb/lb-mole
Liquid Density User Input		lb./gal
RVP		

Mixture Properties

Compound	Mole Fraction	A	B	C	Mi	M_L

Results Summary - Coolant Emissions

Month	Standing lb/month	Working lb/month	Total lb/month	Vapor Pressure @ Daily Average Surface Temp	Average Liquid Surface Temp °F	Liquid Bulk Temp °F
January	0.00	0.00	0.00	0.00	11.45	10.86
February	0.00	0.00	0.00	0.00	18.96	17.95
March	0.00	0.00	0.01	0.00	31.90	30.19
April	0.01	0.01	0.02	0.00	47.61	45.15
May	0.01	0.02	0.03	0.00	58.70	55.77
June	0.02	0.03	0.05	0.00	68.49	65.28
July	0.03	0.05	0.08	0.00	75.90	72.46
August	0.03	0.05	0.07	0.00	74.04	71.14
September	0.01	0.02	0.04	0.00	61.40	59.30
October	0.00	0.01	0.01	0.00	45.57	44.27
November	0.00	0.00	0.00	0.00	29.17	28.46
December	0.00	0.00	0.00	0.00	16.39	15.89
Total Annual lb or avg parameter	0.13	0.20	0.33	0.00	45.11	43.20
Ozone Season lb or Ozone Season average param.	0.11	0.17	0.28	0.00	67.74	64.82
Ozone Season lb/day	0.00	0.00	0.00	-	-	-

Worst Case Hourly Emissions	lb/hr
Coolant	0.01

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Lube Oil Tanks (LT-1, LT-2, LT-3)

Table 14.a. - Lube Oil Tank Characteristics

Parameter	Value	Units
Tank Capacity	210	barrels
Maximum Liquid Height	14.75	ft
Tank Working Capacity	8,666	gallons
Product Stored	Lube Oil	
Shell Height	15.00	ft
Tank Diameter	10.00	ft
Daily Throughput per Tank	6.90	barrels/day/tank
Annual Throughput per Tank	2,520	barrels/year/tank
Quantity	3	tank(s)

Table 14.b. - Lube Oil Tank Emissions

Parameter	Weight Fraction of Working & Breathing Losses, tpy [1]	Uncontrolled	
		Total Emissions per Tank, lb/hr	Working & Breathing Emissions per Tank, tpy
VOC	100.00%	1.00E-02	4.70E-04

[1] Working and breathing emissions are calculated in a separate spreadsheet. HAP and GHG emissions are assumed to be negligible.

LT-1 - LT-3
Rough Rider Operating, LLC
Tank Indentification and Physical Characteristics

Identification

Identification No.	LT-1 - LT-3
Description	210-bbl lube oil tanks
State	North Dakota
City	Watford City
Nearest Major City	Williston, ND
Company	Rough Rider Operating, LLC

Physical Characteristics - Tank Characteristics

Diameter	10	ft		
Shell Length/Height	15	ft		
Maximum Liquid height	14	ft		
Avg. Liquid height	7.5	ft		
Minimum Liquid height	1	ft		
Tank Volume	8,820	gal		
Maximum short-term filling rate	1,000	gal/hr		
Worst Case liquid Surface Temp	95	°F		
Net annual throughput	150,000	gal/yr		
Net Throughput January	12,740	gal/mo	**Turnovers**	1.67
Net Throughput February	11,507	gal/mo	**Turnovers**	1.51
Net Throughput March	12,740	gal/mo	**Turnovers**	1.67
Net Throughput April	12,329	gal/mo	**Turnovers**	1.61
Net Throughput May	12,740	gal/mo	**Turnovers**	1.67
Net Throughput June	12,329	gal/mo	**Turnovers**	1.61
Net Throughput July	12,740	gal/mo	**Turnovers**	1.67
Net Throughput August	12,740	gal/mo	**Turnovers**	1.67
Net Throughput September	12,329	gal/mo	**Turnovers**	1.61
Net Throughput October	12,740	gal/mo	**Turnovers**	1.67
Net Throughput November	12,329	gal/mo	**Turnovers**	1.61
Net Throughput December	12,740	gal/mo	**Turnovers**	1.67
Tank Type	Vertical			
Paint Color/Shade	Beige			
Paint Condition	Average			

Physical Characteristics - Roof Characteristics

Roof Type	Cone

Breather vent pressure setting	0.03	psia
Breather vent vacuum setting	-0.03	psia
Tank has Flash?	N	DO NOT LEAVE BLANK

LT-1 - LT-3
Rough Rider Operating, LLC
Liquid Contents of Storage Tank

Chemical Category of Liquid	Petroleum_Liquid	
Single/Multiple	[redacted]	
Chemical subtype	No. 6 Fuel Oil	
Vapor Pressure Calculation Method	Table 7.1-2	
Chemical Name	Lube oil	
Average Liquid Surface Temperature, T_{LA}	45.11	F
Vapor Pressure at Liquid Surface Temperature	0.001	psia
Liquid Molecular Weight Default	387.000	lb/lb-mole
Vapor Molecular Weight Default	130.000	lb/lb-mole
Liquid Density Default	7.90	lb./gal
Liquid Molecular Weight User Input		lb/lb-mole
Vapor Molecular Weight User Input		lb/lb-mole
Liquid Density User Input		lb./gal
RVP		

Mixture Properties

Compound	Mole Fraction	A	B	C	Mi	M_L

Results Summary - Lube oil Emissions

Month	Standing lb/month	Working lb/month	Total lb/month	Vapor Pressure @ Daily Average Surface Temp	Average Liquid Surface Temp °F	Liquid Bulk Temp °F
January	0.00	0.01	0.02	0.00	11.45	10.86
February	0.01	0.01	0.02	0.00	18.96	17.95
March	0.01	0.03	0.04	0.00	31.90	30.19
April	0.03	0.04	0.07	0.00	47.61	45.15
May	0.04	0.06	0.10	0.00	58.70	55.77
June	0.05	0.08	0.13	0.00	68.49	65.28
July	0.07	0.11	0.18	0.00	75.90	72.46
August	0.07	0.10	0.17	0.00	74.04	71.14
September	0.04	0.07	0.10	0.00	61.40	59.30
October	0.02	0.04	0.06	0.00	45.57	44.27
November	0.01	0.02	0.03	0.00	29.17	28.46
December	0.00	0.01	0.02	0.00	16.39	15.89
Total Annual lb or avg parameter	0.35	0.59	0.94	0.00	45.11	43.20
Ozone Season lb or Ozone Season average param.	0.27	0.42	0.69	0.00	67.74	64.82
Ozone Season lb/day	0.00	0.00	0.00	-	-	-

Worst Case Hourly Emissions	lb/hr
Lube oil	0.01

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Lube Oil Tank (LT-4)

Table 15.a. - Lube Oil Tank Characteristics

Parameter	Value	Units
Tank Capacity	1,990	barrels
Maximum Liquid Height	14.75	ft
Tank Working Capacity	83,279	gallons
Product Stored [1]	Lube Oil	
Shell Height	40.00	ft
Tank Diameter	31.00	ft
Daily Throughput per Tank	6.78	barrels/day/tank
Annual Throughput per Tank	2,476	barrels/year/tank
Quantity	1	tank(s)

Table 15.b. - Lube Oil Tank Emissions

Parameter	Weight Fraction of Working & Breathing Losses, tpy [1]	Uncontrolled	
		Total Emissions per Tank, lb/hr [2]	Working & Breathing Emissions per Tank, tpy [1]
VOC	1.00	0.01	4.72E-03

[1] Working and breathing emissions are calculated in a separate spreadsheet. HAP and GHG emissions are assumed to be negligible.

LT-4

Rough Rider Operating, LLC
Tank Indentification and Physical Characteristics

Identification

Identification No.	LT-4
Description	1990-bbl lube oil tank
State	North Dakota
City	Watford City
Nearest Major City	Williston, ND
Company	Rough Rider Operating, LLC

Physical Characteristics - Tank Characteristics

Diameter	31	ft		
Shell Length/Height	40	ft		
Maximum Liquid height	24	ft		
Avg. Liquid height	20	ft		
Minimum Liquid height	0	ft		
Tank Volume	83,580	gal		
Maximum short-term filling rate	1,000	gal/hr		
Worst Case liquid Surface Temp	95	°F		
Net annual throughput	150,000	gal/yr		
Net Throughput January	12,740	gal/mo	**Turnovers**	0.06
Net Throughput February	11,507	gal/mo	**Turnovers**	0.05
Net Throughput March	12,740	gal/mo	**Turnovers**	0.06
Net Throughput April	12,329	gal/mo	**Turnovers**	0.06
Net Throughput May	12,740	gal/mo	**Turnovers**	0.06
Net Throughput June	12,329	gal/mo	**Turnovers**	0.06
Net Throughput July	12,740	gal/mo	**Turnovers**	0.06
Net Throughput August	12,740	gal/mo	**Turnovers**	0.06
Net Throughput September	12,329	gal/mo	**Turnovers**	0.06
Net Throughput October	12,740	gal/mo	**Turnovers**	0.06
Net Throughput November	12,329	gal/mo	**Turnovers**	0.06
Net Throughput December	12,740	gal/mo	**Turnovers**	0.06
Tank Type	Horizontal			
Paint Color/Shade	Beige			
Paint Condition	Average			

Physical Characteristics - Roof Characteristics

Roof Type	

Breather vent pressure setting	0.03	psia
Breather vent vacuum setting	-0.03	psia
Tank has Flash?	N	DO NOT LEAVE BLANK

LT-4
Rough Rider Operating, LLC
Liquid Contents of Storage Tank

Chemical Category of Liquid	Petroleum_Liquid	
Single/Multiple		
Chemical subtype	No. 6 Fuel Oil	
Vapor Pressure Calculation Method	Table 7.1-2	
Chemical Name	Lube oil	
Average Liquid Surface Temperature, T_{LA}	45.11	F
Vapor Pressure at Liquid Surface Temperature	0.001	psia
Liquid Molecular Weight Default	387.000	lb/lb-mole
Vapor Molecular Weight Default	130.000	lb/lb-mole
Liquid Density Default	7.90	lb./gal
Liquid Molecular Weight User Input		lb/lb-mole
Vapor Molecular Weight User Input		lb/lb-mole
Liquid Density User Input		lb./gal
RVP		

Mixture Properties

Compound	Mole Fraction	A	B	C	Mi	M_L

Results Summary - Lube oil Emissions

Month	Standing lb/month	Working lb/month	Total lb/month	Vapor Pressure @ Daily Average Surface Temp	Average Liquid Surface Temp °F	Liquid Bulk Temp °F
January	0.11	0.01	0.12	0.00	11.45	10.86
February	0.14	0.01	0.16	0.00	18.96	17.95
March	0.31	0.03	0.34	0.00	31.90	30.19
April	0.64	0.04	0.69	0.00	47.61	45.15
May	1.02	0.06	1.08	0.00	58.70	55.77
June	1.34	0.08	1.43	0.00	68.49	65.28
July	1.84	0.11	1.95	0.00	75.90	72.46
August	1.67	0.10	1.77	0.00	74.04	71.14
September	0.98	0.07	1.04	0.00	61.40	59.30
October	0.48	0.04	0.52	0.00	45.57	44.27
November	0.20	0.02	0.22	0.00	29.17	28.46
December	0.12	0.01	0.13	0.00	16.39	15.89
Total Annual lb or avg parameter	8.85	0.59	9.44	0.00	45.11	43.20
Ozone Season lb or Ozone Season average param.	6.85	0.42	7.27	0.00	67.74	64.82
Ozone Season lb/day	0.04	0.00	0.05	-	-	-

Worst Case Hourly Emissions	lb/hr
Lube oil	0.01

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
TEG Tank (GT-1)

Table 16.a. - TEG Tank Characteristics

Parameter	Value	Units
Tank Capacity	210	barrels
Maximum Liquid Height	15.00	ft
Tank Working Capacity	8,813	gallons
Product Stored	TEG	
Shell Height	15.00	ft
Tank Diameter	10.00	ft
Daily Throughput per Tank	6.90	barrels/day/tank
Annual Throughput per Tank	2,520	barrels/year/tank
Quantity	1	tank(s)

Table 16.b. - TEG Storage Tank Emissions

Parameter	Weight Fraction of Working & Breathing Losses, tpy [1]	Uncontrolled	
		Total Emissions per Tank, lb/hr [2]	Working & Breathing Emissions per Tank, tpy [1]
VOC	1.00	1.00E-04	5.00E-06

[1] Working and breathing emissions are calculated in a separate spreadsheet. HAP and GHG emissions are assumed to be negligible.

GT-1

Rough Rider Operating, LLC

Tank Indentification and Physical Characteristics

Identification

Identification No.	GT-1
Description	210-bbl coolant tanks
State	North Dakota
City	Watford City
Nearest Major City	Williston, ND
Company	Rough Rider Operating, LLC

Physical Characteristics - Tank Characteristics

Diameter	10	ft		
Shell Length/Height	15	ft		
Maximum Liquid height	14	ft		
Avg. Liquid height	7.5	ft		
Minimum Liquid height	1	ft		
Tank Volume	8,820	gal		
Maximum short-term filling rate	1,000	gal/hr		
Worst Case liquid Surface Temp	83	°F		
Net annual throughput	150,000	gal/yr		
Net Throughput January	12,740	gal/mo	**Turnovers**	1.67
Net Throughput February	11,507	gal/mo	**Turnovers**	1.51
Net Throughput March	12,740	gal/mo	**Turnovers**	1.67
Net Throughput April	12,329	gal/mo	**Turnovers**	1.61
Net Throughput May	12,740	gal/mo	**Turnovers**	1.67
Net Throughput June	12,329	gal/mo	**Turnovers**	1.61
Net Throughput July	12,740	gal/mo	**Turnovers**	1.67
Net Throughput August	12,740	gal/mo	**Turnovers**	1.67
Net Throughput September	12,329	gal/mo	**Turnovers**	1.61
Net Throughput October	12,740	gal/mo	**Turnovers**	1.67
Net Throughput November	12,329	gal/mo	**Turnovers**	1.61
Net Throughput December	12,740	gal/mo	**Turnovers**	1.67
Tank Type	Vertical			
Paint Color/Shade	Beige			
Paint Condition	Average			

Physical Characteristics - Roof Characteristics

Roof Type	Cone

Breather vent pressure setting	0.03	psia
Breather vent vacuum setting	-0.03	psia
Tank has Flash?	N	DO NOT LEAVE BLANK

GT-1
Rough Rider Operating, LLC
Liquid Contents of Storage Tank

Chemical Category of Liquid	Organic_Liquids	
Single/Multiple	Single	
Chemical subtype	Triethylene Glycol	
Vapor Pressure Calculation Method	Table 7.1-3	
Chemical Name	TEG	
Average Liquid Surface Temperature, T_{LA}	45.11	F
Vapor Pressure at Liquid Surface Temperature	0.000	psia
Liquid Molecular Weight Default	150.170	lb/lb-mole
Vapor Molecular Weight Default	150.170	lb/lb-mole
Liquid Density Default	9.34	lb./gal
Liquid Molecular Weight User Input		lb/lb-mole
Vapor Molecular Weight User Input		lb/lb-mole
Liquid Density User Input		lb./gal
RVP		

Can add compounds on AP-42 tables page: Table 7.1-3

Mixture Properties

Compound	Mole Fraction	A	B	C	Mi	M_L

Results Summary - TEG Emissions

Month	Standing lb/month	Working lb/month	Total lb/month	Vapor Pressure @ Daily Average Surface Temp	Average Liquid Surface Temp °F	Liquid Bulk Temp °F
January	0.00	0.00	0.00	0.00	11.45	10.86
February	0.00	0.00	0.00	0.00	18.96	17.95
March	0.00	0.00	0.00	0.00	31.90	30.19
April	0.00	0.00	0.00	0.00	47.61	45.15
May	0.00	0.00	0.00	0.00	58.70	55.77
June	0.00	0.00	0.00	0.00	68.49	65.28
July	0.00	0.00	0.00	0.00	75.90	72.46
August	0.00	0.00	0.00	0.00	74.04	71.14
September	0.00	0.00	0.00	0.00	61.40	59.30
October	0.00	0.00	0.00	0.00	45.57	44.27
November	0.00	0.00	0.00	0.00	29.17	28.46
December	0.00	0.00	0.00	0.00	16.39	15.89
Total Annual lb or avg parameter	0.00	0.00	0.01	0.00	45.11	43.20
Ozone Season lb or Ozone Season average param.	0.00	0.00	0.01	0.00	67.74	64.82
Ozone Season lb/day	0.00	0.00	0.00	-	-	-

Worst Case Hourly Emissions	lb/hr
TEG	0.0001

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Gas Plant 1 Circulation System Combustion Heater (HTR-1)

Table 17.a. - Gas Plant 1 Natural Gas-Fired Circulation System Combustion Heater (EPN: HTR-1)

Parameter	Value	Units
Number of Units	1	
Maximum Heat Rating of Each Unit	46.00	MMBtu/hr
Maximum Monthly Gas Usage per Unit	29.74	MMSCF/month
Maximum Annual Gas Usage per Unit	350.12	MMSCF/yr
Hours Operated per Year per Unit	8,760	hr/yr
Fuel Heating Value	1,151	Btu/scf

Table 17.b. - Gas Plant 1 Natural Gas-Fired Circulation System Combustion Heater - Emissions

Pollutant	Default Emission Factors		Single Unit Uncontrolled Emissions	
	(lb/10^6 scf) [1, 2]	(lb/MMBtu) [3]	(lb/hr)	(tons/year) [4]
CO	-	0.041	1.886	8.26
NO_X	-	0.033	1.518	6.65
$PM/PM_{10}/PM_{2.5}$	7.6	0.007	0.343	1.50
SO_2	0.6	0.001	0.027	0.12
VOC	-	0.030	1.380	6.04

[1] Emission factor for CO, NO_X, and VOC from manufacturer's specifications.

[2] Emission factors for $PM/PM_{10}/PM_{2.5}$ and SO_2 are from AP-42 Chapter 1 Section 4 –Natural Gas Combustion Table 1.4-2 Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion.

[3] To convert from lb/10^6 scf to lb/MMBtu, the lb/10^6 scf emission factors were then divided by 1,020 as specified in AP-42 Chapter 1.4, Table 1.4-2 footnote a.

[4] Annual emissions are based on an operating schedule of 24 hours/day, 365 days/year (i.e., 8,760 hours/year).

Table 17.c. - Gas Plant 1 Natural Gas-Fired Circulation System Combustion Heater - GHG Emissions

GHG	Default Emission Factors	Single Unit Uncontrolled Emissions	
	(kg/MMBtu) [1, 2]	(lb/hr)	(tons/year) [3]
CO_2	53.06	5,380.95	23,568.58
CH_4	1.00E-03	0.10	4.44E-01
N_2O	1.00E-04	1.01E-02	4.44E-02
CO_2e	-	5,386.51	23,592.92

[1] CO_2 emission factor obtained from 40 CFR 98 Subpart C, Table C-1 for natural gas.

[2] CH_2 and N_2O emission factors from 40 CFR 98 Subpart C, Table C-2 for natural gas.

[5] Global warming potentials obtained from Table A-1 to Subpart 98 - Global Warming Potentials Equation A-1:

$CO_2e = \sum GHGi \times GWPi$

Where:

CO_2e = Carbon dioxide equivalent (tons/year)

GHGi = Mass emissions of each GHG (tons/year)

GWPi = Global warming potential for each GHG (1 for CO_2; 25 for CH_4; 298 for N_2O)

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Gas Plant 1 Circulation System Combustion Heater (HTR-1)

Table 17.d. - Gas Plant 1 Natural Gas-Fired Circulation System Combustion Heater - HAP Emissions

HAP Pollutant	Default Emission Factors [1]		Single Unit Uncontrolled Emissions	
	(lb/10^6 scf)	(lb/MMBtu)	(lb/hr)	(tons/year)
2-Methylnaphthalene	2.4E-05	2.4E-08	1.1E-06	4.7E-06
3-Methylchloranthrene	1.8E-06	1.8E-09	8.1E-08	3.6E-07
7,12-Dimethylbenz(a)anthracene	1.6E-05	1.6E-08	7.2E-07	3.2E-06
Acenaphthene	1.8E-06	1.8E-09	8.1E-08	3.6E-07
Acenaphthylene	1.8E-06	1.8E-09	8.1E-08	3.6E-07
Anthracene	2.4E-06	2.4E-09	1.1E-07	4.7E-07
Benz(a)anthracene	1.8E-06	1.8E-09	8.1E-08	3.6E-07
Benzene	2.1E-03	2.1E-06	9.5E-05	4.1E-04
Benzo(a)pyrene	1.2E-06	1.2E-09	5.4E-08	2.4E-07
Benzo(b)fluoranthene	1.8E-06	1.8E-09	8.1E-08	3.6E-07
Benzo(g,h,i)perylene	1.2E-06	1.2E-09	5.4E-08	2.4E-07
Benzo(k)fluoranthene	1.8E-06	1.8E-09	8.1E-08	3.6E-07
Chrysene	1.8E-06	1.8E-09	8.1E-08	3.6E-07
Dibenzo(a,h)anthracene	1.2E-06	1.2E-09	5.4E-08	2.4E-07
Dichlorobenzene	1.2E-03	1.2E-06	5.4E-05	2.4E-04
Fluoranthene	3.0E-06	2.9E-09	1.4E-07	5.9E-07
Fluorene	2.8E-06	2.7E-09	1.3E-07	5.5E-07
Formaldehyde	7.5E-02	7.4E-05	3.4E-03	1.5E-02
Hexane [2]	1.8E+00	1.8E-03	8.1E-02	3.6E-01
Indeno(1,2,3-cd)pyrene	1.8E-06	1.8E-09	8.1E-08	3.6E-07
Naphthalene	6.1E-04	6.0E-07	2.8E-05	1.2E-04
Phenanathrene	1.7E-05	1.7E-08	7.7E-07	3.4E-06
Pyrene	5.0E-06	4.9E-09	2.3E-07	9.9E-07
Toluene	3.4E-03	3.3E-06	1.5E-04	6.7E-04
		Total HAPs	**8.49E-02**	**3.72E-01**

[1] Emission factors from *AP-42 Chapter 1 Section 4 – Natural Gas Combustion Table 1.4-3 - Emission Factors for Speciated Organic Compounds from Natural Gas Combustion,* dated July 1998.

[2] Historically, hexane emissions were omitted. It has been included here as n-hexane to be conservative.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Crude Stabilizer Medium Line Heaters (HTR-2, HTR-3, HTR-5)

Table 18.a. - Natural Gas-Fired Crude Stabilizer Medium Line Heater (EPN: HTR-2, HTR-3, HTR-5)

Parameter	Value	Units
Number of Units [1]	3	
Heat Rating of Each Unit [1]	30.00	MMBtu/hr
Maximum Monthly Gas Usage per Unit	19.39	MMSCF/month
Maximum Annual Gas Usage per Unit	228.34	MMSCF/yr
Hours Operated per Year per Unit	8,760	hr/yr
Fuel Heating Value	1,151	Btu/scf

[1] Each 30 MMBtu/hr crude stabilizer is made up of two natural gas-fired line heaters (LH-1040/LH-1050, LH-1140/LH-1150, and LH-1240/LH1250. Each line heater includes three 5 MMBtu/hr burners (EUs HTR-2a through HTR-2f, HTR-3a through HTR-3f, and HTR-5a through HTR-5f) with each burner having a separate exhaust stack. Thus, each stabilizer heater system uses a total of 30 MMBtu/hr heat input and has six exhaust stacks.

Table 18.b. - Natural Gas-Fired Crude Stabilizer Medium Line Heater - Emissions

Pollutant	Default Emission Factors		Single Unit Uncontrolled Emissions	
	($lb/10^6$ scf) [1, 2]	(lb/MMBtu) [3]	(lb/hr)	(tons/year) [4]
CO	84	0.082	2.471	10.82
NO_X	-	0.033	0.990	4.34
$PM/PM_{10}/PM_{2.5}$	7.6	0.007	0.224	0.98
SO_2	0.6	0.001	0.018	0.08
VOC	5.5	0.005	0.162	0.71

[1] Emission factor for CO from AP-42 Chapter 1 Section 4 - Natural Gas Combustion Table 1.4-1 Emission Factors for Nitrogen Oxides (NO_X) and Carbon Monoxide (CO) From Natural Gas Combustion. A low NO_X burner is assumed based on historical permitting.

[2] Emission factors for $PM/PM_{10}/PM_{2.5}$, SO_2, and VOC are from AP-42 Chapter 1 Section 4 –Natural Gas Combustion Table 1.4-2 Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion.

[3] To convert from $lb/10^6$ scf to lb/MMBtu, the $lb/10^6$ scf emission factors were then divided by 1,020 as specified in AP-42 Chapter 1.4, Table 1.4-2 footnote a.

[4] Annual emissions are based on an operating schedule of 24 hours/day, 365 days/year (i.e., 8,760 hours/year).

Table 18.c. - Natural Gas-Fired Crude Stabilizer Medium Line Heater - GHG Emissions

GHG	Default Emission Factors	Single Unit Uncontrolled Emissions	
	(kg/MMBtu) [1, 2]	(lb/hr)	(tons/year) [3]
CO_2	53.06	3,509.32	15,370.81
CH_4	1.00E-03	0.07	2.90E-01
N_2O	1.00E-04	6.61E-03	2.90E-02
CO_2e	-	3,512.94	15,386.69

[1] CO_2 emission factor obtained from 40 CFR 98 Subpart C, Table C-1 for natural gas.

[2] CH_2 and N_2O emission factors from 40 CFR 98 Subpart C, Table C-2 for natural gas.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Crude Stabilizer Medium Line Heaters (HTR-2, HTR-3, HTR-5)

[5] Global warming potentials obtained from Table A-1 to Subpart 98 - Global Warming Potentials Equation A-1:
$CO_2e = \sum GHGi \times GWPi$
Where:
CO_2e = Carbon dioxide equivalent (tons/year)
GHGi = Mass emissions of each GHG (tons/year)
GWPi = Global warming potential for each GHG (1 for CO_2; 25 for CH_4; 298 for N_2O)

Table 18.d. - Natural Gas-Fired Crude Stabilizer Medium Line Heater - HAP Emissions

HAP Pollutant	Default Emission Factors [1]		Single Unit Uncontrolled Emissions	
	(lb/10^6 scf)	(lb/MMBtu)	(lb/hr)	(tons/year)
2-Methylnaphthalene	2.4E-05	2.4E-08	7.1E-07	3.1E-06
3-Methylchloranthrene	1.8E-06	1.8E-09	5.3E-08	2.3E-07
7,12-Dimethylbenz(a)anthracene	1.6E-05	1.6E-08	4.7E-07	2.1E-06
Acenaphthene	1.8E-06	1.8E-09	5.3E-08	2.3E-07
Acenaphthylene	1.8E-06	1.8E-09	5.3E-08	2.3E-07
Anthracene	2.4E-06	2.4E-09	7.1E-08	3.1E-07
Benz(a)anthracene	1.8E-06	1.8E-09	5.3E-08	2.3E-07
Benzene	2.1E-03	2.1E-06	6.2E-05	2.7E-04
Benzo(a)pyrene	1.2E-06	1.2E-09	3.5E-08	1.5E-07
Benzo(b)fluoranthene	1.8E-06	1.8E-09	5.3E-08	2.3E-07
Benzo(g,h,i)perylene	1.2E-06	1.2E-09	3.5E-08	1.5E-07
Benzo(k)fluoranthene	1.8E-06	1.8E-09	5.3E-08	2.3E-07
Chrysene	1.8E-06	1.8E-09	5.3E-08	2.3E-07
Dibenzo(a,h)anthracene	1.2E-06	1.2E-09	3.5E-08	1.5E-07
Dichlorobenzene	1.2E-03	1.2E-06	3.5E-05	1.5E-04
Fluoranthene	3.0E-06	2.9E-09	8.8E-08	3.9E-07
Fluorene	2.8E-06	2.7E-09	8.2E-08	3.6E-07
Formaldehyde	7.5E-02	7.4E-05	2.2E-03	9.7E-03
Hexane [2]	1.8E+00	1.8E-03	5.3E-02	2.3E-01
Indeno(1,2,3-cd)pyrene	1.8E-06	1.8E-09	5.3E-08	2.3E-07
Naphthalene	6.1E-04	6.0E-07	1.8E-05	7.9E-05
Phenanathrene	1.7E-05	1.7E-08	5.0E-07	2.2E-06
Pyrene	5.0E-06	4.9E-09	1.5E-07	6.4E-07
Toluene	3.4E-03	3.3E-06	1.0E-04	4.4E-04
		Total HAPs	**5.54E-02**	**2.42E-01**

[1] Emission factors from *AP-42 Chapter 1 Section 4 – Natural Gas Combustion Table 1.4-3 - Emission Factors for Speciated Organic Compounds from Natural Gas Combustion,* dated July 1998.

[2] Historically, hexane emissions were omitted. It has been included here as n-hexane to be conservative.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Gas Plant 2 Hot Oil Heater (HTR-7)

Table 19.a. - Gas Plant 2 Natural Gas-Fired Hot Oil Heater (EPN: HTR-7)

Parameter	Value	Units
Number of Units	1	
Heat Rating [1]	86.58	MMBtu/hr
Maximum Monthly Gas Usage	55.97	MMSCF/month
Maximum Annual Gas Usage	658.99	MMSCF/yr
Hours per Year per Unit Operated	8,760	hr/yr
Fuel Heating Value	1,151	Btu/scf

[1] From manufacturer's specs. Using maximum burner release to be conservative.

Table 19.b. - Gas Plant 2 Natural Gas-Fired Hot Oil Heater - Emissions

Pollutant	Default Emission Factors		Single Unit Uncontrolled Emissions	
	(lb/10^6 scf) [1, 2]	(lb/MMBtu) [3]	(lb/hr)	(tons/year) [4]
CO	-	0.041	3.55	15.55
NO_X	-	0.040	3.46	15.17
$PM/PM_{10}/PM_{2.5}$	7.6	0.007	0.65	2.83
SO_2	0.6	0.001	0.05	0.22
VOC	-	0.019	1.65	7.21

[1] Emission factor for CO, NO_X, and VOC from manufacturer's specifications.

[2] Emission factors for $PM/PM_{10}/PM_{2.5}$ and SO_2 are from AP-42 Chapter 1 Section 4 –Natural Gas Combustion Table 1.4-2 Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion.

[3] To convert from lb/10^6 scf to lb/MMBtu, the lb/10^6 scf emission factors were then divided by 1,020 as specified in AP-42 Chapter 1.4, Table 1.4-2 footnote a.

[4] Annual emissions are based on an operating schedule of 24 hours/day, 365 days/year (i.e., 8,760 hours/year).

Table 19.c. - Gas Plant 2 Natural Gas-Fired Hot Oil Heater - GHG Emissions

GHG	Default Emission Factors	Single Unit Uncontrolled Emissions	
	(kg/MMBtu) [1, 2]	(lb/hr)	(tons/year) [3]
CO_2	53.06	10,127.89	44,360.17
CH_4	1.00E-03	0.19	8.36E-01
N_2O	1.00E-04	0.02	8.36E-02
CO_2e	-	10,138.35	44,405.98

[1] CO_2 emission factor obtained from 40 CFR 98 Subpart C, Table C-1 for natural gas.

[2] CH_4 and N_2O emission factors from 40 CFR 98 Subpart C, Table C-2 for natural gas.

[5] Global warming potentials obtained from Table A-1 to Subpart 98 - Global Warming Potentials Equation A-1:

$CO_2e = \sum GHGi \times GWPi$

Where:

CO_2e = Carbon dioxide equivalent (tons/year)

GHGi = Mass emissions of each GHG (tons/year)

GWPi = Global warming potential for each GHG (1 for CO_2; 25 for CH_4; 298 for N_2O)

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Gas Plant 2 Hot Oil Heater (HTR-7)

Table 19.d. - Gas Plant 2 Natural Gas-Fired Hot Oil Heater - HAP Emissions

HAP Pollutant	Default Emission Factors [1]		Single Unit Uncontrolled Emissions	
	(lb/10^6 scf)	(lb/MMBtu)	(lb/hr)	(tons/year)
2-Methylnaphthalene	2.4E-05	2.4E-08	2.0E-06	8.9E-06
3-Methylchloranthrene	1.8E-06	1.8E-09	1.5E-07	6.7E-07
7,12-Dimethylbenz(a)anthracene	1.6E-05	1.6E-08	1.4E-06	5.9E-06
Acenaphthene	1.8E-06	1.8E-09	1.5E-07	6.7E-07
Acenaphthylene	1.8E-06	1.8E-09	1.5E-07	6.7E-07
Anthracene	2.4E-06	2.4E-09	2.0E-07	8.9E-07
Benz(a)anthracene	1.8E-06	1.8E-09	1.5E-07	6.7E-07
Benzene	2.1E-03	2.1E-06	1.8E-04	7.8E-04
Benzo(a)pyrene	1.2E-06	1.2E-09	1.0E-07	4.5E-07
Benzo(b)fluoranthene	1.8E-06	1.8E-09	1.5E-07	6.7E-07
Benzo(g,h,i)perylene	1.2E-06	1.2E-09	1.0E-07	4.5E-07
Benzo(k)fluoranthene	1.8E-06	1.8E-09	1.5E-07	6.7E-07
Chrysene	1.8E-06	1.8E-09	1.5E-07	6.7E-07
Dibenzo(a,h)anthracene	1.2E-06	1.2E-09	1.0E-07	4.5E-07
Dichlorobenzene	1.2E-03	1.2E-06	1.0E-04	4.5E-04
Fluoranthene	3.0E-06	2.9E-09	2.5E-07	1.1E-06
Fluorene	2.8E-06	2.7E-09	2.4E-07	1.0E-06
Formaldehyde	7.5E-02	7.4E-05	6.4E-03	2.8E-02
Hexane [2]	1.8E+00	1.8E-03	1.5E-01	6.7E-01
Indeno(1,2,3-cd)pyrene	1.8E-06	1.8E-09	1.5E-07	6.7E-07
Naphthalene	6.1E-04	6.0E-07	5.2E-05	2.3E-04
Phenanathrene	1.7E-05	1.7E-08	1.4E-06	6.3E-06
Pyrene	5.0E-06	4.9E-09	4.2E-07	1.9E-06
Toluene	3.4E-03	3.3E-06	2.9E-04	1.3E-03
		Total HAPs	**1.60E-01**	**7.00E-01**

[1] Emission factors from *AP-42 Chapter 1 Section 4 – Natural Gas Combustion Table 1.4-3 - Emission Factors for Speciated Organic Compounds from Natural Gas Combustion,* dated July 1998.

[2] Historically, hexane emissions were omitted. It has been included here as n-hexane to be conservative.

Wild Basin Gas Plant
Watford City, ND
Triethylene Glycol Dehydration Unit (DEHY-1)

Table 20.a. - Stream Information

Parameter	Value
Number of Units	1
Annual Operating Hours	8,760
Dry Gas Flowrate per Unit (MMSCFD)	200.00
Wet Gas Temperature (°F)	50
Wet Gas Pressure (psig)	150
Wet Gas Water Content (lb/mmscf)	7
Glycol Type	TEG
Lean Glycol Water Content (wt%)	1.50
Lean Glycol Flow Rate (gpm)	50.0
Flash Tank Temperature (°F)	100
Flash Tank Pressure (psig)	65
Control Device Efficiency	98%

Table 20.b. - TEG Dehydrator - Total Annual Emissions

Compound	Uncontrolled Condenser Emissions [1]		Uncontrolled Flash Tank Emissions [2]		Total Uncontrolled Emissions Per Unit		Controlled Regenerator		Controlled Flash Tank Emissions		Total Controlled Emissions Per Unit [3, 4]	
	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
Hydrogen Sulfide	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Methane	3.5600	15.5928	9.5042	41.6286	13.0642	57.2214	0.0712	0.3119	0.1901	0.8326	0.2613	1.1444
Ethane	16.3000	71.3940	11.4377	50.0970	27.7377	121.4910	0.3260	1.4279	0.2288	1.0019	0.5548	2.4298
Propane	28.2000	123.5160	10.3290	45.2409	38.5290	168.7569	0.5640	2.4703	0.2066	0.9048	0.7706	3.3751
Isobutane	7.6600	33.5508	2.0950	9.1760	9.7550	42.7268	0.1532	0.6710	0.0419	0.1835	0.1951	0.8545
n-Butane	27.0000	118.2600	6.4093	28.0727	33.4093	146.3327	0.5400	2.3652	0.1282	0.5615	0.6682	2.9267
Isopentane	5.5800	24.4404	1.7622	7.7184	7.3422	32.1588	0.1116	0.4888	0.0352	0.1544	0.1468	0.6432
n-Pentane	9.0700	39.7266	2.6971	11.8132	11.7671	51.5398	0.1814	0.7945	0.0539	0.2363	0.2353	1.0308
Cyclopentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Hexane	2.6800	11.7384	0.8903	3.8997	3.5703	15.6381	0.0536	0.2348	0.0178	0.0780	0.0714	0.3128
Cyclohexane	2.4000	10.5120	0.2639	1.1561	2.6639	11.6681	0.0480	0.2102	0.0053	0.0231	0.0533	0.2334
Other Hexanes	3.4500	15.1110	1.0914	4.7802	4.5414	19.8912	0.0690	0.3022	0.0218	0.0956	0.0908	0.3978
Heptanes	1.8300	8.0154	0.8584	3.7599	2.6884	11.7753	0.0366	0.1603	0.0172	0.0752	0.0538	0.2355
Methylcyclohexane	1.0600	4.6428	0.1754	0.7682	1.2354	5.4110	0.0212	0.0929	0.0035	0.0154	0.0247	0.1082
2,2,4-Trimethylpentane	0.0564	0.2470	0.0468	0.2051	0.1032	0.4521	0.0011	0.0049	0.0009	0.0041	0.0021	0.0090
Benzene	10.9000	47.7420	0.1646	0.7208	11.0646	48.4628	0.2180	0.9548	0.0033	0.0144	0.2213	0.9693
Toluene	2.5800	11.3004	0.0708	0.3101	2.6508	11.6105	0.0516	0.2260	0.0014	0.0062	0.0530	0.2322
Ethylbenzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Xylenes	0.3140	1.3753	0.0131	0.0574	0.3271	1.4327	0.0063	0.0275	0.0003	0.0011	0.0065	0.0287
C8+	0.0060	0.0263	0.0665	0.2912	0.0725	0.3175	0.0001	0.0005	0.0013	0.0058	0.0015	0.0063
Total Emissions	122.6464	537.1912	47.8757	209.6955	170.5221	746.8867	2.4529	10.7438	0.9575	4.1939	3.4104	14.9377
Total Hydrocarbon Emissions	122.6464	537.1912	47.8757	209.6955	170.5221	746.8867	2.4529	10.7438	0.9575	4.1939	3.4104	14.9377
Total VOC Emissions	**102.7864**	**450.2044**	**26.9338**	**117.9699**	**129.7202**	**568.1743**	**2.0557**	**9.0041**	**0.5387**	**2.3594**	**2.5944**	**11.3635**
Total HAP Emissions	**16.5304**	**72.4032**	**1.1856**	**5.1931**	**17.7160**	**77.5963**	**0.3306**	**1.4481**	**0.0237**	**0.1039**	**0.3543**	**1.5519**

[1] From *Condenser Vent Stream* in GLYCalc report.

[2] From *Flash Tank Off Gas Emissions* in GLYCalc report.

[3] Overhead vapors from the regenerator (i.e., still vent) are routed through a cooler to an accumulator vessel which is represented in GLYCalc as a condenser. The vapor outlet from the accumulator can be routed for recycle to the plant inlet through VRU compressors or routed to the combustor. To be conservative, the calculations assume all outlet vapors are routed to the combustor (EU: EC-3).

[4] Vapors from the flash tank are routed to the combustor (EU: EC-3).

[5] Inlet gas composition for GLYCalc report taken from P2 INLET GAS 120622 composition.

Table 20.c. - TEG Dehydrator - GHG Emissions

GHG	Uncontrolled Dehydrator Emissions		Controlled Dehydrator Emissions	
	lb/hr	tpy	lb/hr	tpy
CO_2	10.50	45.99	10.50	45.99
CH_4	13.06	57.22	0.26	1.14
CO_2e	337.11	1476.52	17.03	74.60

1 CH4 emissions from TEG Dehydrator Emissions (calculated in Table 20.b).

[5] Global warming potentials obtained from Table A-1 to Subpart 98 - Global Warming Potentials Equation A-1:

$CO_2e = \sum GHGi \times GWPi$

Where:

CO_2e = Carbon dioxide equivalent (tons/year)

GHGi = Mass emissions of each GHG (tons/year)

GWPi = Global warming potential for each GHG (1 for CO_2; 25 for CH_4; 298 for N_2O)

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Wild Basin Plant
File Name: \\tsclient\C\Users\jguest\Desktop\Crestwood Wild Basin Gas Plant Oasis Gas Plant\Calculations\DEHY\DEHY-1.ddf
Date: January 10, 2023

DESCRIPTION:

Description: DEHY-1

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0711	1.708	0.3116
Ethane	0.3255	7.813	1.4259
Propane	0.5630	13.512	2.4659
Isobutane	0.1531	3.675	0.6707
n-Butane	0.5399	12.957	2.3647
Isopentane	0.1115	2.677	0.4885
n-Pentane	0.1814	4.354	0.7945
n-Hexane	0.0536	1.287	0.2348
Cyclohexane	0.0480	1.151	0.2101
Other Hexanes	0.0689	1.654	0.3019
Heptanes	0.0366	0.879	0.1605
Methylcyclohexane	0.0213	0.511	0.0932
2,2,4-Trimethylpentane	0.0011	0.027	0.0049
Benzene	0.2185	5.244	0.9571
Toluene	0.0516	1.239	0.2261
Xylenes	0.0063	0.151	0.0275
C8+ Heavies	0.0001	0.003	0.0005
Total Emissions	2.4517	58.842	10.7386
Total Hydrocarbon Emissions	2.4517	58.842	10.7386
Total VOC Emissions	2.0551	49.321	9.0011
Total HAP Emissions	0.3312	7.948	1.4505
Total BTEX Emissions	0.2764	6.634	1.2107

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	3.5826	85.982	15.6917
Ethane	16.9354	406.449	74.1769
Propane	33.8567	812.560	148.2923
Isobutane	11.0846	266.030	48.5504
n-Butane	46.1724	1108.139	202.2353
Isopentane	15.4954	371.888	67.8696
n-Pentane	30.1599	723.838	132.1005
n-Hexane	19.3277	463.865	84.6554
Cyclohexane	23.6532	567.678	103.6012
Other Hexanes	17.5794	421.905	76.9977
Heptanes	41.4771	995.452	181.6699

Methylcyclohexane	21.0988	506.371	92.4127
2,2,4-Trimethylpentane	1.1065	26.555	4.8463
Benzene	114.2316	2741.559	500.3345
Toluene	82.4216	1978.119	361.0066
Xylenes	42.1558	1011.740	184.6426
C8+ Heavies	34.9440	838.656	153.0547
Total Emissions	555.2827	13326.785	2432.1383
Total Hydrocarbon Emissions	555.2827	13326.785	2432.1383
Total VOC Emissions	534.7648	12834.354	2342.2697
Total HAP Emissions	259.2432	6221.838	1135.4854
Total BTEX Emissions	238.8091	5731.417	1045.9837

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.1901	4.562	0.8326
Ethane	0.2288	5.490	1.0019
Propane	0.2066	4.958	0.9048
Isobutane	0.0419	1.006	0.1835
n-Butane	0.1282	3.076	0.5615
Isopentane	0.0352	0.846	0.1544
n-Pentane	0.0539	1.295	0.2363
n-Hexane	0.0178	0.427	0.0780
Cyclohexane	0.0053	0.127	0.0231
Other Hexanes	0.0218	0.524	0.0956
Heptanes	0.0172	0.412	0.0752
Methylcyclohexane	0.0035	0.084	0.0154
2,2,4-Trimethylpentane	0.0009	0.022	0.0041
Benzene	0.0033	0.079	0.0144
Toluene	0.0014	0.034	0.0062
Xylenes	0.0003	0.006	0.0011
C8+ Heavies	0.0013	0.032	0.0058
Total Emissions	0.9575	22.980	4.1939
Total Hydrocarbon Emissions	0.9575	22.980	4.1939
Total VOC Emissions	0.5387	12.928	2.3594
Total HAP Emissions	0.0237	0.569	0.1039
Total BTEX Emissions	0.0050	0.119	0.0218

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	9.5042	228.102	41.6286
Ethane	11.4377	274.504	50.0970
Propane	10.3290	247.895	45.2409
Isobutane	2.0950	50.279	9.1760
n-Butane	6.4093	153.824	28.0729
Isopentane	1.7622	42.293	7.7184
n-Pentane	2.6971	64.730	11.8132
n-Hexane	0.8903	21.368	3.8997
Cyclohexane	0.2639	6.335	1.1561
Other Hexanes	1.0914	26.193	4.7802
Heptanes	0.8584	20.602	3.7599
Methylcyclohexane	0.1754	4.209	0.7682
2,2,4-Trimethylpentane	0.0468	1.124	0.2051
Benzene	0.1646	3.950	0.7208

Toluene	0.0708	1.699	0.3101
Xylenes	0.0131	0.314	0.0574
C8+ Heavies	0.0665	1.596	0.2912
Total Emissions	47.8757	1149.017	209.6957
Total Hydrocarbon Emissions	47.8757	1149.017	209.6957
Total VOC Emissions	26.9338	646.411	117.9701
Total HAP Emissions	1.1856	28.455	5.1931
Total BTEX Emissions	0.2485	5.963	1.0883

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature:	92.00 deg. F
Condenser Pressure:	16.70 psia
Condenser Duty:	5.10e-001 MM BTU/hr
Hydrocarbon Recovery:	34.88 bbls/day
Produced Water:	26.54 bbls/day
Ambient Temperature:	50.00 deg. F
Excess Oxygen:	0.00 %
Combustion Efficiency:	98.00 %
Supplemental Fuel Requirement:	5.10e-001 MM BTU/hr

Component	Emitted	Destroyed
Methane	1.99%	98.01%
Ethane	1.92%	98.08%
Propane	1.66%	98.34%
Isobutane	1.38%	98.62%
n-Butane	1.17%	98.83%
Isopentane	0.72%	99.28%
n-Pentane	0.60%	99.40%
n-Hexane	0.28%	99.72%
Cyclohexane	0.20%	99.80%
Other Hexanes	0.39%	99.61%
Heptanes	0.09%	99.91%
Methylcyclohexane	0.10%	99.90%
2,2,4-Trimethylpentane	0.10%	99.90%
Benzene	0.19%	99.81%
Toluene	0.06%	99.94%
Xylenes	0.01%	99.99%
C8+ Heavies	0.00%	100.00%

ABSORBER

NOTE: Because the Calculated Absorber Stages was below the minimum allowed, GRI-GLYCalc has set the number of Absorber Stages to 1.25 and has calculated a revised Dry Gas Dew Point.

Calculated Absorber Stages:	1.25
Calculated Dry Gas Dew Point:	1.92 lbs. H2O/MMSCF
Temperature:	47.0 deg. F
Pressure:	150.0 psig

Dry Gas Flow Rate: 200.0000 MMSCF/day
Glycol Losses with Dry Gas: 0.0559 lb/hr
Wet Gas Water Content: Saturated
Calculated Wet Gas Water Content: 48.59 lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio: 7.68 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	3.95%	96.05%
Carbon Dioxide	99.88%	0.12%
Nitrogen	99.99%	0.01%
Methane	99.99%	0.01%
Ethane	99.97%	0.03%
Propane	99.94%	0.06%
Isobutane	99.89%	0.11%
n-Butane	99.83%	0.17%
Isopentane	99.78%	0.22%
n-Pentane	99.70%	0.30%
n-Hexane	99.33%	0.67%
Cyclohexane	97.14%	2.86%
Other Hexanes	99.53%	0.47%
Heptanes	98.29%	1.71%
Methylcyclohexane	95.80%	4.20%
2,2,4-Trimethylpentane	99.26%	0.74%
Benzene	73.96%	26.04%
Toluene	58.42%	41.58%
Xylenes	27.69%	72.31%
C8+ Heavies	95.25%	4.75%

FLASH TANK

Flash Control: Combustion device
Flash Control Efficiency: 98.00 %
Flash Temperature: 100.0 deg. F
Flash Pressure: 65.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	100.00%	0.00%
Carbon Dioxide	84.11%	15.89%
Nitrogen	26.86%	73.14%
Methane	27.37%	72.63%
Ethane	59.69%	40.31%
Propane	76.62%	23.38%
Isobutane	84.10%	15.90%
n-Butane	87.81%	12.19%
Isopentane	89.84%	10.16%
n-Pentane	91.83%	8.17%
n-Hexane	95.62%	4.38%
Cyclohexane	98.93%	1.07%
Other Hexanes	94.21%	5.79%
Heptanes	97.98%	2.02%
Methylcyclohexane	99.21%	0.79%
2,2,4-Trimethylpentane	96.00%	4.00%
Benzene	99.86%	0.14%
Toluene	99.92%	0.08%
Xylenes	99.97%	0.03%
C8+ Heavies	99.83%	0.17%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	51.90%	48.10%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.56%	99.44%
n-Pentane	0.54%	99.46%
n-Hexane	0.52%	99.48%
Cyclohexane	3.23%	96.77%
Other Hexanes	1.06%	98.94%
Heptanes	0.51%	99.49%
Methylcyclohexane	4.03%	95.97%
2,2,4-Trimethylpentane	1.56%	98.44%
Benzene	5.01%	94.99%
Toluene	7.91%	92.09%
Xylenes	12.90%	87.10%
C8+ Heavies	12.02%	87.98%

STREAM REPORTS:

WET GAS STREAM

Temperature: 47.00 deg. F
Pressure: 164.70 psia
Flow Rate: 8.35e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.02e-001	4.06e+002
Carbon Dioxide	1.12e+000	1.09e+004
Nitrogen	1.59e+000	9.77e+003
Methane	6.76e+001	2.38e+005
Ethane	1.71e+001	1.13e+005
Propane	7.31e+000	7.09e+004
Isobutane	8.98e-001	1.15e+004
n-Butane	2.47e+000	3.15e+004
Isopentane	4.96e-001	7.86e+003
n-Pentane	6.93e-001	1.10e+004
n-Hexane	1.60e-001	3.04e+003
Cyclohexane	4.53e-002	8.38e+002
Other Hexanes	2.12e-001	4.01e+003
Heptanes	1.12e-001	2.47e+003
Methylcyclohexane	2.35e-002	5.07e+002
2,2,4-Trimethylpentane	6.19e-003	1.56e+002
Benzene	2.56e-002	4.39e+002
Toluene	9.79e-003	1.98e+002

Component	Conc. (vol%)	Loading (lb/hr)
Xylenes	2.50e-003	5.83e+001
C8+ Heavies	1.97e-002	7.37e+002
Total Components	100.00	5.18e+005

DRY GAS STREAM

Temperature: 47.00 deg. F
Pressure: 164.70 psia
Flow Rate: 8.33e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	4.05e-003	1.60e+001
Carbon Dioxide	1.12e+000	1.09e+004
Nitrogen	1.59e+000	9.77e+003
Methane	6.77e+001	2.38e+005
Ethane	1.71e+001	1.13e+005
Propane	7.31e+000	7.08e+004
Isobutane	8.99e-001	1.15e+004
n-Butane	2.47e+000	3.15e+004
Isopentane	4.95e-001	7.85e+003
n-Pentane	6.92e-001	1.10e+004
n-Hexane	1.59e-001	3.02e+003
Cyclohexane	4.40e-002	8.14e+002
Other Hexanes	2.11e-001	3.99e+003
Heptanes	1.11e-001	2.43e+003
Methylcyclohexane	2.25e-002	4.86e+002
2,2,4-Trimethylpentane	6.16e-003	1.54e+002
Benzene	1.89e-002	3.25e+002
Toluene	5.73e-003	1.16e+002
Xylenes	6.93e-004	1.61e+001
C8+ Heavies	1.88e-002	7.02e+002
Total Components	100.00	5.17e+005

LEAN GLYCOL STREAM

Temperature: 47.00 deg. F
Flow Rate: 4.98e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.84e+001	2.76e+004
Water	1.50e+000	4.20e+002
Carbon Dioxide	4.55e-012	1.27e-009
Nitrogen	1.92e-013	5.37e-011
Methane	1.57e-018	4.40e-016
Ethane	4.78e-008	1.34e-005
Propane	6.42e-009	1.80e-006
Isobutane	1.41e-009	3.95e-007
n-Butane	4.66e-009	1.30e-006
Isopentane	3.10e-004	8.67e-002
n-Pentane	5.90e-004	1.65e-001
n-Hexane	3.63e-004	1.02e-001
Cyclohexane	2.82e-003	7.91e-001
Other Hexanes	6.73e-004	1.89e-001
Heptanes	7.60e-004	2.13e-001
Methylcyclohexane	3.16e-003	8.86e-001

Component	Conc. (wt%)	Loading (lb/hr)
2,2,4-Trimethylpentane	6.27e-005	1.76e-002
Benzene	2.15e-002	6.02e+000
Toluene	2.53e-002	7.08e+000
Xylenes	2.23e-002	6.25e+000
C8+ Heavies	1.70e-002	4.77e+000
Total Components	100.00	2.80e+004

RICH GLYCOL STREAM

Temperature: 47.00 deg. F
Pressure: 164.70 psia
Flow Rate: 5.19e+001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.50e+001	2.76e+004
Water	2.79e+000	8.10e+002
Carbon Dioxide	4.39e-002	1.27e+001
Nitrogen	1.85e-003	5.37e-001
Methane	4.51e-002	1.31e+001
Ethane	9.78e-002	2.84e+001
Propane	1.52e-001	4.42e+001
Isobutane	4.54e-002	1.32e+001
n-Butane	1.81e-001	5.26e+001
Isopentane	5.98e-002	1.73e+001
n-Pentane	1.14e-001	3.30e+001
n-Hexane	7.00e-002	2.03e+001
Cyclohexane	8.52e-002	2.47e+001
Other Hexanes	6.50e-002	1.89e+001
Heptanes	1.47e-001	4.25e+001
Methylcyclohexane	7.64e-002	2.22e+001
2,2,4-Trimethylpentane	4.04e-003	1.17e+000
Benzene	4.15e-001	1.20e+002
Toluene	3.09e-001	8.96e+001
Xylenes	1.67e-001	4.84e+001
C8+ Heavies	1.37e-001	3.98e+001
Total Components	100.00	2.90e+004

FLASH TANK OFF GAS STREAM

Temperature: 100.00 deg. F
Pressure: 79.70 psia
Flow Rate: 5.76e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.80e-002	2.13e-002
Carbon Dioxide	3.03e+000	2.03e+000
Nitrogen	9.24e-001	3.93e-001
Methane	3.91e+001	9.50e+000
Ethane	2.51e+001	1.14e+001
Propane	1.54e+001	1.03e+001
Isobutane	2.38e+000	2.09e+000
n-Butane	7.27e+000	6.41e+000
Isopentane	1.61e+000	1.76e+000
n-Pentane	2.46e+000	2.70e+000

n-Hexane	6.81e-001	8.90e-001
Cyclohexane	2.07e-001	2.64e-001
Other Hexanes	8.35e-001	1.09e+000
Heptanes	5.65e-001	8.58e-001
Methylcyclohexane	1.18e-001	1.75e-001
2,2,4-Trimethylpentane	2.70e-002	4.68e-002
Benzene	1.39e-001	1.65e-001
Toluene	5.07e-002	7.08e-002
Xylenes	8.14e-003	1.31e-002
C8+ Heavies	2.57e-002	6.65e-002
Total Components	100.00	5.03e+001

FLASH TANK GLYCOL STREAM

Temperature: 100.00 deg. F
Flow Rate: 5.18e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.52e+001	2.76e+004
Water	2.80e+000	8.10e+002
Carbon Dioxide	3.70e-002	1.07e+001
Nitrogen	4.98e-004	1.44e-001
Methane	1.24e-002	3.58e+000
Ethane	5.85e-002	1.69e+001
Propane	1.17e-001	3.39e+001
Isobutane	3.83e-002	1.11e+001
n-Butane	1.59e-001	4.62e+001
Isopentane	5.38e-002	1.56e+001
n-Pentane	1.05e-001	3.03e+001
n-Hexane	6.71e-002	1.94e+001
Cyclohexane	8.44e-002	2.44e+001
Other Hexanes	6.14e-002	1.78e+001
Heptanes	1.44e-001	4.17e+001
Methylcyclohexane	7.59e-002	2.20e+001
2,2,4-Trimethylpentane	3.88e-003	1.12e+000
Benzene	4.15e-001	1.20e+002
Toluene	3.09e-001	8.95e+001
Xylenes	1.67e-001	4.84e+001
C8+ Heavies	1.37e-001	3.97e+001
Total Components	100.00	2.90e+004

FLASH GAS EMISSIONS

Flow Rate: 2.95e+003 scfh
Control Method: Combustion Device
Control Efficiency: 98.00

Component	Conc. (vol%)	Loading (lb/hr)
Water	5.85e+001	8.20e+001
Carbon Dioxide	4.10e+001	1.40e+002
Nitrogen	1.80e-001	3.93e-001
Methane	1.52e-001	1.90e-001
Ethane	9.77e-002	2.29e-001
Propane	6.02e-002	2.07e-001

Isobutane	9.26e-003	4.19e-002
n-Butane	2.83e-002	1.28e-001
Isopentane	6.27e-003	3.52e-002
n-Pentane	9.60e-003	5.39e-002
n-Hexane	2.65e-003	1.78e-002
Cyclohexane	8.06e-004	5.28e-003
Other Hexanes	3.25e-003	2.18e-002
Heptanes	2.20e-003	1.72e-002
Methylcyclohexane	4.59e-004	3.51e-003
2,2,4-Trimethylpentane	1.05e-004	9.36e-004
Benzene	5.41e-004	3.29e-003
Toluene	1.97e-004	1.42e-003
Xylenes	3.17e-005	2.62e-004
C8+ Heavies	1.00e-004	1.33e-003
Total Components	100.00	2.24e+002

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.11e+004 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.37e+001	3.89e+002
Carbon Dioxide	8.30e-001	1.07e+001
Nitrogen	1.75e-002	1.44e-001
Methane	7.61e-001	3.58e+000
Ethane	1.92e+000	1.69e+001
Propane	2.62e+000	3.39e+001
Isobutane	6.50e-001	1.11e+001
n-Butane	2.71e+000	4.62e+001
Isopentane	7.32e-001	1.55e+001
n-Pentane	1.42e+000	3.02e+001
n-Hexane	7.64e-001	1.93e+001
Cyclohexane	9.57e-001	2.37e+001
Other Hexanes	6.95e-001	1.76e+001
Heptanes	1.41e+000	4.15e+001
Methylcyclohexane	7.32e-001	2.11e+001
2,2,4-Trimethylpentane	3.30e-002	1.11e+000
Benzene	4.98e+000	1.14e+002
Toluene	3.05e+000	8.24e+001
Xylenes	1.35e+000	4.22e+001
C8+ Heavies	6.99e-001	3.49e+001
Total Components	100.00	9.56e+002

CONDENSER PRODUCED WATER STREAM

Temperature: 92.00 deg. F
Flow Rate: 7.74e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	9.99e+001	3.87e+002	999124.
Carbon Dioxide	1.14e-002	4.42e-002	114.
Nitrogen	3.38e-006	1.31e-005	0.
Methane	1.73e-004	6.68e-004	2.
Ethane	9.74e-004	3.77e-003	10.

Propane	1.35e-003	5.22e-003	13.
Isobutane	2.06e-004	7.99e-004	2.
n-Butane	9.99e-004	3.87e-003	10.
Isopentane	1.51e-004	5.85e-004	2.
n-Pentane	2.70e-004	1.04e-003	3.
n-Hexane	6.97e-005	2.70e-004	1.
Cyclohexane	3.89e-004	1.51e-003	4.
Other Hexanes	7.06e-005	2.73e-004	1.
Heptanes	2.74e-005	1.06e-004	0.
Methylcyclohexane	8.41e-005	3.26e-004	1.
2,2,4-Trimethylpentane	5.50e-007	2.13e-006	0.
Benzene	5.80e-002	2.25e-001	580.
Toluene	1.18e-002	4.58e-002	118.
Xylenes	1.63e-003	6.31e-003	16.
C8+ Heavies	4.35e-008	1.68e-007	0.
Total Components	100.00	3.87e+002	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 92.00 deg. F
Flow Rate: 1.02e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
Water	3.72e-002	1.61e-001
Carbon Dioxide	4.81e-002	2.08e-001
Nitrogen	2.14e-004	9.26e-004
Methane	5.67e-003	2.45e-002
Ethane	1.51e-001	6.55e-001
Propane	1.32e+000	5.70e+000
Isobutane	7.92e-001	3.43e+000
n-Butane	4.43e+000	1.92e+001
Isopentane	2.29e+000	9.92e+000
n-Pentane	4.87e+000	2.11e+001
n-Hexane	3.85e+000	1.66e+001
Cyclohexane	4.91e+000	2.13e+001
Other Hexanes	3.27e+000	1.41e+001
Heptanes	9.16e+000	3.96e+001
Methylcyclohexane	4.63e+000	2.00e+001
2,2,4-Trimethylpentane	2.43e-001	1.05e+000
Benzene	2.38e+001	1.03e+002
Toluene	1.84e+001	7.98e+001
Xylenes	9.67e+000	4.18e+001
C8+ Heavies	8.07e+000	3.49e+001
Total Components	100.00	4.33e+002

CONDENSER VENT STREAM

Temperature: 92.00 deg. F
Pressure: 16.70 psia
Flow Rate: 1.09e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	4.49e+000	2.32e+000
Carbon Dioxide	8.28e+000	1.05e+001
Nitrogen	1.78e-001	1.43e-001

Methane	7.72e+000	3.56e+000
Ethane	1.88e+001	1.63e+001
Propane	2.22e+001	2.82e+001
Isobutane	4.59e+000	7.66e+000
n-Butane	1.62e+001	2.70e+001
Isopentane	2.69e+000	5.58e+000
n-Pentane	4.38e+000	9.07e+000
n-Hexane	1.08e+000	2.68e+000
Cyclohexane	9.92e-001	2.40e+000
Other Hexanes	1.39e+000	3.45e+000
Heptanes	6.36e-001	1.83e+000
Methylcyclohexane	3.77e-001	1.06e+000
2,2,4-Trimethylpentane	1.72e-002	5.64e-002
Benzene	4.87e+000	1.09e+001
Toluene	9.75e-001	2.58e+000
Xylenes	1.03e-001	3.14e-001
C8+ Heavies	1.23e-003	6.00e-003
Total Components	100.00	1.36e+002

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.90e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	8.87e+000	7.11e-002
Ethane	2.16e+001	3.26e-001
Propane	2.55e+001	5.63e-001
Isobutane	5.27e+000	1.53e-001
n-Butane	1.86e+001	5.40e-001
Isopentane	3.09e+000	1.12e-001
n-Pentane	5.03e+000	1.81e-001
n-Hexane	1.24e+000	5.36e-002
Cyclohexane	1.14e+000	4.80e-002
Other Hexanes	1.60e+000	6.89e-002
Heptanes	7.31e-001	3.66e-002
Methylcyclohexane	4.33e-001	2.13e-002
2,2,4-Trimethylpentane	1.98e-002	1.13e-003
Benzene	5.59e+000	2.19e-001
Toluene	1.12e+000	5.16e-002
Xylenes	1.18e-001	6.29e-003
C8+ Heavies	1.41e-003	1.20e-004
Total Components	100.00	2.45e+000

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Wild Basin Plant
File Name: \\tsclient\C\Users\jguest\Desktop\Crestwood Wild Basin Gas Plant Oasis Gas Plant\Calculations\DEHY\DEHY-1.ddf
Date: January 10, 2023

DESCRIPTION:

Description: DEHY-1

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 47.00 deg. F
Pressure: 150.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	1.1234
Nitrogen	1.5869
Methane	67.6696
Ethane	17.1271
Propane	7.3161
Isobutane	0.8992
n-Butane	2.4703
Isopentane	0.4961
n-Pentane	0.6941
n-Hexane	0.1603
Cyclohexane	0.0453
Other Hexanes	0.2119
Heptanes	0.1124
Methylcyclohexane	0.0235
2,2,4-Trimethylpentane	0.0062
Benzene	0.0256
Toluene	0.0098
Xylenes	0.0025
C8+ Heavies	0.0197

DRY GAS:

Flow Rate: 200.0 MMSCF/day
Water Content: 7.0 lbs. H2O/MMSCF

LEAN GLYCOL:

Glycol Type: TEG
Water Content: 1.5 wt% H2O
Flow Rate: 50.0 gpm

PUMP:

Glycol Pump Type: Electric/Pneumatic

FLASH TANK:

Flash Control:	Combustion device
Flash Control Efficiency:	98.00 %
Temperature:	100.0 deg. F
Pressure:	65.0 psig

REGENERATOR OVERHEADS CONTROL DEVICE:

Control Device:	Condenser
Temperature:	92.0 deg. F
Pressure:	16.7 psia

Control Device:	Combustion Device
Destruction Efficiency:	98.0 %
Excess Oxygen:	0.0 %
Ambient Air Temperature:	50.0 deg. F

GRI-GLYCalc VERSION 4.0 - EQUIPMENT SUMMARY REPORT

Case Name: Wild Basin Plant
File Name: \\tsclient\C\Users\jguest\Desktop\Crestwood Wild Basin Gas Plant Oasis Gas Plant\Calculations\DEHY\DEHY-1.ddf
Date: January 10, 2023

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature:	92.00 deg. F
Condenser Pressure:	16.70 psia
Condenser Duty:	5.10e-001 MM BTU/hr
Hydrocarbon Recovery:	34.88 bbls/day
Produced Water:	26.54 bbls/day
Ambient Temperature:	50.00 deg. F
Excess Oxygen:	0.00 %
Combustion Efficiency:	98.00 %
Supplemental Fuel Requirement:	5.10e-001 MM BTU/hr

Component	Emitted	Destroyed
Methane	1.99%	98.01%
Ethane	1.92%	98.08%
Propane	1.66%	98.34%
Isobutane	1.38%	98.62%
n-Butane	1.17%	98.83%
Isopentane	0.72%	99.28%
n-Pentane	0.60%	99.40%
n-Hexane	0.28%	99.72%
Cyclohexane	0.20%	99.80%
Other Hexanes	0.39%	99.61%
Heptanes	0.09%	99.91%
Methylcyclohexane	0.10%	99.90%
2,2,4-Trimethylpentane	0.10%	99.90%
Benzene	0.19%	99.81%
Toluene	0.06%	99.94%
Xylenes	0.01%	99.99%
C8+ Heavies	0.00%	100.00%

ABSORBER

NOTE: Because the Calculated Absorber Stages was below the minimum allowed, GRI-GLYCalc has set the number of Absorber Stages to 1.25 and has calculated a revised Dry Gas Dew Point.

Calculated Absorber Stages:	1.25
Calculated Dry Gas Dew Point:	1.92 lbs. H2O/MMSCF
Temperature:	47.0 deg. F
Pressure:	150.0 psig
Dry Gas Flow Rate:	200.0000 MMSCF/day
Glycol Losses with Dry Gas:	0.0559 lb/hr
Wet Gas Water Content:	Saturated
Calculated Wet Gas Water Content:	48.59 lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	7.68 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	3.95%	96.05%
Carbon Dioxide	99.88%	0.12%

Nitrogen	99.99%	0.01%
Methane	99.99%	0.01%
Ethane	99.97%	0.03%
Propane	99.94%	0.06%
Isobutane	99.89%	0.11%
n-Butane	99.83%	0.17%
Isopentane	99.78%	0.22%
n-Pentane	99.70%	0.30%
n-Hexane	99.33%	0.67%
Cyclohexane	97.14%	2.86%
Other Hexanes	99.53%	0.47%
Heptanes	98.29%	1.71%
Methylcyclohexane	95.80%	4.20%
2,2,4-Trimethylpentane	99.26%	0.74%
Benzene	73.96%	26.04%
Toluene	58.42%	41.58%
Xylenes	27.69%	72.31%
C8+ Heavies	95.25%	4.75%

FLASH TANK

Flash Control: Combustion device
Flash Control Efficiency: 98.00 %
Flash Temperature: 100.0 deg. F
Flash Pressure: 65.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	100.00%	0.00%
Carbon Dioxide	84.11%	15.89%
Nitrogen	26.86%	73.14%
Methane	27.37%	72.63%
Ethane	59.69%	40.31%
Propane	76.62%	23.38%
Isobutane	84.10%	15.90%
n-Butane	87.81%	12.19%
Isopentane	89.84%	10.16%
n-Pentane	91.83%	8.17%
n-Hexane	95.62%	4.38%
Cyclohexane	98.93%	1.07%
Other Hexanes	94.21%	5.79%
Heptanes	97.98%	2.02%
Methylcyclohexane	99.21%	0.79%
2,2,4-Trimethylpentane	96.00%	4.00%
Benzene	99.86%	0.14%
Toluene	99.92%	0.08%
Xylenes	99.97%	0.03%
C8+ Heavies	99.83%	0.17%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	51.90%	48.10%
Carbon Dioxide	0.00%	100.00%

Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.56%	99.44%
n-Pentane	0.54%	99.46%
n-Hexane	0.52%	99.48%
Cyclohexane	3.23%	96.77%
Other Hexanes	1.06%	98.94%
Heptanes	0.51%	99.49%
Methylcyclohexane	4.03%	95.97%
2,2,4-Trimethylpentane	1.56%	98.44%
Benzene	5.01%	94.99%
Toluene	7.91%	92.09%
Xylenes	12.90%	87.10%
C8+ Heavies	12.02%	87.98%

GRI-GLYCalc VERSION 4.0 - EMISSIONS SUMMARY

Case Name: Wild Basin Plant
File Name: \\tsclient\C\Users\jguest\Desktop\Crestwood Wild Basin Gas Plant Oasis Gas Plant\Calculations\DEHY\DEHY-1.ddf
Date: January 10, 2023

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0711	1.708	0.3116
Ethane	0.3255	7.813	1.4259
Propane	0.5630	13.512	2.4659
Isobutane	0.1531	3.675	0.6707
n-Butane	0.5399	12.957	2.3647
Isopentane	0.1115	2.677	0.4885
n-Pentane	0.1814	4.354	0.7945
n-Hexane	0.0536	1.287	0.2348
Cyclohexane	0.0480	1.151	0.2101
Other Hexanes	0.0689	1.654	0.3019
Heptanes	0.0366	0.879	0.1605
Methylcyclohexane	0.0213	0.511	0.0932
2,2,4-Trimethylpentane	0.0011	0.027	0.0049
Benzene	0.2185	5.244	0.9571
Toluene	0.0516	1.239	0.2261
Xylenes	0.0063	0.151	0.0275
C8+ Heavies	0.0001	0.003	0.0005
Total Emissions	2.4517	58.842	10.7386
Total Hydrocarbon Emissions	2.4517	58.842	10.7386
Total VOC Emissions	2.0551	49.321	9.0011
Total HAP Emissions	0.3312	7.948	1.4505
Total BTEX Emissions	0.2764	6.634	1.2107

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	3.5826	85.982	15.6917
Ethane	16.9354	406.449	74.1769
Propane	33.8567	812.560	148.2923
Isobutane	11.0846	266.030	48.5504
n-Butane	46.1724	1108.139	202.2353
Isopentane	15.4954	371.888	67.8696
n-Pentane	30.1599	723.838	132.1005
n-Hexane	19.3277	463.865	84.6554
Cyclohexane	23.6532	567.678	103.6012
Other Hexanes	17.5794	421.905	76.9977
Heptanes	41.4771	995.452	181.6699
Methylcyclohexane	21.0988	506.371	92.4127
2,2,4-Trimethylpentane	1.1065	26.555	4.8463
Benzene	114.2316	2741.559	500.3345
Toluene	82.4216	1978.119	361.0066
Xylenes	42.1558	1011.740	184.6426
C8+ Heavies	34.9440	838.656	153.0547
Total Emissions	555.2827	13326.785	2432.1383
Total Hydrocarbon Emissions	555.2827	13326.785	2432.1383

Total VOC Emissions	534.7648	12834.354	2342.2697
Total HAP Emissions	259.2432	6221.838	1135.4854
Total BTEX Emissions	238.8091	5731.417	1045.9837

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.1901	4.562	0.8326
Ethane	0.2288	5.490	1.0019
Propane	0.2066	4.958	0.9048
Isobutane	0.0419	1.006	0.1835
n-Butane	0.1282	3.076	0.5615
Isopentane	0.0352	0.846	0.1544
n-Pentane	0.0539	1.295	0.2363
n-Hexane	0.0178	0.427	0.0780
Cyclohexane	0.0053	0.127	0.0231
Other Hexanes	0.0218	0.524	0.0956
Heptanes	0.0172	0.412	0.0752
Methylcyclohexane	0.0035	0.084	0.0154
2,2,4-Trimethylpentane	0.0009	0.022	0.0041
Benzene	0.0033	0.079	0.0144
Toluene	0.0014	0.034	0.0062
Xylenes	0.0003	0.006	0.0011
C8+ Heavies	0.0013	0.032	0.0058
Total Emissions	0.9575	22.980	4.1939
Total Hydrocarbon Emissions	0.9575	22.980	4.1939
Total VOC Emissions	0.5387	12.928	2.3594
Total HAP Emissions	0.0237	0.569	0.1039
Total BTEX Emissions	0.0050	0.119	0.0218

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	9.5042	228.102	41.6286
Ethane	11.4377	274.504	50.0970
Propane	10.3290	247.895	45.2409
Isobutane	2.0950	50.279	9.1760
n-Butane	6.4093	153.824	28.0729
Isopentane	1.7622	42.293	7.7184
n-Pentane	2.6971	64.730	11.8132
n-Hexane	0.8903	21.368	3.8997
Cyclohexane	0.2639	6.335	1.1561
Other Hexanes	1.0914	26.193	4.7802
Heptanes	0.8584	20.602	3.7599
Methylcyclohexane	0.1754	4.209	0.7682
2,2,4-Trimethylpentane	0.0468	1.124	0.2051
Benzene	0.1646	3.950	0.7208
Toluene	0.0708	1.699	0.3101
Xylenes	0.0131	0.314	0.0574
C8+ Heavies	0.0665	1.596	0.2912
Total Emissions	47.8757	1149.017	209.6957
Total Hydrocarbon Emissions	47.8757	1149.017	209.6957
Total VOC Emissions	26.9338	646.411	117.9701
Total HAP Emissions	1.1856	28.455	5.1931
Total BTEX Emissions	0.2485	5.963	1.0883

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Slop Truck Loading (STL-1)

Table 21.a. - Loading Losses - Calculation Inputs

Parameter	Value		
Saturation Factor (S) [1]	0.6		
Control Device Capture Efficiency	0%		
Control Device Efficiency	0%		
Short Term Emissions [2]		***Long Term Emissions***	
True Vapor Pressure of Liquid Loaded (P), psia [3]	9.80	True Vapor Pressure of Liquid Loaded (P), psia [3]	4.16
Molecular Weight of Vapors (M), lb/lb-mole [4]	37.99	Molecular Weight of Vapors (M), lb/lb-mole [4]	37.99
Temperature of Bulk Liquid Loaded (T), °F	83	Temperature of Bulk Liquid Loaded (T), °F	45.11
Hourly Loading Rate, gal/hr [5]	16,000.00	Maximum Yearly Throughput, gallons/yr	4,599,000
Uncontrolled VOC Emission Rate, lb/hr	51.12	Uncontrolled VOC Emission Rate, tpy[6]	3.35
Uncontrolled Benzene Emission Rate, lb/hr	0.15	Uncontrolled Benzene Emission Rate, tpy[6]	0.01
Loading Losses, lb/1,000 gallons [7]	**5.13**	**Loading Losses, lb/1,000 gallons [7]**	**2.34**

[1] Saturation factor of 0.60 was chosen for truck loading (submerged, dedicated service) from AP-42 Chapter 5 Section 2, Table 5.2-1. Saturation (S) Factors for Calculating Petroleum Liquid Loading Losses.

[2] Short term emissions account for the hottest day of the year.

[3] True vapor pressure (TVP) was estimated using the equation from Figure 7.1-14b. in U.S. EPA Report AP-42, Fifth Edition, Chapter 7. Short term TVP was calculated using the hottest temperature recorded and the long term TVP was calculated using the average annual temperature.

[4] Molecular weight of vapors (M) from molecular weight of vapors from E&P Tanks W&S stream from Brause CS.

[5] Hourly loading rate based on maximum loading rate multiplied by 2 because it is assumed that both slop tanks are loaded out during the same hour.

[6] Weight percent VOC taken from E&P tanks working and standing stream. Loading loss lb/1000 gallon * gallons/yr / 2000 lb/ton * wt% VOC/100 = tpy VOC.

[7] Loading emission estimates are calculated using Equation 1 from AP-42 Chapter 5 Section 2 – Transportation and Marketing of Petroleum Liquids:

*LL = 12.46 * (SPM/T)* , where:

LL = Loading loss, pounds per 1,000 gallons of liquid loaded

S = Saturation factor

P = True vapor pressure of liquid loaded, psia

M = Molecular weight of vapors, lb/lb-mole

T = Temperature of bulk liquid loaded, °R

Table 21.b. - Loading Losses - Total Organic Compounds

Emissions Type	Uncollected Emissions		Controlled Emissions	
	lb/hr	tpy	lb/hr	tpy
VOC	51.12	3.35		
HAP[1]	2.27	0.15		
Benzene	0.15	0.01		
Toluene	0.13	0.01		
Ethylbenzene	5.05E-03	3.31E-04		
Xylenes	0.05	3.29E-03		
2,2,4-Trimethylpentane	0.01	6.80E-04		
n-Hexane	1.92	0.13		

[1] HAP emissions are based on total loading losses * total HAP weight fraction from E&P Tanks working and breathing stream.

Table 21.c. - Loading Losses - GHG

Emissions Type	Total Emission Rate, tpy	CH_4 Emission Rate, tpy [1]	CO_2 Emission Rate, tpy [1]	CO_2e Emission Rate, tpy [1]
Potential to Emit	3.35	0.57	0.03	14.28

[1] GHG loading losses are based on the working and breathing stream emissions from E&P Tanks. The emissions of methane have a Global Warming Potential (GWP) of 25 times that of CO_2, and therefore methane emissions are multiplied by 25 and added to the CO_2 emissions to determine total GHG emissions.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Produced Water Truck Loading (WTL-1)

Table 22.a. - Loading Losses - Calculation Inputs

Parameter	Value
Saturation Factor (S) [1]	0.6
Control Device Capture Efficiency	0%
Control Device Efficiency	0%
Percent Reduction - Produced Water	98%

Short Term Emissions [2]		***Long Term Emissions***	
True Vapor Pressure of Liquid Loaded (P), psia [3]	14.40	True Vapor Pressure of Liquid Loaded (P), psia [3]	6.96
Molecular Weight of Vapors (M), lb/lb-mole [4]	50.00	Molecular Weight of Vapors (M), lb/lb-mole [4]	50.00
Temperature of Bulk Liquid Loaded (T), °F	83	Temperature of Bulk Liquid Loaded (T), °F	43.0667
Hourly Loading Rate, gal/hr [5]	8,000.00	Maximum Yearly Throughput, gallons/yr	453,600
Uncontrolled VOC Emission Rate, lb/hr	1.59	Uncontrolled VOC Emission Rate, tpy[6]	0.02
Uncontrolled Benzene Emission Rate, lb/hr	3.97E-03	Uncontrolled Benzene Emission Rate, tpy[6]	5.87E-05
Loading Losses, lb/1,000 gallons [7]	**9.92**	**Loading Losses, lb/1,000 gallons [7]**	**5.17**

[1] Saturation factor of 0.60 was chosen for truck loading (submerged, dedicated service) from AP-42 Chapter 5 Section 2, Table 5.2-1. Saturation (S) Factors for Calculating Petroleum Liquid Loading Losses.

[2] Short term emissions account for the hottest day of the year.

[3] True vapor pressure (TVP) was estimated using the equation from Figure 7.1-14b. in U.S. EPA Report AP-42, Fifth Edition, Chapter 7. Short term TVP was calculated using the hottest temperature recorded and the long term TVP was calculated using the average annual temperature.

[4] Molecular weight of vapors (M) from molecular weight of vapors from AP-42 tank calculations for crude oil tank CT-1.

[5] Hourly loading rate based on maximum loading rate.

[6] Weight percent VOC taken from E&P tanks working and standing stream. Loading loss lb/1000 gallon * gallons/yr / 2000 lb/ton * wt% VOC/100 = tpy VOC.

[7] Loading emissions represent an MSS activity to periodically remove the water collected on the bottom of the three IFRTs. Loading emission estimates are calculated using Equation 1 from AP-42 Chapter 5 Section 2 – Transportation and Marketing of Petroleum Liquids:

*LL = 12.46 * (SPM/T)* , where:

LL = Loading loss, pounds per 1,000 gallons of liquid loaded

S = Saturation factor

P = True vapor pressure of liquid loaded, psia

M = Molecular weight of vapors, lb/lb-mole

T = Temperature of bulk liquid loaded, °R

Table 22.b. - Loading Losses - Total Organic Compounds

Emissions Type	Uncollected Emissions		Controlled Emissions	
	lb/hr	tpy	lb/hr	tpy
VOC	1.59	0.02		
HAP[1]	0.05	6.81E-04		
Benzene	3.97E-03	5.87E-05		
Toluene	0.01	1.13E-04		
Ethylbenzene	1.90E-03	2.82E-05		
Xylenes	0.01	1.29E-04		
2,2,4-Trimethylpentane	0.00E+00	0.00E+00		
n-Hexane	0.02	3.52E-04		

[1] HAP emissions are based on loading losses * total HAP wt fraction from E&P Tanks working and breathing stream.

Table 22.c. - Loading Losses - GHG

Emissions Type	Total Emission Rate, tpy	CH_4 Emission Rate, tpy [1]	CO_2 Emission Rate, tpy [1]	CO_2e Emission Rate, tpy [1]
Potential to Emit	0.02	0.00	0.00	0.00

[1] GHG loading losses are based on the working and breathing stream emissions from E&P Tanks. The emissions of methane have a Global Warming Potential (GWP) of 25 times that of CO_2, and therefore methane emissions are multiplied by 25 and added to the CO_2 emissions to determine total GHG emissions.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Fugitive Component Emissions - Gas Processing Plants (FUG-1)

Table 23.a. - Gas Processing Plants Fugitive Emissions - Gas Service

Equipment Type	Gas Leak Emission Factor [1]	Count	Non-Methane, Non-Ethane VOC Content [2]	Control Effectiveness [3]	Fugitive VOC Emissions [4]		Benzene Emissions [5]		Toluene Emissions [5]		Ethylbenzene Emissions [5]		Xylene Emissions [5]		n-Hexane Emissions [5]		2,2,4-Trimethylpentane Emissions [5]		Fugitive CH_4 Emissions [6]		Fugitive CO_2 Emissions [6]		Fugitive CO_2e Emissions [6]	
	(lb/hr/source)				(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
Connectors	4.41E-04	8,836	29.18%	97%	0.03	0.15	9.93E-05	4.35E-04	4.48E-05	1.96E-04	0.00E+00	0.00E+00	1.32E-05	5.77E-05	6.86E-04	3.00E-03	3.52E-05	1.54E-04	0.05	0.24	2.45E-03	0.01	1.35	5.91
Flanges	8.60E-04	0	29.18%	97%	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	0.00	0.00	0.00	0.00	0.00
Open-Ended Lines	4.41E-03	2	29.18%	100%	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	0.00	0.00	0.00	0.00	0.00
Pump Seals	5.29E-03	0	29.18%	85%	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	0.00	0.00	0.00	0.00	0.00
Valves	9.92E-03	1,731	29.18%	97%	0.15	0.66	4.38E-04	1.92E-03	1.98E-04	8.66E-04	0.00E+00	0.00E+00	5.81E-05	2.54E-04	3.02E-03	0.01	1.55E-04	6.79E-04	0.24	1.04	0.01	0.05	5.95	26.06
Other	1.94E-02	960	29.18%	0%	5.44	23.81	0.02	0.07	0.01	0.03	0.00	0.00	0.00	0.01	0.11	0.48	0.01	0.02	8.59	37.62	0.39	1.71	215.09	942.10
Total					**5.62**	**24.62**	**0.02**	**0.07**	**0.01**	**0.03**	**0.00**	**0.00**	**2.17E-03**	**0.01**	**0.11**	**0.49**	**0.01**	**0.03**	**8.88**	**38.89**	**0.40**	**1.77**	**222.39**	**974.07**

[1] Factors are taken from Table 2-4 of "Protocol for Equipment Leak Emission Estimates" (EPA Document, EPA-453/R-95-017, November 1995).

[2] The non-methane, non-ethane VOC content is determined based on the VOC weight percent of the inlet gas divided by total hydrocarbon weight percent since the Table 2-4 emission factors are based on total organic compound emission rates.

3 Control efficiencies are assumed for a gas plant implementing the NSPS OOOOa LDAR program which is equivalent to TCEQ's 28VHP program. The 28 series LDAR Programs require open-ended lines to be equipped with a cap, blind flange, plug, or a second valve for 100% control credit. Flanges and connectors are assumed to be monitored at 500ppmv; therefore a 97% control credit can be applied. 28VHP control efficiencies taken from "TCEQ Technical Guidance Package for Chemical Sources - Equipment Leak Fugitives".

[4] Continuous operations for 8,760 hours was assumed.

[5] Fugitive HAP emissions were estimated based on the benzene, toluene, ethylbenzene, xylene, 2,2,4-TMP, and n-Hexane content in the compositional analysis of the inlet natural gas.

[6] Fugitive emissions are assumed to contain compositions based on the provided extended gas analysis. The emissions of methane have a Global Warming Potential (GWP) of 25 times that of CO_2, and therefore methane emissions are multiplied by 25 and added to the CO_2 emissions to determine total GHG emissions.

Table 23.b. - Gas Processing Plants Fugitive Emissions - Light Oil

Equipment Type	Gas Leak Emission Factor [1]	Count	Non-Methane, Non-Ethane VOC Content [2]	Control Effectiveness [3]	Fugitive VOC Emissions [4]		Benzene Emissions [5]		Toluene Emissions [5]		Ethylbenzene Emissions [5]		Xylene Emissions [5]		n-Hexane Emissions [5]		2,2,4-Trimethylpentane Emissions [5]		Fugitive CH_4 Emissions [6]		Fugitive CO_2 Emissions [6]		Fugitive CO_2e Emissions [6]	
	(lb/hr/source)				(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
Connectors	4.63E-04	12,159	62.2973%	97%	0.11	0.46	3.17E-04	1.39E-03	2.76E-04	1.21E-03	1.04E-05	4.55E-05	1.03E-04	4.53E-04	3.95E-03	1.73E-02	2.13E-05	9.34E-05	0.02	0.08	2.03E-03	0.01	0.45	1.97
Flanges	2.43E-04	0	62.2973%	97%	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	0.00	0.00	0.00	0.00	0.00
Open-Ended Lines	3.09E-03	8	62.2973%	100%	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	0.00	0.00	0.00	0.00	0.00
Pump Seals	2.87E-02	32	62.2973%	85%	0.09	0.38	2.58E-04	1.13E-03	2.25E-04	9.84E-04	8.46E-06	3.70E-05	8.42E-05	3.69E-04	3.21E-03	0.01	1.74E-05	7.61E-05	0.01	0.06	1.65E-03	0.01	0.37	1.60
Valves	5.51E-03	3,614	62.2973%	97%	0.37	1.63	1.12E-03	4.91E-03	9.75E-04	4.27E-03	3.67E-05	1.61E-04	3.66E-04	1.60E-03	0.01	0.06	7.55E-05	3.31E-04	0.06	0.28	0.01	0.03	1.59	6.96
Other	1.65E-02	87	62.2973%	0%	0.90	3.93	2.70E-03	0.01	2.35E-03	0.01	8.84E-05	3.87E-04	8.80E-04	3.86E-03	0.03	0.15	1.82E-04	7.96E-04	0.15	0.67	0.02	0.08	3.83	16.76
Total					**1.46**	**6.39**	**0.00**	**0.02**	**3.82E-03**	**0.02**	**1.44E-04**	**6.31E-04**	**1.43E-03**	**0.01**	**0.05**	**0.24**	**2.96E-04**	**1.30E-03**	**0.25**	**1.09**	**0.03**	**0.12**	**6.23**	**27.29**

[1] Factors are taken from Table 2-4 of "Protocol for Equipment Leak Emission Estimates" (EPA Document, EPA-453/R-95-017, November 1995).

[2] The non-methane, non-ethane VOC content is determined based on the VOC weight percent of a proxy stream from a similar facility divided by the total hydrocarbon weight percent since the Table 2-4 emission factors are based on total organic compound emission rates.

3 Control efficiencies are assumed for a gas plant implementing the NSPS OOOOa LDAR program which is equivalent to TCEQ's 28VHP program. The 28 series LDAR Programs require open-ended lines to be equipped with a cap, blind flange, plug, or a second valve for 100% control credit. Flanges and connectors are assumed to be monitored at 500ppmv; therefore a 97% control credit can be applied. 28VHP control efficiencies taken from "TCEQ Technical Guidance Package for Chemical Sources - Equipment Leak Fugitives".

[4] Continuous operations for 8,760 hours was assumed.

[5] Fugitive HAP emissions were estimated based on the benzene, toluene, ethylbenzene, xylene, 2,2,4-TMP, and n-Hexane content in a proxy stream from a similar facility.

[6] Methane and CO_2 concentrations are conservatively based on the provided proxy analysis. The emissions of methane have a Global Warming Potential (GWP) of 25 times that of CO_2, and therefore methane emissions are multiplied by 25 and added to the CO_2 emissions to determine total GHG emissions.

Table 23.c. - Gas Processing Plants Fugitive Emissions - Propane

Equipment Type	Gas Leak Emission Factor [1]	Count	Non-Methane, Non-Ethane VOC Content [2]	Control Effectiveness [3]	Fugitive VOC Emissions [4]		Benzene Emissions [5]		Toluene Emissions [5]		Ethylbenzene Emissions [5]		Xylene Emissions [5]		n-Hexane Emissions [5]		2,2,4-Trimethylpentane Emissions [5]		Fugitive CH_4 Emissions [6]		Fugitive CO_2 Emissions [6]		Fugitive CO_2e Emissions [6]	
	(lb/hr/source)				(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
Connectors	4.41E-04	8,915	100%	97%	0.12	0.52	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	0.00	0.00	0.00
Flanges	8.60E-04	0	100%	97%	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	0.00	0.00	0.00	0.00	0.00
Open-Ended Lines	4.41E-03	2	100%	100%	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	0.00	0.00	0.00	0.00	0.00
Pump Seals	5.29E-03	2	100%	85%	1.59E-03	0.01	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	0.00	0.00	0.00
Valves	9.92E-03	538	100%	97%	0.16	0.70	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	0.00	0.00	0.00
Other	1.94E-02	0	100%	0%	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	0.00	0.00	0.00	0.00	0.00
Total					**0.28**	**1.22**	**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**	**0.00**	**0.00**	**0.00**

[1] Factors are taken from Table 2-4 of "Protocol for Equipment Leak Emission Estimates" (EPA Document, EPA-453/R-95-017, November 1995).

[2] The non-methane, non-ethane VOC content is determined based on the VOC weight percent of the propane stream.

3 Control efficiencies are assumed for a gas plant implementing the NSPS OOOOa LDAR program which is equivalent to TCEQ's 28VHP program. The 28 series LDAR Programs require open-ended lines to be equipped with a cap, blind flange, plug, or a second valve for 100% control credit. Flanges and connectors are assumed to be monitored at 500ppmv; therefore a 97% control credit can be applied. 28VHP control efficiencies taken from "TCEQ Technical Guidance Package for Chemical Sources - Equipment Leak Fugitives".

[4] Continuous operations for 8,760 hours was assumed.

[5] Fugitive HAP emissions are negligible in a propane stream.

[6] Methane and CO_2 concentrations are negligible in a propane stream.

Table 23.d. - Gas Processing Plants Fugitive Emissions - Methanol

Equipment Type	Gas Leak Emission Factor [1]	Count	Non-Methane, Non-Ethane VOC Content [2]	Control Effectiveness [3]	Fugitive VOC Emissions [4]		Benzene Emissions [5]		Toluene Emissions [5]		Ethylbenzene Emissions [5]		Xylene Emissions [5]		n-Hexane Emissions [5]		2,2,4-Trimethylpentane Emissions [5]		Fugitive CH_4 Emissions [6]		Fugitive CO_2 Emissions [6]		Fugitive CO_2e Emissions [6]	
	(lb/hr/source)				(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
Connectors	4.63E-04	666	100%	97%	0.01	0.04	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	0.00	0.00	0.00
Flanges	2.43E-04	0	100%	97%	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	0.00	0.00	0.00	0.00	0.00
Open-Ended Lines	3.09E-03	0	100%	100%	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	0.00	0.00	0.00	0.00	0.00
Pump Seals	2.87E-02	7	100%	85%	0.03	0.13	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	0.00	0.00	0.00
Valves	5.51E-03	160	100%	97%	0.03	0.12	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	0.00	0.00	0.00
Other	1.65E-02	0	100%	0%	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	0.00	0.00	0.00	0.00	0.00
Total					**0.07**	**0.29**	**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**	**0.00**	**0.00**	**0.00**

[1] Factors are taken from Table 2-4 of "Protocol for Equipment Leak Emission Estimates" (EPA Document, EPA-453/R-95-017, November 1995).

[2] The non-methane, non-ethane VOC content is determined based on the VOC weight percent of the methanol stream.

3 Control efficiencies are assumed for a gas plant implementing the NSPS OOOOa LDAR program which is equivalent to TCEQ's 28VHP program. The 28 series LDAR Programs require open-ended lines to be equipped with a cap, blind flange, plug, or a second valve for 100% control credit. Flanges and connectors are assumed to be monitored at 500ppmv; therefore a 97% control credit can be applied. 28VHP control efficiencies taken from "TCEQ Technical Guidance Package for Chemical Sources - Equipment Leak Fugitives".

[4] Continuous operations for 8,760 hours was assumed.

[5] Fugitive HAP emissions are negligible in a methanol stream.

[6] Methane and CO_2 concentrations are negligible in a methanol stream.

Table 23.e. - Gas Processing Plants Fugitive Emissions - Slop: Water/Oil

Equipment Type	Gas Leak Emission Factor [1]	Count	Non-Methane, Non-Ethane VOC Content [2]	Control Effectiveness [3]	Fugitive VOC Emissions [4]		Benzene Emissions [5]		Toluene Emissions [5]		Ethylbenzene Emissions [5]		Xylene Emissions [5]		n-Hexane Emissions [5]		2,2,4-Trimethylpentane Emissions [5]		Fugitive CH_4 Emissions [6]		Fugitive CO_2 Emissions [6]		Fugitive CO_2e Emissions [6]	
	(lb/hr/source)				(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
Connectors	4.63E-04	1,003	99.9721%	97%	0.01	0.06	2.61E-05	1.14E-04	2.27E-05	9.96E-05	8.57E-07	3.75E-06	8.53E-06	3.73E-05	3.25E-04	1.43E-03	1.76E-06	7.71E-06	1.48E-03	0.01	1.68E-04	7.34E-04	0.04	0.16
Flanges	2.43E-04	0	99.9721%	97%	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	0.00	0.00	0.00	0.00	0.00
Open-Ended Lines	3.09E-03	0	99.9721%	100%	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	0.00	0.00	0.00	0.00	0.00
Pump Seals	2.87E-02	6	99.9721%	85%	0.03	0.11	4.84E-05	2.12E-04	4.21E-05	1.84E-04	1.59E-06	6.95E-06	1.58E-05	6.91E-05	6.03E-04	2.64E-03	3.26E-06	1.43E-05	2.73E-03	0.01	3.10E-04	1.36E-03	0.07	0.30
Valves	5.51E-03	302	99.9721%	97%	0.05	0.22	9.36E-05	4.10E-04	8.15E-05	3.57E-04	3.07E-06	1.34E-05	3.06E-05	1.34E-04	1.17E-03	0.01	6.31E-06	2.76E-05	0.01	0.02	6.01E-04	2.63E-03	0.13	0.58
Other	1.65E-02	18	99.9721%	0%	0.30	1.30	5.58E-04	2.44E-03	4.86E-04	2.13E-03	1.83E-05	8.02E-05	1.82E-04	7.98E-04	0.01	0.03	3.76E-05	1.65E-04	0.03	0.14	3.58E-03	0.02	0.79	3.47
Total					**0.39**	**1.70**	**7.26E-04**	**3.18E-03**	**6.32E-04**	**2.77E-03**	**2.38E-05**	**1.04E-04**	**2.37E-04**	**1.04E-03**	**0.01**	**0.04**	**4.89E-05**	**2.14E-04**	**0.04**	**0.18**	**4.66E-03**	**0.02**	**1.03**	**4.51**

[1] Factors are taken from Table 2-4 of "Protocol for Equipment Leak Emission Estimates" (EPA Document, EPA-453/R-95-017, November 1995).

[2] The non-methane, non-ethane VOC content is determined based on the VOC weight percent of the June 2022 condensate stream divided by the total hydrocarbon weight percent since the Table 2-4 emission factors are based on total organic compound emission rates.

3 Control efficiencies are assumed for a gas plant implementing the NSPS OOOOa LDAR program which is equivalent to TCEQ's 28VHP program. The 28 series LDAR Programs require open-ended lines to be equipped with a cap, blind flange, plug, or a second valve for 100% control credit. Flanges and connectors are assumed to be monitored at 500ppmv; therefore a 97% control credit can be applied. 28VHP control efficiencies taken from "TCEQ Technical Guidance Package for Chemical Sources - Equipment Leak Fugitives".

[4] Continuous operations for 8,760 hours was assumed.

[5] Fugitive HAP emissions were estimated based on the benzene, toluene, ethylbenzene, xylene, 2,2,4-TMP, and n-Hexane content in the June 2022 condensate stream.

[6] Methane and CO_2 concentrations are conservatively based on the provided condensate analysis. The emissions of methane have a Global Warming Potential (GWP) of 25 times that of CO_2, and therefore methane emissions are multiplied by 25 and added to the CO_2 emissions to determine total GHG emissions.

Table 23.f. - Gas Processing Plants Fugitive Emissions - Residue Gas

Equipment Type	Gas Leak Emission Factor [1]	Count	Non-Methane, Non-Ethane VOC Content [2]	Control Effectiveness [3]	Fugitive VOC Emissions [4]		Benzene Emissions [5]		Toluene Emissions [5]		Ethylbenzene Emissions [5]		Xylene Emissions [5]		n-Hexane Emissions [5]		2,2,4-Trimethylpentane Emissions [5]		Fugitive CH_4 Emissions [6]		Fugitive CO_2 Emissions [6]		Fugitive CO_2e Emissions [6]	
	(lb/hr/source)				(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
Connectors	4.63E-04	3,683	2.3849%	97%	1.22E-03	0.01	7.29E-08	3.19E-07	3.29E-08	1.44E-07	0.00E+00	0.00E+00	9.67E-09	4.24E-08	5.03E-07	2.21E-06	2.58E-08	1.13E-07	0.03	0.14	1.30E-03	0.01	0.78	3.44
Flanges	2.43E-04	0	2.3849%	97%	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	0.00	0.00	0.00	0.00	0.00
Open-Ended Lines	3.09E-03	1	2.3849%	100%	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	0.00	0.00	0.00	0.00	0.00
Pump Seals	2.87E-02	2	2.3849%	85%	1.85E-04	8.08E-04	1.10E-08	4.83E-08	4.98E-09	2.18E-08	0.00E+00	0.00E+00	1.46E-09	6.41E-09	7.62E-08	3.34E-07	3.90E-09	1.71E-08	4.74E-03	0.02	1.97E-04	8.62E-04	0.12	0.52
Valves	5.51E-03	486	2.3849%	97%	1.92E-03	0.01	1.14E-07	5.01E-07	5.17E-08	2.26E-07	0.00E+00	0.00E+00	1.52E-08	6.65E-08	7.90E-07	3.46E-06	4.05E-08	1.78E-07	0.05	0.22	2.04E-03	0.01	1.23	5.40
Other	1.65E-02	192	2.3849%	0%	0.08	0.33	4.52E-06	1.98E-05	2.04E-06	8.94E-06	0.00E+00	0.00E+00	6.00E-07	2.63E-06	3.12E-05	1.37E-04	1.60E-06	7.02E-06	1.95	8.52	0.08	0.35	48.71	213.36
Total					**0.08**	**0.35**	**4.72E-06**	**2.07E-05**	**2.13E-06**	**9.34E-06**	**0.00E+00**	**0.00E+00**	**6.27E-07**	**2.74E-06**	**3.26E-05**	**1.43E-04**	**1.67E-06**	**7.32E-06**	**2.03**	**8.89**	**0.08**	**0.37**	**50.85**	**222.72**

[1] Factors are taken from Table 2-4 of "Protocol for Equipment Leak Emission Estimates" (EPA Document, EPA-453/R-95-017, November 1995).

[2] The non-methane, non-ethane VOC content is determined based on the VOC weight percent of the PLT 2 fuel gas sample from July 2022 divided by the total hydrocarbon weight percent since the Table 2-4 emission factors are based on total organic compound emission rates.

3 Control efficiencies are assumed for a gas plant implementing the NSPS OOOOa LDAR program which is equivalent to TCEQ's 28VHP program. The 28 series LDAR Programs require open-ended lines to be equipped with a cap, blind flange, plug, or a second valve for 100% control credit. Flanges and connectors are assumed to be monitored at 500ppmv; therefore a 97% control credit can be applied. 28VHP control efficiencies taken from "TCEQ Technical Guidance Package for Chemical Sources - Equipment Leak Fugitives".

[4] Continuous operations for 8,760 hours was assumed.

[5] Fugitive HAP emissions were estimated based on the benzene, toluene, ethylbenzene, xylene, 2,2,4-TMP, and n-Hexane content in the PLT 2 fuel gas sample from July 2022.

[6] Methane and CO_2 concentrations are conservatively based on the provided PLT 2 fuel gas sample from July 2022 analysis. The emissions of methane have a Global Warming Potential (GWP) of 25 times that of CO_2, and therefore methane emissions are multiplied by 25 and added to the CO_2 emissions to determine total GHG emissions.

Table 23.g. - Gas Plants Fugitive Emissions - Total Emissions

Component	Total Emissions	
	(lb/hr)	(tpy)
VOC	7.89	34.56
Benzene	0.02	0.09
Toluene	0.01	0.05
Ethylbenzene	1.68E-04	7.35E-04
Xylene	3.84E-03	0.02
n-Hexane	0.18	0.77
2,2,4-Trimethylpentane	0.01	0.03
CH_4	11.20	49.05
CO_2	0.52	2.28
CO_2e	280.50	1,228.59

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Fugitive Component Emissions - Crude Stabilization Facility (FUG-2)

Table 24.a. - Crude Stabilization Facility Fugitive Emissions - Gas Service

Equipment Type	Gas Leak Emission Factor [1] (lb/hr/source)	Count	Non-Methane, Non-Ethane VOC Content [2]	Control Effectiveness [3]	Fugitive VOC Emissions [4]		Benzene Emissions [5]		Toluene Emissions [5]		Ethylbenzene Emissions [5]		Xylene Emissions [5]		n-Hexane Emissions [5]		2,2,4-Trimethylpentane Emissions [5]		Fugitive CH_4 Emissions [6]		Fugitive CO_2 Emissions [6]		Fugitive CO_2e Emissions [6]	
					(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
Connectors	4.41E-04	201	29.18%	30%	0.02	0.08	5.27E-05	2.31E-04	2.38E-05	1.04E-04	0.00E+00	0.00E+00	7.00E-06	3.06E-05	3.64E-04	1.59E-03	1.87E-05	8.18E-05	0.03	0.13	1.30E-03	0.01	0.72	3.14
Flanges	8.60E-04	0	29.18%	30%	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	0.00	0.00	0.00	0.00	0.00
Open-Ended Lines	4.41E-03	0	29.18%	97%	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	0.00	0.00	0.00	0.00	0.00
Pump Seals	5.29E-03	0	29.18%	85%	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	0.00	0.00	0.00	0.00	0.00
Valves	9.92E-03	40	29.18%	97%	3.47E-03	0.02	1.01E-05	4.43E-05	4.57E-06	2.00E-05	0.00E+00	0.00E+00	1.34E-06	5.88E-06	6.99E-05	3.06E-04	3.58E-06	1.57E-05	0.01	0.02	2.50E-04	1.10E-03	0.14	0.60
Other	1.94E-02	59	29.18%	0%	0.33	1.46	9.72E-04	4.26E-03	4.39E-04	1.92E-03	0.00E+00	0.00E+00	1.29E-04	5.65E-04	0.01	0.03	3.44E-04	1.51E-03	0.53	2.31	0.02	0.11	13.22	57.90
Total					**0.36**	**1.56**	**1.04E-03**	**4.53E-03**	**4.67E-04**	**2.05E-03**	**0.00**	**0.00**	**1.37E-04**	**6.02E-04**	**0.01**	**0.03**	**3.67E-04**	**1.61E-03**	**0.56**	**2.46**	**0.03**	**0.11**	**14.07**	**61.64**

[1] Factors are taken from Table 2-4 of "Protocol for Equipment Leak Emission Estimates" (EPA Document, EPA-453/R-95-017, November 1995).

[2] The non-methane, non-ethane VOC content is determined based on the VOC weight percent of the inlet gas divided by total hydrocarbon weight percent since the Table 2-4 emission factors are based on total organic compound emission rates.

[3] Control efficiencies are assumed for Gas Plant implementing the NSPS OOOOa LDAR program which is equivalent to TCEQ's 28VHP program. 28VHP control efficiencies taken from "Control Efficiencies for TCEQ Leak detection and Repair Programs" available at: https://www.tceq.texas.gov/assets/public/permitting/air/Guidance/NewSourceReview/control_eff.pdf

[4] Continuous operations for 8,760 hours was assumed.

[5] Fugitive HAP emissions were estimated based on the benzene, toluene, ethylbenzene, xylene, 2,2,4-TMP, and n-Hexane content in the compositional analysis of the inlet natural gas.

[6] Fugitive emissions are assumed to contain compositions based on the provided extended gas analysis. The emissions of methane have a Global Warming Potential (GWP) of 25 times that of CO_2, and therefore methane emissions are multiplied by 25 and added to the CO_2 emissions to determine total GHG emissions.

Table 24.b. - Crude Stabilization Facility Fugitive Emissions - Slop: Water/Oil

Equipment Type	Gas Leak Emission Factor [1] (lb/hr/source)	Count	Non-Methane, Non-Ethane VOC Content [2]	Control Effectiveness [3]	Fugitive VOC Emissions [4]		Benzene Emissions [5]		Toluene Emissions [5]		Ethylbenzene Emissions [5]		Xylene Emissions [5]		n-Hexane Emissions [5]		2,2,4-Trimethylpentane Emissions [5]		Fugitive CH_4 Emissions [6]		Fugitive CO_2 Emissions [6]		Fugitive CO_2e Emissions [6]	
					(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
Connectors	2.20E-04	1	99.9721%	30%	1.54E-04	6.76E-04	1.20E-06	5.28E-06	2.52E-07	1.10E-06	9.49E-09	4.16E-08	9.45E-08	4.14E-07	3.61E-06	1.58E-05	1.95E-08	8.54E-08	1.63E-05	7.16E-05	1.86E-06	8.13E-06	4.10E-04	1.80E-03
Flanges	6.39E-06	0	99.9721%	30%	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	0.00	0.00	0.00	0.00	0.00
Open-Ended Lines	5.51E-04	0	99.9721%	97%	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	0.00	0.00	0.00	0.00	0.00
Pump Seals	5.29E-05	0	99.9721%	85%	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	0.00	0.00	0.00	0.00	0.00
Valves	2.16E-04	1	99.9721%	97%	6.48E-06	2.84E-05	1.22E-08	5.32E-08	1.06E-08	4.63E-08	3.99E-10	1.75E-09	3.97E-09	1.74E-08	1.51E-07	6.63E-07	8.19E-10	3.59E-09	6.86E-07	3.01E-06	7.80E-08	3.41E-07	1.72E-05	7.55E-05
Other	3.09E-02	0	99.9721%	0%	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	0.00	0.00	0.00	0.00	0.00
Total					**1.61E-04**	**7.04E-04**	**1.22E-06**	**5.33E-06**	**2.62E-07**	**1.15E-06**	**9.89E-09**	**4.33E-08**	**9.84E-08**	**4.31E-07**	**3.76E-06**	**1.65E-05**	**2.03E-08**	**8.90E-08**	**1.70E-05**	**7.46E-05**	**1.93E-06**	**8.47E-06**	**4.28E-04**	**1.87E-03**

[1] Factors are taken from Table 2-4 of "Protocol for Equipment Leak Emission Estimates" (EPA Document, EPA-453/R-95-017, November 1995).

[2] The non-methane, non-ethane VOC content is determined based on the VOC weight percent of the June 2022 condensate stream divided by the total hydrocarbon weight percent since the Table 2-4 emission factors are based on total organic compound emission rates.

[3] Control efficiencies are assumed for Gas Plant implementing the NSPS OOOOa LDAR program which is equivalent to TCEQ's 28VHP program. 28VHP control efficiencies taken from "Control Efficiencies for TCEQ Leak detection and Repair Programs" available at: https://www.tceq.texas.gov/assets/public/permitting/air/Guidance/NewSourceReview/control_eff.pdf

[4] Continuous operations for 8,760 hours was assumed.

[5] Fugitive HAP emissions were estimated based on the benzene, toluene, ethylbenzene, xylene, 2,2,4-TMP, and n-Hexane content in the June 2022 condensate stream.

[6] Methane and CO_2 concentrations are conservatively based on the provided condensate analysis. The emissions of methane have a Global Warming Potential (GWP) of 25 times that of CO_2, and therefore methane emissions are multiplied by 25 and added to the CO_2 emissions to determine total GHG emissions.

Table 24.c. - Crude Stabilization Facility Fugitive Emissions - Crude: Light Oil

Equipment Type	Gas Leak Emission Factor [1] (lb/hr/source)	Count	Non-Methane, Non-Ethane VOC Content [2]	Control Effectiveness [3]	Fugitive VOC Emissions [4]		Benzene Emissions [5]		Toluene Emissions [5]		Ethylbenzene Emissions [5]		Xylene Emissions [5]		n-Hexane Emissions [5]		2,2,4-Trimethylpentane Emissions [5]		Fugitive CH_4 Emissions [6]		Fugitive CO_2 Emissions [6]		Fugitive CO_2e Emissions [6]	
					(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
Connectors	4.63E-04	7,878	99.9721%	30%	2.55	11.18	4.79E-03	0.02	4.17E-03	0.02	1.57E-04	6.88E-04	1.56E-03	0.01	0.06	0.26	3.22E-04	1.41E-03	0.27	1.18	0.03	0.13	6.79	29.74
Flanges	2.43E-04	0	99.9721%	30%	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	0.00	0.00	0.00	0.00	0.00
Open-Ended Lines	3.09E-03	4	99.9721%	97%	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	0.00	0.00	0.00	0.00	0.00
Pump Seals	2.87E-02	41	99.9721%	85%	0.18	0.77	3.31E-04	1.45E-03	2.88E-04	1.26E-03	1.08E-05	4.75E-05	1.08E-04	4.73E-04	4.12E-03	0.02	2.23E-05	9.75E-05	0.02	0.08	2.12E-03	0.01	0.47	2.05
Valves	5.51E-03	1,480	99.9721%	97%	0.24	1.07	4.59E-04	2.01E-03	3.99E-04	1.75E-03	1.50E-05	6.59E-05	1.50E-04	6.56E-04	0.01	0.03	3.09E-05	1.35E-04	0.03	0.11	2.94E-03	0.01	0.65	2.85
Other	1.65E-02	9	99.9721%	0%	0.15	0.65	2.79E-04	1.22E-03	2.43E-04	1.06E-03	9.15E-06	4.01E-05	9.11E-05	3.99E-04	0.00	0.02	1.88E-05	8.23E-05	0.02	0.07	1.79E-03	0.01	0.40	1.73
Total					**3.12**	**13.68**	**0.01**	**0.03**	**0.01**	**0.02**	**1.92E-04**	**8.41E-04**	**1.91E-03**	**0.01**	**0.07**	**0.32**	**3.94E-04**	**1.73E-03**	**0.33**	**1.45**	**0.04**	**0.16**	**8.31**	**36.38**

[1] Factors are taken from Table 2-4 of "Protocol for Equipment Leak Emission Estimates" (EPA Document, EPA-453/R-95-017, November 1995).

[2] The non-methane, non-ethane VOC content is determined based on the VOC weight percent of the June 2022 condensate stream divided by the total hydrocarbon weight percent since the Table 2-4 emission factors are based on total organic compound emission rates.

[3] Control efficiencies are assumed for Gas Plant implementing the NSPS OOOOa LDAR program which is equivalent to TCEQ's 28VHP program. 28VHP control efficiencies taken from "Control Efficiencies for TCEQ Leak detection and Repair Programs" available at: https://www.tceq.texas.gov/assets/public/permitting/air/Guidance/NewSourceReview/control_eff.pdf

[4] Continuous operations for 8,760 hours was assumed.

[5] Fugitive HAP emissions were estimated based on the benzene, toluene, ethylbenzene, xylene, 2,2,4-TMP, and n-Hexane content in the June 2022 condensate stream.

[6] Methane and CO_2 concentrations are conservatively based on the provided condensate analysis. The emissions of methane have a Global Warming Potential (GWP) of 25 times that of CO_2, and therefore methane emissions are multiplied by 25 and added to the CO_2 emissions to determine total GHG emissions.

Table 24.d. - Crude Stabilization Facility Fugitive Emissions - Residue

Equipment Type	Gas Leak Emission Factor [1] (lb/hr/source)	Count	Non-Methane, Non-Ethane VOC Content [2]	Control Effectiveness [3]	Fugitive VOC Emissions [4]		Benzene Emissions [5]		Toluene Emissions [5]		Ethylbenzene Emissions [5]		Xylene Emissions [5]		n-Hexane Emissions [5]		2,2,4-Trimethylpentane		Fugitive CH_4 Emissions [6]		Fugitive CO_2 Emissions [6]		Fugitive CO_2e Emissions [6]	
					(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
Connectors	4.63E-04	40	2.3849%	30%	3.11E-04	1.36E-03	1.86E-08	8.13E-08	8.38E-09	3.67E-08	0.00E+00	0.00E+00	2.46E-09	1.08E-08	1.28E-07	5.62E-07	6.57E-09	2.88E-08	0.01	0.03	3.31E-04	1.45E-03	0.20	0.88
Flanges	2.43E-04	0	2.3849%	30%	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	0.00	0.00	0.00	0.00	0.00
Open-Ended Lines	3.09E-03	0	2.3849%	97%	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	0.00	0.00	0.00	0.00	0.00
Pump Seals	2.87E-02	0	2.3849%	85%	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	0.00	0.00	0.00	0.00	0.00
Valves	5.51E-03	8	2.3849%	97%	3.15E-05	1.38E-04	1.88E-09	8.25E-09	8.51E-10	3.73E-09	0.00E+00	0.00E+00	2.50E-10	1.10E-09	1.30E-08	5.70E-08	6.67E-10	2.92E-09	8.11E-04	3.55E-03	3.36E-05	1.47E-04	0.02	0.09
Other	1.65E-02	12	2.3849%	0%	4.65E-03	2.04E-02	2.78E-07	1.22E-06	1.26E-07	5.50E-07	0.00E+00	0.00E+00	3.69E-08	1.62E-07	1.92E-06	8.41E-06	9.84E-08	4.31E-07	0.12	0.52	4.96E-03	0.02	2.99	13.11
Total					**5.00E-03**	**0.02**	**2.98E-07**	**1.31E-06**	**1.35E-07**	**5.90E-07**	**0.00**	**0.00**	**3.96E-08**	**1.73E-07**	**2.06E-06**	**9.03E-06**	**1.06E-07**	**4.63E-07**	**0.13**	**0.56**	**0.01**	**0.02**	**3.21**	**14.08**

[1] Factors are taken from Table 2-4 of "Protocol for Equipment Leak Emission Estimates" (EPA Document, EPA-453/R-95-017, November 1995).

[2] The non-methane, non-ethane VOC content is determined based on the VOC weight percent of the PLT 2 fuel gas sample from July 2022 divided by the total hydrocarbon weight percent since the Table 2-4 emission factors are based on total organic compound emission rates.

[3] Control efficiencies are assumed for Gas Plant implementing the NSPS OOOOa LDAR program which is equivalent to TCEQ's 28VHP program. 28VHP control efficiencies taken from "Control Efficiencies for TCEQ Leak detection and Repair Programs" available at: https://www.tceq.texas.gov/assets/public/permitting/air/Guidance/NewSourceReview/control_eff.pdf

[4] Continuous operations for 8,760 hours was assumed.

[5] Fugitive HAP emissions were estimated based on the benzene, toluene, ethylbenzene, xylene, 2,2,4-TMP, and n-Hexane content in the PLT 2 fuel gas sample from July 2022.

[6] Methane and CO_2 concentrations are conservatively based on the provided PLT 2 fuel gas sample from July 2022 analysis. The emissions of methane have a Global Warming Potential (GWP) of 25 times that of CO_2, and therefore methane emissions are multiplied by 25 and added to the CO_2 emissions to determine total GHG emissions.

Table 24.e. - Crude Stabilization Facility Fugitive Emissions - Total Emissions

Component	Total Emissions	
	(lb/hr)	(tpy)
VOC	3.48	15.26
Benzene	0.01	0.03
Toluene	0.01	0.02
Ethylbenzene	1.92E-04	8.41E-04
Xylene	2.05E-03	0.01
n-Hexane	0.08	0.35
2,2,4-Trimethylpentane	7.61E-04	3.33E-03
CH_4	1.02	4.47
CO_2	0.07	0.30
CO_2e	25.59	112.10

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Plant 1 Flare - Pilot (E-1)

Table 25.a. - Plant 1 Flare - Pilot + Purge Gas Information

Parameter	Value
Pilot Gas + Purge Gas, scfh	816.67
Natural Gas Heat Value, Btu/scf	1,150.91
Flare Pilot Rating, MMBtu/hr	0.94
Annual Operating Hours	8,760

Table 25.b. - Plant 1 Flare - Criteria Pollutant Emissions

Component	Emission Factor, lb/MMSCF [1]	Emission Factor, lb/MMBtu [2]	Emission Rate, lb/hr	Emission Rate, tpy
PM_{10} [3]	7.6	0.007	7.00E-03	0.03
SO_2	0.6	0.001	5.53E-04	2.42E-03
NO_X	-	0.068	6.39E-02	0.28
CO	-	0.310	2.91E-01	1.28
VOC	5.5	0.005	5.07E-03	0.02
CO_2	120,000	117.647	110.58	484.33

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1 and 1.4-2). Emission factors converted from lb/10^6 scf to lb/MMBtu by dividing by the AP-42 average natural gas heating value (Btu/scf).

[2] NO_X and CO emissions based on EPA AP-42, Section 13.5, Industrial Flares (Tables 13.5-1 and 13.5-2).

[3] PM_{10} is assumed to equal total particulate matter.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Plant 1 Flare - Pilot (E-1)

Table 25.c. - Plant 1 Flare - Hazardous Air Pollutant Emissions

Component	Emission Factor, lb/MMSCF [1]	Emission Factor, lb/MMBtu [1]	Emission Rate, lb/hr	Emission Rate, tpy
2-Methylnaphthalene	2.40E-05	2.35E-08	2.21E-08	9.69E-08
3-Methylchloranthrene	1.80E-06	1.76E-09	1.66E-09	7.26E-09
7,12-Dimethylbenz(a)anthracene	1.60E-05	1.57E-08	1.47E-08	6.46E-08
Acenaphthene	1.80E-06	1.76E-09	1.66E-09	7.26E-09
Acenaphthylene	1.80E-06	1.76E-09	1.66E-09	7.26E-09
Anthracene	2.40E-06	2.35E-09	2.21E-09	9.69E-09
Benz(a)anthracene	1.80E-06	1.76E-09	1.66E-09	7.26E-09
Benzene	2.10E-03	2.06E-06	1.94E-06	8.48E-06
Benzo(a)pyrene	1.20E-06	1.18E-09	1.11E-09	4.84E-09
Benzo(b)fluoranthene	1.80E-06	1.76E-09	1.66E-09	7.26E-09
Benzo(g,h,i)perylene	1.20E-06	1.18E-09	1.11E-09	4.84E-09
Benzo(k)fluoranthene	1.80E-06	1.76E-09	1.66E-09	7.26E-09
Chrysene	1.80E-06	1.76E-09	1.66E-09	7.26E-09
Dibenzo(a,h)anthracene	1.20E-06	1.18E-09	1.11E-09	4.84E-09
Dichlorobenzene	1.20E-03	1.18E-06	1.11E-06	4.84E-06
Fluoranthene	3.00E-06	2.94E-09	2.76E-09	1.21E-08
Fluorene	2.80E-06	2.75E-09	2.58E-09	1.13E-08
Formaldehyde	7.50E-02	7.35E-05	6.91E-05	3.03E-04
Hexane	1.80E+00	1.76E-03	1.66E-03	7.26E-03
Indeno(1,2,3-cd)pyrene	1.80E-06	1.76E-09	1.66E-09	7.26E-09
Naphthalene	6.10E-04	5.98E-07	5.62E-07	2.46E-06
Phenanathrene	1.70E-05	1.67E-08	1.57E-08	6.86E-08
Pyrene	5.00E-06	4.90E-09	4.61E-09	2.02E-08
Toluene	3.40E-03	3.33E-06	3.13E-06	1.37E-05
		Total	**1.73E-03**	**7.60E-03**

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1, 1.4-2, and 1.4-3). Emission factors in lb/10^6 scf were divided by 1,020, the average natural heating value as specified in AP-42 Chapter 1.4, Table 1.4-1 and Table 1.4-2 footnote a, and multiplied by MMBTU/hr or MMBTU/yr, to determine lb/hr and tpy emissions, respectively.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Plant 1 Flare - Combustion Products (E-1)

Table 26.a. - Stream Information and Mass Flow Rates of Vapors Sent to Plant 1 Flare

Stream Sent to Flare	Plant 1 Compressor Blowdowns
Mass Flow Rate of VOC Sent to Flare (lb/hr)	0.54
Mass Flow Rate of VOC Sent to Flare (tpy)	2.38
Heat Value of Stream (Btu/scf)	1,295.13
Maximum Expected Hourly Volumetric Flow Rate of Stream (scf/hr)	54.37
Maximum Expected Annual Volumetric Flow Rate of Stream (scf/yr)	476,268.20
Maximum Hourly Heat Input (MMBtu/hr)	0.07
Annual Heat Input (MMBtu/yr)	616.83

Table 26.b. - Plant 1 Flare - Average Hourly Controlled Emissions

Component	Emission Factors		Short-Term Emissions (lb/hr)	
	Emission Factor, lb/MMSCF [1]	Emission Factor, lb/MMBtu [1]	Plant 1 Compressor Blowdowns	Total
PM_{10} [2]	7.6	0.007	5.247E-04	**5.247E-04**
$PM_{2.5}$	5.7	0.006	3.935E-04	**3.935E-04**
SO_2	0.6	0.001	4.142E-05	**4.142E-05**
NO_X [3]	-	0.068	4.788E-03	**4.788E-03**
CO [3]	-	0.310	2.183E-02	**2.183E-02**
VOC [4]	-	-	-	**-**
CO_2	120,000	117.647	8.284	**8.28**

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1 and 1.4-2). Emission factors in $lb/10^6$ scf were divided by the average heating value as specified in AP-42 Chapter 1.4, Table 1.4-1 and Table 1.4-2 footnote a, and multiplied by the MMBTU/hr.

[2] PM_{10} is assumed to equal total particulate matter.

[3] NO_X and CO emissions based on EPA AP-42, Section 13.5, Industrial Flares (Tables 13.5-1 and 13.5-2).

[4] VOC emissions will be controlled by a flare with a combined capture and control efficiency of 98%. VOC fugitive emissions were accounted for elsewhere.

Table 26.c. - Plant 1 Flare - Annual Controlled Emissions

Component	Emission Factors		Annual Emissions (TPY)	
	Emission Factor, lb/MMSCF [1]	Emission Factor, lb/MMBtu [1]	Plant 1 Compressor Blowdowns	Total
PM_{10} [2]	7.6	0.007	2.30E-03	**2.30E-03**
$PM_{2.5}$	5.7	0.006	1.72E-03	**1.72E-03**
SO_2	0.6	0.001	1.81E-04	**1.81E-04**
NO_X [3]	-	0.068	2.10E-02	**2.10E-02**
CO [3]	-	0.370	1.14E-01	**1.14E-01**
VOC [4]	-	-	-	**-**
CO_2	120,000	117.647	36.284	**36.28**

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Plant 1 Flare - Combustion Products (E-1)

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1 and 1.4-2). Emission factors in lb/10^6 scf were divided by the average heating value as specified in AP-42 Chapter 1.4, Table 1.4-1 and Table 1.4-2 footnote a, and multiplied by the MMBTU/yr.

[2] PM_{10} is assumed to equal total particulate matter.

[3] NO_X and CO emissions based on EPA AP-42, Section 13.5, Industrial Flares (Tables 13.5-1 and 13.5-2).

[4] VOC emissions will be controlled by a flare with a combined capture and control efficiency of 98%. VOC fugitive emissions were accounted for elsewhere.

Table 26.d. - Plant 1 Flare - Hazardous Air Pollutant Emissions

Component	Emission Factors lb/MMSCF [1]	HAP Emissions			
		Plant 1 Compressor Blowdowns		Total	
		lb/hr	tpy	lb/hr	tpy
2-Methylnaphthalene	2.40E-05	1.66E-09	7.26E-09	1.66E-09	7.26E-09
3-Methylchloranthrene	1.80E-06	1.24E-10	5.44E-10	1.24E-10	5.44E-10
7,12-Dimethylbenz(a)anthracene	1.60E-05	1.10E-09	4.84E-09	1.10E-09	4.84E-09
Acenaphthene	1.80E-06	1.24E-10	5.44E-10	1.24E-10	5.44E-10
Acenaphthylene	1.80E-06	1.24E-10	5.44E-10	1.24E-10	5.44E-10
Anthracene	2.40E-06	1.66E-10	7.26E-10	1.66E-10	7.26E-10
Benz(a)anthracene	1.80E-06	1.24E-10	5.44E-10	1.24E-10	5.44E-10
Benzene	2.10E-03	1.45E-07	6.35E-07	1.45E-07	6.35E-07
Benzo(a)pyrene	1.20E-06	8.28E-11	3.63E-10	8.28E-11	3.63E-10
Benzo(b)fluoranthene	1.80E-06	1.24E-10	5.44E-10	1.24E-10	5.44E-10
Benzo(g,h,i)perylene	1.20E-06	8.28E-11	3.63E-10	8.28E-11	3.63E-10
Benzo(k)fluoranthene	1.80E-06	1.24E-10	5.44E-10	1.24E-10	5.44E-10
Chrysene	1.80E-06	1.24E-10	5.44E-10	1.24E-10	5.44E-10
Dibenzo(a,h)anthracene	1.20E-06	8.28E-11	3.63E-10	8.28E-11	3.63E-10
Dichlorobenzene	1.20E-03	8.28E-08	3.63E-07	8.28E-08	3.63E-07
Fluoranthene	3.00E-06	2.07E-10	9.07E-10	2.07E-10	9.07E-10
Fluorene	2.80E-06	1.93E-10	8.47E-10	1.93E-10	8.47E-10
Formaldehyde	7.50E-02	5.18E-06	2.27E-05	5.18E-06	2.27E-05
Hexane	1.80E+00	1.24E-04	5.44E-04	1.24E-04	5.44E-04
Indeno(1,2,3-cd)pyrene	1.80E-06	1.24E-10	5.44E-10	1.24E-10	5.44E-10
Naphthalene	6.10E-04	4.21E-08	1.84E-07	4.21E-08	1.84E-07
Phenanathrene	1.70E-05	1.17E-09	5.14E-09	1.17E-09	5.14E-09
Pyrene	5.00E-06	3.45E-10	1.51E-09	3.45E-10	1.51E-09
Toluene	3.40E-03	2.35E-07	1.03E-06	2.35E-07	1.03E-06
Total		**1.30E-04**	**5.69E-04**	**1.30E-04**	**5.69E-04**

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1 and 1.4-2). Emission factors in lb/10^6 scf are based on a heat content of 1,020 Btu/scf. Emission factors in lb/10^6 scf were divided by 1,020, the average natural heating value as specified in AP-42 Chapter 1.4, Table 1.4-1 and Table 1.4-2 footnote a, and multiplied by MMBTU/hr or MMBTU/yr, to determine lb/hr and tpy emissions, respectively.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Plant 2 Flare - Pilot (FLR-1)

Table 27.a. - Plant 2 Flare - Pilot + Purge Gas Information

Parameter	Value
Pilot Gas + Purge Gas, scfh	1,650.00
Natural Gas Heat Value, Btu/scf	1,150.91
Flare Pilot Rating, MMBtu/hr	1.90
Annual Operating Hours	8,760

Table 27.b. - Plant 2 Flare - Criteria Pollutant Emissions

Component	Emission Factor, lb/MMSCF [1]	Emission Factor, lb/MMBtu [2]	Emission Rate, lb/hr	Emission Rate, tpy
PM_{10} [3]	7.6	0.007	1.41E-02	0.06
SO_2	0.6	0.001	1.12E-03	4.89E-03
NO_X	-	0.068	1.29E-01	0.57
CO	-	0.310	5.89E-01	2.58
VOC	5.5	0.005	1.02E-02	0.04
CO_2	120,000	117.647	223.41	978.55

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1 and 1.4-2). Emission factors converted from lb/10^6 scf to lb/MMBtu by dividing by the AP-42 average natural gas heating value (Btu/scf).

[2] NO_X and CO emissions based on EPA AP-42, Section 13.5, Industrial Flares (Tables 13.5-1 and 13.5-2).

[3] PM_{10} is assumed to equal total particulate matter.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Plant 2 Flare - Pilot (FLR-1)

Table 27.c. - Plant 2 Flare - Hazardous Air Pollutant Emissions

Component	Emission Factor, lb/MMSCF [1]	Emission Factor, lb/MMBtu [1]	Emission Rate, lb/hr	Emission Rate, tpy
2-Methylnaphthalene	2.40E-05	2.35E-08	4.47E-08	1.96E-07
3-Methylchloranthrene	1.80E-06	1.76E-09	3.35E-09	1.47E-08
7,12-Dimethylbenz(a)anthracene	1.60E-05	1.57E-08	2.98E-08	1.30E-07
Acenaphthene	1.80E-06	1.76E-09	3.35E-09	1.47E-08
Acenaphthylene	1.80E-06	1.76E-09	3.35E-09	1.47E-08
Anthracene	2.40E-06	2.35E-09	4.47E-09	1.96E-08
Benz(a)anthracene	1.80E-06	1.76E-09	3.35E-09	1.47E-08
Benzene	2.10E-03	2.06E-06	3.91E-06	1.71E-05
Benzo(a)pyrene	1.20E-06	1.18E-09	2.23E-09	9.79E-09
Benzo(b)fluoranthene	1.80E-06	1.76E-09	3.35E-09	1.47E-08
Benzo(g,h,i)perylene	1.20E-06	1.18E-09	2.23E-09	9.79E-09
Benzo(k)fluoranthene	1.80E-06	1.76E-09	3.35E-09	1.47E-08
Chrysene	1.80E-06	1.76E-09	3.35E-09	1.47E-08
Dibenzo(a,h)anthracene	1.20E-06	1.18E-09	2.23E-09	9.79E-09
Dichlorobenzene	1.20E-03	1.18E-06	2.23E-06	9.79E-06
Fluoranthene	3.00E-06	2.94E-09	5.59E-09	2.45E-08
Fluorene	2.80E-06	2.75E-09	5.21E-09	2.28E-08
Formaldehyde	7.50E-02	7.35E-05	1.40E-04	6.12E-04
Hexane	1.80E+00	1.76E-03	3.35E-03	1.47E-02
Indeno(1,2,3-cd)pyrene	1.80E-06	1.76E-09	3.35E-09	1.47E-08
Naphthalene	6.10E-04	5.98E-07	1.14E-06	4.97E-06
Phenanathrene	1.70E-05	1.67E-08	3.17E-08	1.39E-07
Pyrene	5.00E-06	4.90E-09	9.31E-09	4.08E-08
Toluene	3.40E-03	3.33E-06	6.33E-06	2.77E-05
Total			**3.50E-03**	**1.54E-02**

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1, 1.4-2, and 1.4-3). Emission factors in lb/10^6 scf were divided by 1,020, the average natural heating value as specified in AP-42 Chapter 1.4, Table 1.4-1 and Table 1.4-2 footnote a, and multiplied by MMBTU/hr or MMBTU/yr, to determine lb/hr and tpy emissions, respectively.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Plant 2 Flare - Combustion Products (FLR-1)

Table 28.a. - Stream Information and Mass Flow Rates of Vapors Sent to Plant 2 Flare

Stream Sent to Flare	Plant 2 Compressor Blowdowns
Mass Flow Rate of VOC Sent to Flare (lb/hr)	4.31
Mass Flow Rate of VOC Sent to Flare (tpy)	18.87
Heat Value of Stream (Btu/scf)	1,229.02
Maximum Expected Hourly Volumetric Flow Rate of Stream (scf/hr)	800.46
Maximum Expected Annual Volumetric Flow Rate of Stream (scf/yr)	7,012,015.49
Maximum Hourly Heat Input (MMBtu/hr)	0.98
Annual Heat Input (MMBtu/yr)	8,617.94

Table 28.b. - Plant 2 Flare - Average Hourly Controlled Emissions

Component	Emission Factors		Short-Term Emissions (lb/hr)	
	Emission Factor, lb/MMSCF [1]	Emission Factor, lb/MMBtu [1]	Plant 2 Compressor Blowdowns	Total
PM_{10} [2]	7.6	0.007	0.007	**0.007**
$PM_{2.5}$	5.7	0.006	0.005	**0.005**
SO_2	0.6	0.001	0.001	**0.001**
NO_X [3]	-	0.068	0.067	**0.067**
CO [3]	-	0.310	0.305	**0.305**
VOC [4]	-	-	-	**-**
CO_2	120,000	117.647	115.739	**115.74**

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1 and 1.4-2). Emission factors in lb/10^6 scf were divided by the average heating value as specified in AP-42 Chapter 1.4, Table 1.4-1 and Table 1.4-2 footnote a, and multiplied by the MMBTU/hr.

[2] PM_{10} is assumed to equal total particulate matter.

[3] NO_X and CO emissions based on EPA AP-42, Section 13.5, Industrial Flares (Tables 13.5-1 and 13.5-2).

[4] VOC emissions will be controlled by a flare with a combined capture and control efficiency of 98%. VOC fugitive emissions were accounted for elsewhere.

Table 28.c. - Plant 2 Flare - Annual Controlled Emissions

Component	Emission Factors		Annual Emissions (TPY)	
	Emission Factor, lb/MMSCF [1]	Emission Factor, lb/MMBtu [1]	Plant 2 Compressor Blowdowns	Total
PM_{10} [2]	7.6	0.007	3.21E-02	**3.21E-02**
$PM_{2.5}$	5.7	0.006	2.41E-02	**2.41E-02**
SO_2	0.6	0.001	2.53E-03	**2.53E-03**
NO_X [3]	-	0.068	2.93E-01	**0.29**
CO [3]	-	0.370	1.59E+00	**1.59**
VOC [4]	-	-	-	**-**
CO_2	120,000	117.647	506.938	**506.94**

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1 and 1.4-2). Emission factors in lb/10^6 scf were divided by the average heating value as specified in AP-42 Chapter 1.4, Table 1.4-1 and Table 1.4-2 footnote a, and multiplied by the MMBTU/yr.

[2] PM_{10} is assumed to equal total particulate matter.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Plant 2 Flare - Combustion Products (FLR-1)

[3] NO_X and CO emissions based on EPA AP-42, Section 13.5, Industrial Flares (Tables 13.5-1 and 13.5-2).

[4] VOC emissions will be controlled by a flare with a combined capture and control efficiency of 98%. VOC fugitive emissions were accounted for elsewhere.

Table 28.d. - Plant 2 Flare - Hazardous Air Pollutant Emissions

Component	Emission Factors	HAP Emissions			
	lb/MMSCF [1]	Plant 2 Compressor Blowdowns		Total	
		lb/hr	tpy	lb/hr	tpy
2-Methylnaphthalene	2.40E-05	2.31E-08	1.01E-07	2.31E-08	1.01E-07
3-Methylchloranthrene	1.80E-06	1.74E-09	7.60E-09	1.74E-09	7.60E-09
7,12-Dimethylbenz(a)anthracene	1.60E-05	1.54E-08	6.76E-08	1.54E-08	6.76E-08
Acenaphthene	1.80E-06	1.74E-09	7.60E-09	1.74E-09	7.60E-09
Acenaphthylene	1.80E-06	1.74E-09	7.60E-09	1.74E-09	7.60E-09
Anthracene	2.40E-06	2.31E-09	1.01E-08	2.31E-09	1.01E-08
Benz(a)anthracene	1.80E-06	1.74E-09	7.60E-09	1.74E-09	7.60E-09
Benzene	2.10E-03	2.03E-06	8.87E-06	2.03E-06	8.87E-06
Benzo(a)pyrene	1.20E-06	1.16E-09	5.07E-09	1.16E-09	5.07E-09
Benzo(b)fluoranthene	1.80E-06	1.74E-09	7.60E-09	1.74E-09	7.60E-09
Benzo(g,h,i)perylene	1.20E-06	1.16E-09	5.07E-09	1.16E-09	5.07E-09
Benzo(k)fluoranthene	1.80E-06	1.74E-09	7.60E-09	1.74E-09	7.60E-09
Chrysene	1.80E-06	1.74E-09	7.60E-09	1.74E-09	7.60E-09
Dibenzo(a,h)anthracene	1.20E-06	1.16E-09	5.07E-09	1.16E-09	5.07E-09
Dichlorobenzene	1.20E-03	1.16E-06	5.07E-06	1.16E-06	5.07E-06
Fluoranthene	3.00E-06	2.89E-09	1.27E-08	2.89E-09	1.27E-08
Fluorene	2.80E-06	2.70E-09	1.18E-08	2.70E-09	1.18E-08
Formaldehyde	7.50E-02	7.23E-05	3.17E-04	7.23E-05	3.17E-04
Hexane	1.80E+00	1.74E-03	7.60E-03	1.74E-03	7.60E-03
Indeno(1,2,3-cd)pyrene	1.80E-06	1.74E-09	7.60E-09	1.74E-09	7.60E-09
Naphthalene	6.10E-04	5.88E-07	2.58E-06	5.88E-07	2.58E-06
Phenanathrene	1.70E-05	1.64E-08	7.18E-08	1.64E-08	7.18E-08
Pyrene	5.00E-06	4.82E-09	2.11E-08	4.82E-09	2.11E-08
Toluene	3.40E-03	3.28E-06	1.44E-05	3.28E-06	1.44E-05
Total		**1.82E-03**	**7.95E-03**	**1.82E-03**	**7.95E-03**

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1 and 1.4-2). Emission factors in lb/10^6 scf are based in a heat content of 1,020 Btu/scf. Emission factors in lb/10^6 scf were divided by 1,020, the average natural heating value as specified in AP-42 Chapter 1.4, Table 1.4-1 and Table 1.4-2 footnote a, and multiplied by MMBTU/hr or MMBTU/yr, to determine lb/hr and tpy emissions, respectively.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Crude Truck Unloading Tanks Enclosed Combustor (EC-2)

Table 29.a. - Crude Truck Unloading Tanks Enclosed Combustor Pilot Fuel Information

Parameter	Value
Natural Gas Usage, scfh	65.00
Natural Gas Heat Value, Btu/scf	1,150.91
Flare Pilot Rating, MMBtu/hr	0.07
Annual Operating Hours	8,760

Table 29.b. - Crude Truck Unloading Tanks Enclosed Combustor - Criteria Pollutant Emissions

Component	Emission Factor, lb/MMSCF [1]	Emission Factor, lb/MMBtu [2]	Emission Rate, lb/hr	Emission Rate, tpy
PM_{10} [3]	7.6	0.007	5.57E-04	2.44E-03
SO_2	0.6	0.001	4.40E-05	1.93E-04
NO_X	-	0.068	5.09E-03	2.23E-02
CO	-	0.310	2.32E-02	1.02E-01
VOC	5.5	0.005	4.03E-04	1.77E-03
CO_2	120,000	117.647	8.80	38.55

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1 and 1.4-2). Emission factors converted from lb/10^6 scf to lb/MMBtu by dividing by the AP-42 average natural gas heating value (1,020 Btu/scf).

[2] NO_X and CO emissions based on EPA AP-42, Section 13.5, Industrial Flares (Tables 13.5-1 and 13.5-2).

[3] PM_{10} is assumed to equal total particulate matter.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Crude Truck Unloading Tanks Enclosed Combustor (EC-2)

Table 29.c. - Crude Truck Unloading Tanks Enclosed Combustor - Hazardous Air Pollutant Emissions

Component	Emission Factor, lb/MMSCF [1]	Emission Factor, lb/MMBtu [1]	Emission Rate, lb/hr	Emission Rate, tpy
2-Methylnaphthalene	2.40E-05	2.35E-08	1.76E-09	7.71E-09
3-Methylchloranthrene	1.80E-06	1.76E-09	1.32E-10	5.78E-10
7,12-Dimethylbenz(a)anthracene	1.60E-05	1.57E-08	1.17E-09	5.14E-09
Acenaphthene	1.80E-06	1.76E-09	1.32E-10	5.78E-10
Acenaphthylene	1.80E-06	1.76E-09	1.32E-10	5.78E-10
Anthracene	2.40E-06	2.35E-09	1.76E-10	7.71E-10
Benz(a)anthracene	1.80E-06	1.76E-09	1.32E-10	5.78E-10
Benzene	2.10E-03	2.06E-06	1.54E-07	6.75E-07
Benzo(a)pyrene	1.20E-06	1.18E-09	8.80E-11	3.85E-10
Benzo(b)fluoranthene	1.80E-06	1.76E-09	1.32E-10	5.78E-10
Benzo(g,h,i)perylene	1.20E-06	1.18E-09	8.80E-11	3.85E-10
Benzo(k)fluoranthene	1.80E-06	1.76E-09	1.32E-10	5.78E-10
Chrysene	1.80E-06	1.76E-09	1.32E-10	5.78E-10
Dibenzo(a,h)anthracene	1.20E-06	1.18E-09	8.80E-11	3.85E-10
Dichlorobenzene	1.20E-03	1.18E-06	8.80E-08	3.85E-07
Fluoranthene	3.00E-06	2.94E-09	2.20E-10	9.64E-10
Fluorene	2.80E-06	2.75E-09	2.05E-10	8.99E-10
Formaldehyde	7.50E-02	7.35E-05	5.50E-06	2.41E-05
Hexane	1.80E+00	1.76E-03	1.32E-04	5.78E-04
Indeno(1,2,3-cd)pyrene	1.80E-06	1.76E-09	1.32E-10	5.78E-10
Naphthalene	6.10E-04	5.98E-07	4.47E-08	1.96E-07
Phenanathrene	1.70E-05	1.67E-08	1.25E-09	5.46E-09
Pyrene	5.00E-06	4.90E-09	3.67E-10	1.61E-09
Toluene	3.40E-03	3.33E-06	2.49E-07	1.09E-06
		Total	**1.38E-04**	**6.05E-04**

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1 and 1.4-2). Emission factors converted from lb/10^6 scf to lb/MMBtu by dividing by 1,020.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Enclosed Combustor - Combustion Products (EC-2)

Table 30.a. - Stream Information and Mass Flow Rates of Vapors Sent to Enclosed Combustor

Stream Sent to Flare	STC-1 thru STC-6 Tanks Gas
Mass Flow Rate of VOC Sent to Flare (lb/hr)	3,102.90
Mass Flow Rate of VOC Sent to Flare (tpy)	135.31
Heat Value of Stream (Btu/scf)	4,127.76
Maximum Expected Hourly Volumetric Flow Rate of Stream (scf/hr)	15,329.43
Maximum Expected Annual Volumetric Flow Rate of Stream (scf/yr)	1,337,004.69
Maximum Hourly Heat Input (MMBtu/hr)	63.28
Annual Heat Input (MMBtu/yr)	5,518.83

Table 30.b. - Enclosed Combustor - Average Hourly Controlled Emissions

Component	Emission Factors		Short-Term Emissions (lb/hr)
	Emission Factor, lb/MMSCF [1]	Emission Factor, lb/MMBtu [2]	STC-1 thru STC-6 Tanks Gas
PM_{10} [3]	7.6	0.007	0.471
$PM_{2.5}$	5.7	0.006	0.354
SO_2	0.6	0.001	0.037
NO_X	-	0.068	4.303
CO	-	0.310	19.616
VOC [4]	-	-	-
CO_2	120,000	117.647	7,444.260

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1 and 1.4-2). Emission factors in $lb/10^6$ scf were divided by 1,020, the average natural heating value as specified in AP-42 Chapter 1.4, Table 1.4-1 and Table 1.4-2 footnote a, and multiplied by MMBTU/hr.

[2] NO_X and CO emissions based on EPA AP-42, Section 13.5, Industrial Flares (Tables 13.5-1 and 13.5-2).

[3] PM_{10} is assumed to equal total particulate matter.

[4] VOC emissions will be controlled by a combustor with a combined capture and control efficiency of 98% and the emissions are calculated in the storage tank emission calculations.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Enclosed Combustor - Combustion Products (EC-2)

Table 30.c. - Enclosed Combustor - Annual Controlled Emissions

Component	Emission Factors		Annual Emissions (TPY)
	Emission Factor, lb/MMSCF [1]	Emission Factor, lb/MMBtu [2]	STC-1 thru STC-6 Tanks Gas
PM_{10} [3]	7.6	0.007	0.021
$PM_{2.5}$	5.7	0.006	0.015
SO_2	0.6	0.001	0.002
NO_X	-	0.068	0.188
CO	-	0.310	0.855
VOC [4]	-	-	-
CO_2	120,000	117.647	324.637

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1 and 1.4-2). Emission factors in lb/10^6 scf were divided by 1,020, the average natural heating value as specified in AP-42 Chapter 1.4, Table 1.4-1 and Table 1.4-2 footnote a, and multiplied by MMBTU/yr.

[2] NO_X and CO emissions based on EPA AP-42, Section 13.5, Industrial Flares (Tables 13.5-1 and 13.5-2).

[3] PM_{10} is assumed to equal total particulate matter.

[4] VOC emissions will be controlled by a combustor with a combined capture and control efficiency of 98% and the emissions are calculated in the storage tank emission calculations.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Enclosed Combustor - Combustion Products (EC-2)

Table 30.d. - Enclosed Combustor - Hazardous Air Pollutant Emissions

Component	Emission Factors	HAP Emissions (lb/hr)	Annual HAP Emissions (TPY)
	Emission Factor, lb/MMSCF [1]	STC-1 thru STC-6 Tanks Gas	STC-1 thru STC-6 Tanks Gas
2-Methylnaphthalene	2.40E-05	1.49E-06	6.49E-08
3-Methylchloranthrene	1.80E-06	1.12E-07	4.87E-09
7,12-Dimethylbenz(a)anthracene	1.60E-05	9.93E-07	4.33E-08
Acenaphthene	1.80E-06	1.12E-07	4.87E-09
Acenaphthylene	1.80E-06	1.12E-07	4.87E-09
Anthracene	2.40E-06	1.49E-07	6.49E-09
Benz(a)anthracene	1.80E-06	1.12E-07	4.87E-09
Benzene	2.10E-03	1.30E-04	5.68E-06
Benzo(a)pyrene	1.20E-06	7.44E-08	3.25E-09
Benzo(b)fluoranthene	1.80E-06	1.12E-07	4.87E-09
Benzo(g,h,i)perylene	1.20E-06	7.44E-08	3.25E-09
Benzo(k)fluoranthene	1.80E-06	1.12E-07	4.87E-09
Chrysene	1.80E-06	1.12E-07	4.87E-09
Dibenzo(a,h)anthracene	1.20E-06	7.44E-08	3.25E-09
Dichlorobenzene	1.20E-03	7.44E-05	3.25E-06
Fluoranthene	3.00E-06	1.86E-07	8.12E-09
Fluorene	2.80E-06	1.74E-07	7.57E-09
Formaldehyde	7.50E-02	4.65E-03	2.03E-04
Hexane	1.80E+00	1.12E-01	4.87E-03
Indeno(1,2,3-cd)pyrene	1.80E-06	1.12E-07	4.87E-09
Naphthalene	6.10E-04	3.78E-05	1.65E-06
Phenanathrene	1.70E-05	1.05E-06	4.60E-08
Pyrene	5.00E-06	3.10E-07	1.35E-08
Toluene	3.40E-03	2.11E-04	9.20E-06
Total	**-**	**1.17E-01**	**5.09E-03**

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1 and 1.4-2). Emission factors in lb/10^6 scf are based in a heat content of 1,020 Btu/scf. Emission factors in lb/10^6 scf were divided by 1,020, the average natural heating value as specified in AP-42 Chapter 1.4, Table 1.4-1 and Table 1.4-2 footnote a, and multiplied by MMBTU/hr or MMBTU/yr, to determine lb/hr and tpy emissions, respectively.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
TEG Dehydrator BTEX Enclosed Combustor (EC-3)

Table 31.a. - TEG Dehydrator BTEX Enclosed Combustor Pilot Fuel Information

Parameter	Value
Natural Gas Usage, scfh	65.00
Natural Gas Heat Value, Btu/scf	1,150.91
Flare Pilot Rating, MMBtu/hr	0.07
Annual Operating Hours	8,760

Table 31.b. - TEG Dehydrator BTEX Enclosed Combustor - Criteria Pollutant Emissions

Component	Emission Factor, lb/MMSCF [1]	Emission Factor, lb/MMBtu [2]	Emission Rate, lb/hr	Emission Rate, tpy
PM_{10} [3]	7.6	0.007	5.57E-04	2.44E-03
SO_2	0.6	0.001	4.40E-05	1.93E-04
NO_X	-	0.068	5.09E-03	2.23E-02
CO	-	0.310	2.32E-02	1.02E-01
VOC	5.5	0.005	4.03E-04	1.77E-03
CO_2	120,000	117.647	8.80	38.55

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1 and 1.4-2). Emission factors converted from lb/10^6 scf to lb/MMBtu by dividing by the AP-42 average natural gas heating value (1,020 Btu/scf).

[2] NO_X and CO emissions based on EPA AP-42, Section 13.5, Industrial Flares (Tables 13.5-1 and 13.5-2).

[3] PM_{10} is assumed to equal total particulate matter.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
TEG Dehydrator BTEX Enclosed Combustor (EC-3)

Table 31.c. - TEG Dehydrator BTEX Enclosed Combustor - Hazardous Air Pollutant Emissions

Component	Emission Factor, lb/MMSCF [1]	Emission Factor, lb/MMBtu [1]	Emission Rate, lb/hr	Emission Rate, tpy
2-Methylnaphthalene	2.40E-05	2.35E-08	1.76E-09	7.71E-09
3-Methylchloranthrene	1.80E-06	1.76E-09	1.32E-10	5.78E-10
7,12-Dimethylbenz(a)anthracene	1.60E-05	1.57E-08	1.17E-09	5.14E-09
Acenaphthene	1.80E-06	1.76E-09	1.32E-10	5.78E-10
Acenaphthylene	1.80E-06	1.76E-09	1.32E-10	5.78E-10
Anthracene	2.40E-06	2.35E-09	1.76E-10	7.71E-10
Benz(a)anthracene	1.80E-06	1.76E-09	1.32E-10	5.78E-10
Benzene	2.10E-03	2.06E-06	1.54E-07	6.75E-07
Benzo(a)pyrene	1.20E-06	1.18E-09	8.80E-11	3.85E-10
Benzo(b)fluoranthene	1.80E-06	1.76E-09	1.32E-10	5.78E-10
Benzo(g,h,i)perylene	1.20E-06	1.18E-09	8.80E-11	3.85E-10
Benzo(k)fluoranthene	1.80E-06	1.76E-09	1.32E-10	5.78E-10
Chrysene	1.80E-06	1.76E-09	1.32E-10	5.78E-10
Dibenzo(a,h)anthracene	1.20E-06	1.18E-09	8.80E-11	3.85E-10
Dichlorobenzene	1.20E-03	1.18E-06	8.80E-08	3.85E-07
Fluoranthene	3.00E-06	2.94E-09	2.20E-10	9.64E-10
Fluorene	2.80E-06	2.75E-09	2.05E-10	8.99E-10
Formaldehyde	7.50E-02	7.35E-05	5.50E-06	2.41E-05
Hexane	1.80E+00	1.76E-03	1.32E-04	5.78E-04
Indeno(1,2,3-cd)pyrene	1.80E-06	1.76E-09	1.32E-10	5.78E-10
Naphthalene	6.10E-04	5.98E-07	4.47E-08	1.96E-07
Phenanathrene	1.70E-05	1.67E-08	1.25E-09	5.46E-09
Pyrene	5.00E-06	4.90E-09	3.67E-10	1.61E-09
Toluene	3.40E-03	3.33E-06	2.49E-07	1.09E-06
		Total	**1.38E-04**	**6.05E-04**

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1 and 1.4-2). Emission factors converted from lb/10^6 scf to lb/MMBtu by dividing by 1,020.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Enclosed Combustor - Combustion Products (EC-3)

Table 32.a. - Stream Information and Mass Flow Rates of Vapors Sent to Enclosed Combustor

Stream Sent to Flare	DEHY-1 Condenser Vent Stream	DEHY-1 Flash Tank Off Gas Stream
Mass Flow Rate of VOC Sent to Flare (lb/hr)	102.79	26.93
Mass Flow Rate of VOC Sent to Flare (tpy)	450.20	117.97
Heat Value of Stream (Btu/scf)	2,228.53	1,697.31
Maximum Expected Hourly Volumetric Flow Rate of Stream (scf/hr) [1]	1,090.00	576.00
Maximum Expected Annual Volumetric Flow Rate of Stream (scf/yr)	9,548,400.00	5,045,760.00
Maximum Hourly Heat Input (MMBtu/hr)	2.43	0.98
Annual Heat Input (MMBtu/yr)	21,278.93	8,564.22

[1] Condenser vent stream and flash tank off gas stream from GlyCalc aggregate report for DEHY-1.

Table 32.b. - Enclosed Combustor - Average Hourly Controlled Emissions

Component	Emission Factors		Short-Term Emissions (lb/hr)		
	lb/MMSCF [1]	lb/MMBtu [2]	DEHY-1 Condenser Vent Stream	DEHY-1 Flash Tank Off Gas Stream	Total
PM_{10} [3]	7.6	0.007	0.018	0.007	**0.025**
$PM_{2.5}$	5.7	0.006	0.014	0.005	**0.019**
SO_2	0.6	0.001	0.001	0.001	**0.002**
NO_X	-	0.068	0.165	0.066	**0.232**
CO	-	0.310	0.753	0.303	**1.056**
VOC [4]	-	-	-	-	**-**
CO_2	120,000	117.647	285.777	503.778	**789.55**

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1 and 1.4-2). Emission factors in $lb/10^6$ scf were divided by 1,020, the average natural heating value as specified in AP-42 Chapter 1.4, Table 1.4-1 and Table 1.4-2 footnote a, and multiplied by MMBTU/hr.

[2] NO_X and CO emissions based on EPA AP-42, Section 13.5, Industrial Flares (Tables 13.5-1 and 13.5-2).

[3] PM_{10} is assumed to equal total particulate matter.

[4] VOC emissions will be controlled by a combustor with a combined capture and control efficiency of 98% and the emissions are calculated in the DEHY-1 emission calculations.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Enclosed Combustor - Combustion Products (EC-3)

Table 32.c. - Enclosed Combustor - Annual Controlled Emissions

Component	Emission Factors		Annual Emissions (TPY)		
	lb/MMSCF [1]	lb/MMBtu [2]	DEHY-1 Condenser Vent Stream	DEHY-1 Flash Tank Off Gas Stream	Total
PM_{10} [3]	7.6	0.007	0.079	0.032	**0.111**
$PM_{2.5}$	5.7	0.006	0.059	0.024	**0.083**
SO_2	0.6	0.001	0.006	0.003	**0.009**
NO_X	-	0.068	0.723	0.291	**1.015**
CO	-	0.310	3.298	1.327	**4.626**
VOC [4]	-	-	-	-	**-**
CO_2	120,000	117.647	1251.702	503.778	**1,755.479**

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1 and 1.4-2). Emission factors in $lb/10^6$ scf were divided by 1,020, the average natural heating value as specified in AP-42 Chapter 1.4, Table 1.4-1 and Table 1.4-2 footnote a, and multiplied by MMBTU/yr.

[2] NO_X and CO emissions based on EPA AP-42, Section 13.5, Industrial Flares (Tables 13.5-1 and 13.5-2).

[3] PM_{10} is assumed to equal total particulate matter.

[4] VOC emissions will be controlled by a combustor with a combined capture and control efficiency of 98% and the emissions are calculated in the DEHY-1 emission calculations.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Enclosed Combustor - Combustion Products (EC-3)

Table 32.d. - Enclosed Combustor - Hazardous Air Pollutant Emissions

Component	Emission Factors	HAP Emissions (lb/hr)			Annual HAP Emissions (TPY)		
	Emission Factor, lb/MMSCF [1]	DEHY-1 Regenerator and Flash Tank Gas	M DEHY-1 Regenerator and Flash Tank Gas	Total Hourly Emissions	DEHY-1 Regenerator and Flash Tank Gas	M DEHY-1 Regenerator and Flash Tank Gas	Total Annual Emissions
2-Methylnaphthalene	2.40E-05	5.72E-08	2.30E-08	8.02E-08	2.50E-07	1.01E-07	3.51E-07
3-Methylchloranthrene	1.80E-06	4.29E-09	1.73E-09	6.01E-09	1.88E-08	7.56E-09	2.63E-08
7,12-Dimethylbenz(a)anthracene	1.60E-05	3.81E-08	1.53E-08	5.34E-08	1.67E-07	6.72E-08	2.34E-07
Acenaphthene	1.80E-06	4.29E-09	1.73E-09	6.01E-09	1.88E-08	7.56E-09	2.63E-08
Acenaphthylene	1.80E-06	4.29E-09	1.73E-09	6.01E-09	1.88E-08	7.56E-09	2.63E-08
Anthracene	2.40E-06	5.72E-09	2.30E-09	8.02E-09	2.50E-08	1.01E-08	3.51E-08
Benz(a)anthracene	1.80E-06	4.29E-09	1.73E-09	6.01E-09	1.88E-08	7.56E-09	2.63E-08
Benzene	2.10E-03	5.00E-06	2.01E-06	7.01E-06	2.19E-05	8.82E-06	3.07E-05
Benzo(a)pyrene	1.20E-06	2.86E-09	1.15E-09	4.01E-09	1.25E-08	5.04E-09	1.76E-08
Benzo(b)fluoranthene	1.80E-06	4.29E-09	1.73E-09	6.01E-09	1.88E-08	7.56E-09	2.63E-08
Benzo(g,h,i)perylene	1.20E-06	2.86E-09	1.15E-09	4.01E-09	1.25E-08	5.04E-09	1.76E-08
Benzo(k)fluoranthene	1.80E-06	4.29E-09	1.73E-09	6.01E-09	1.88E-08	7.56E-09	2.63E-08
Chrysene	1.80E-06	4.29E-09	1.73E-09	6.01E-09	1.88E-08	7.56E-09	2.63E-08
Dibenzo(a,h)anthracene	1.20E-06	2.86E-09	1.15E-09	4.01E-09	1.25E-08	5.04E-09	1.76E-08
Dichlorobenzene	1.20E-03	2.86E-06	1.15E-06	4.01E-06	1.25E-05	5.04E-06	1.76E-05
Fluoranthene	3.00E-06	7.14E-09	2.88E-09	1.00E-08	3.13E-08	1.26E-08	4.39E-08
Fluorene	2.80E-06	6.67E-09	2.68E-09	9.35E-09	2.92E-08	1.18E-08	4.10E-08
Formaldehyde	7.50E-02	1.79E-04	7.19E-05	2.50E-04	7.82E-04	3.15E-04	1.10E-03
Hexane	1.80E+00	4.29E-03	1.73E-03	6.01E-03	1.88E-02	7.56E-03	2.63E-02
Indeno(1,2,3-cd)pyrene	1.80E-06	4.29E-09	1.73E-09	6.01E-09	1.88E-08	7.56E-09	2.63E-08
Naphthalene	6.10E-04	1.45E-06	5.85E-07	2.04E-06	6.36E-06	2.56E-06	8.92E-06
Phenanathrene	1.70E-05	4.05E-08	1.63E-08	5.68E-08	1.77E-07	7.14E-08	2.49E-07
Pyrene	5.00E-06	1.19E-08	4.79E-09	1.67E-08	5.22E-08	2.10E-08	7.31E-08
Toluene	3.40E-03	8.10E-06	3.26E-06	1.14E-05	3.55E-05	1.43E-05	4.97E-05
Total	**-**	**4.48E-03**	**1.80E-03**	**6.29E-03**	**1.96E-02**	**7.90E-03**	**2.75E-02**

[1] Based on EPA AP-42, Section 1.4, Natural Gas Combustion (Tables 1.4-1 and 1.4-2). Emission factors in lb/10^6 scf are based in a heat content of 1,020 Btu/scf. Emission factors in lb/10^6 scf were divided by 1,020, the average natural heating value as specified in AP-42 Chapter 1.4, Table 1.4-1 and Table 1.4-2 footnote a, and multiplied by MMBTU/hr or MMBTU/yr, to determine lb/hr and tpy emissions, respectively.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Pigging Emissions (MSS-PIG)

Table 33.a. - Parameters

Parameter	Inlet Gas	Crude Oil [1]	NGL	Standard Fuel Gas/Residue
VOC wt%	28.02%	100.00%	0.00%	2.38%
HAPs wt%	0.75%	2.90%	0.00%	0.00%
CH4 wt%	46.11%	0.00%	0.00%	61.28%
CO2 wt%	2.10%	0.00%	0.00%	2.54%
MW of Gas (lb/lb-mole)	23.54	75.28	0.00	19.75
Control Efficiency (Flare)	0%	0%	0%	0%

Table 33.b. Launcher/Receivers

Launcher/Receiver	Quantity	Pipe Diameter (P_D)	Pipe Length (P_L)	Volume (Q)	Events per Unit [1]	Events per Year	Temperature of Gas Inside Unit	Pressure Before Venting	Final Pressure
		(in)	(ft)	(ft^3)			(°F)	(psia)	(psia)
Inlet Gas Receivers	20	16	2	2.79	52	1,040	100.0	200.0	14.7
Crude Oil Receiver/Launcher	2	10	1.16	0.63	52	104	68.0	15.7	
NGL Receiver/Launchers	0	0	0	0	0	0	0.0	0.0	
Gas Lift Gas Launcher	1	8	2	0.7	52	52	100.0	600.0	

[1] Assuming 1 hour per event.

Table 33.c. Uncontrolled Emissions

Launcher/Receiver	Emissions [2] lb/event	VOC		HAPS		CO_2		CH_4		CO_2e	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Inlet Receivers [1]	2.19	12.26	0.32	0.33	0.01	0.92	0.02	20.17	0.52	505.12	13.13
Crude Oil Receiver/Launcher	0.13	0.26	6.84E-03	7.63E-03	1.98E-04	0.00E+00	0.00E+00	0.00	0.00E+00	0.00	0.00
NGL Receiver/Launchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas Lift Gas Launcher	1.38	0.03	8.56E-04	1.74E-05	4.53E-07	0.04	9.13E-04	0.85	0.02	21.19	0.55

[1] Short-term emission calculations assume pigging will occur at the same time.

[2] Emissions are calculated using the ideal gas law.

$$Emissions = \frac{PV}{RT} * MW$$

Where:

P = Pressure (psia)

T = Temperature (R)

R = 10.732 ft^3*psia/R*lbmol

V = Volume of Pig Launcher/Reciever (ft^3)

MW = Molecular Weight of Gas

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
MSS Compressor Emissions (MSS-Comp)

Table 34.a. MSS Emissions

Parameter	Residue Gas	Inlet Gas
VOC wt%	2.38%	28.02%
HAPs wt%	0.00%	0.75%
CH_4 wt%	61.28%	46.11%
CO_2 wt%	2.54%	2.10%
HHV (Btu/scf)	1,153.00	1,400.90
MW of Gas (lb/lb-mole)	1.00	23.54

Event Type	Estimated Maximum Number of Events	Number of Compressors	Gas Volume Releases	Control Efficiency	VOC Emissions (Uncontrolled)		VOC Emissions (Controlled)		HAP Emissions [1] (Uncontrolled)		HAP Emissions [1] (Controlled)		Methane Emissions (Uncontrolled)		Methane Emissions (Controlled)		CO_2 Emissions (Uncontrolled)		CO_2e Emissions [2] (Uncontrolled)		CO_2e Emissions [2] (Controlled)	
	(events/year/compressor)	(Qty)	(scf/event)	%	(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)
Plant 1 Inlet Compressor Blowdowns	52	4	945.30	98%	0.39	1.71	0.01	0.03	0.01	0.05	2.10E-04	9.18E-04	0.64	2.82	0.01	0.06	0.03	0.13	16.10	70.52	0.35	1.54
Plant 1 Residue Compressor Blowdowns	52	3	1,302.61	98%	1.46E-03	0.01	2.92E-05	1.28E-04	7.71E-07	3.38E-06	1.54E-08	6.76E-08	0.04	0.16	7.50E-04	3.29E-03	1.56E-03	0.01	0.94	4.11	0.02	0.09
Plant 1 Regen Compressor Blowdowns	52	1	1,470.00	98%	0.15	0.67	3.04E-03	0.01	4.07E-03	0.02	8.15E-05	3.57E-04	0.25	1.09	5.00E-03	0.02	0.01	0.05	6.26	27.41	0.14	0.60
Plant 2 Inlet Compressor Blowdowns	52	4	9,236.43	98%	3.82	16.72	0.08	0.33	0.10	0.45	2.05E-03	8.97E-03	6.28	27.51	0.13	0.55	0.29	1.25	157.31	689.01	3.43	15.01
Plant 2 Residue Compressor Blowdowns	52	3	31,163.58	98%	0.03	0.15	6.98E-04	3.06E-03	1.85E-05	8.08E-05	3.69E-07	1.62E-06	0.90	3.93	0.02	0.08	0.04	0.16	22.47	98.41	0.49	2.13
Plant 2 BTEX VRU Compressor Blowdowns	52	2	1,470.00	98%	0.30	1.33	0.01	0.03	8.15E-03	0.04	1.63E-04	7.14E-04	0.50	2.19	0.01	0.04	0.02	0.10	12.52	54.83	0.27	1.19
Plant 2 Regen Compressor Blowdowns	52	1	1,470.00	98%	0.15	0.67	3.04E-03	0.01	4.07E-03	0.02	8.15E-05	3.57E-04	0.25	1.09	5.00E-03	0.02	0.01	0.05	6.26	27.41	0.14	0.60
TOTAL	**-**	**-**	**-**	**-**	**4.85**	**21.25**	**0.10**	**0.42**	**0.13**	**0.57**	**2.58E-03**	**0.01**	**8.86**	**38.80**	**0.18**	**0.78**	**0.40**	**1.75**	**221.85**	**971.71**	**4.83**	**21.15**

[1] Emissions of CH_4 and CO_2 are calculated in accordance with Equations W-32a, W-35 and W-36 in Subpart W of 40 CFR 98.

$$\text{Emissions (tpy)} = \frac{\text{Number of events per year} * \text{Gas Volume (scf/event)} * \text{Molecular Weight of Gas (lb/lb-mol)} * \text{Weight Fraction of Pollutant}}{\text{Density of Natural Gas (379 scf/lb-mol)} * \text{2,000 (lb/ton)}}$$

$$\text{Emissions (lb/hr)} = \frac{\text{Emissions (ton/year)} * \text{2,000 (lb/ton)}}{\text{8,760 (hr/year)}}$$

[2] The emissions of methane have a Global Warming Potential (GWP) of 25 times that of CO_2, and therefore methane emissions are multiplied by 25 and added to the CO_2 emissions to determine total GHG emissions.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
MSS Vessel Blowdown Emissions - Inlet (MSS-Vessel1)

Table 35.a. MSS Emissions for Inlet Gas Vessel Blowdowns

Parameter	Value
VOC wt%	28.02%
HAPs wt%	0.75%
CH_4 wt%	46.11%
CO_2 wt%	2.10%
MW of Gas (lb/lb-mole)	23.54
Scf per Event	100,000
Events per Year	1
Maximum Events per Hour	1
Control Efficiency (Flare)	0%

Event Type	Gas Volume Releases		VOC Emissions [1] (Uncontrolled)		VOC Emissions [1] (Controlled)		HAP Emissions [2] (Uncontrolled)		HAP Emissions [2] (Controlled)		Methane Emissions [3] (Uncontrolled)		Methane Emissions [3] (Controlled)		CO_2 Emissions [3] (Uncontrolled)		CO_2e Emissions [4] (Uncontrolled)		CO_2e Emissions [4] (Controlled)	
	(scf/hr)	(scf/yr)	(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)
Vessel Blowdowns	100,000	100,000	1,740.32	0.87	1,740.32	0.87	46.68	0.02	46.68	0.02	2,863.91	1.43	2,863.91	1.43	130.45	0.07	71,728.10	35.86	71,728.10	35.86
TOTAL			**1,740.32**	**0.87**	**1,740.32**	**0.87**	**46.68**	**0.02**	**46.68**	**0.02**	**2,863.91**	**1.43**	**2,863.91**	**1.43**	**130.45**	**0.07**	**71,728.10**	**35.86**	**71,728.10**	**35.86**

[1] The non-methane, non-ethane VOC content is conservatively based on the VOC content of hydrocarbon fraction only in the compositional analysis of the inlet gas.

[2] HAP emissions are based on the HAPs content in the inlet gas composition.

[3] GHG emissions are conservatively assumed for all streams based on the concentrations of methane and CO_2 in the inlet gas composition. The emissions of methane have a Global Warming Potential (GWP) of 25 times that of CO_2, and therefore methane emissions are multiplied by 25 and added to the CO_2 emissions to determine total GHG emissions.

$$\text{Emissions (tpy)} = \frac{\text{Number of events per year} * \text{Gas Volume (scf/event)} * \text{Molecular Weight of Gas (lb/lb-mol)} * \text{Weight Fraction of Pollutant}}{\text{Density of Natural Gas (379 scf/lb-mol)} * 2{,}000 \text{ (lb/ton)}}$$

$$\text{Emissions (lb/hr)} = \frac{\text{Emissions (ton/year)} * 2{,}000 \text{ (lb/ton)}}{8{,}760 \text{ (hr/year)}}$$

[4] Emissions of CH_4 and CO_2 are calculated in accordance with Equations W-32a, W-35 and W-36 in Subpart W of 40 CFR 98.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
MSS Vessel Blowdown Emissions - Residue (MSS-Vessel2)

Table 36.a. MSS Emissions for Residue Gas Vessel Blowdowns

Parameter	Value
VOC wt%	2.38%
HAPs wt%	0.00%
CH_4 wt%	61.28%
CO_2 wt%	2.54%
MW of Gas (lb/lb-mole)	19.75
Scf per Event	100,000
Events per Year	1
Maximum Events per Hour	1
Control Efficiency (Flare)	0%

Event Type	Gas Volume Releases		VOC Emissions [1] (Uncontrolled)		VOC Emissions [1] (Controlled)		HAP Emissions [2] (Uncontrolled)		HAP Emissions [2] (Controlled)		Methane Emissions [3] (Uncontrolled)		Methane Emissions [3] (Controlled)		CO_2 Emissions [3] (Uncontrolled)		CO_2e Emissions [4] (Uncontrolled)		CO_2e Emissions [4] (Controlled)	
	(scf/hr)	(scf/yr)	(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)
Vessel Blowdowns	100,000	100,000	124.28	0.06	124.28	0.06	0.07	3.28E-05	0.07	3.28E-05	3,193.22	1.60	3,193.22	1.60	132.53	0.07	79,963	39.98	79,963	39.98
TOTAL			**124.28**	**0.06**	**124.28**	**0.06**	**0.07**	**3.28E-05**	**0.07**	**3.28E-05**	**3,193.22**	**1.60**	**3,193.22**	**1.60**	**132.53**	**0.07**	**79,963**	**39.98**	**79,963**	**39.98**

[1] The non-methane, non-ethane VOC content is based on the residue gas composition

[2] HAP emissions are based on the HAPs content in the residue gas composition.

[3] GHG emissions are conservatively assumed for all streams based on the concentrations of methane and CO_2 in the inlet gas composition. The emissions of methane have a Global Warming Potential (GWP) of 25 times that of CO_2, and therefore methane emissions are multiplied by 25 and added to the CO_2 emissions to determine total GHG emissions.

$$\text{Emissions (tpy)} = \frac{\text{Number of events per year} * \text{Gas Volume (scf/event)} * \text{Molecular Weight of Gas (lb/lb-mol)} * \text{Weight Fraction of Pollutant}}{\text{Density of Natural Gas (379 scf/lb-mol)} * \text{2,000 (lb/ton)}}$$

$$\text{Emissions (lb/hr)} = \frac{\text{Emissions (ton/year)} * \text{2,000 (lb/ton)}}{\text{8,760 (hr/year)}}$$

[4] Emissions of CH_4 and CO_2 are calculated in accordance with Equations W-32a, W-35 and W-36 in Subpart W of 40 CFR 98.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Tank Cleaning Venting (MSS-Tank Cleaning)

Table 37.a. MSS Tank Cleaning Venting Parameters

Parameter	Value	
VOC wt%	100.00%	
HAPs wt%	2.90%	
CH_4 wt%	0.00%	
CO_2 wt%	0.00%	
MW of Gas (lb/lb-mole)	75.28	
Tank Diameter (ft)	15.50	
Tank Height (ft)	30.00	
Tank Volume, V_V (ft^3)	5,660.76	
Number of Events per Year [1]	6.00	
Emission Parameters	**Max Hourly Emissions [2]**	**Average Annual Emissions**
Duration (hr/event)	1	1
Day Time Temp. (°F)	83	58.5
Night Time Temp. (°F)	56	34.3
Temperature Expansion (%)	5%	5%
Average Stock Temp., T_V (°F)	95	45.11
True Vapor Pressure, P_{VA} (psia) [3]	12.81	5.79
Emissions (lb/event) [4]	458.29	227.42
Hourly Emissions (lb/hr)	458.29	227.42
Yearly (tpy)	-	0.68

[1] Assuming one event per tank per year.

[2] Max hourly emissions are based on the assumption only one tank will be cleaned at a time.

[3] True vapor pressure was estimated using the equation from Figure 7.1-16. in U.S. EPA Report AP-42, Fifth Edition, Chapter 7.

[4] Vapor space purge emissions calculated using equation 4-2 in U.S. EPA Report AP-42, Fifth Edition, Chapter 7:

$$L_P = \frac{P_{VA} V_V}{R T_V} * M_V S$$

Where:

L_P = The total purge emissions from tank venting (lb/event).

P_{VA} = the true vapor pressure of the exposed volatile material in the tank (psia).

V_V = volume of vapor space (ft^3).

R = the ideal gas law. 10.731 psia ft^3 per lb-mol °R

M_V = molecular weight of vapors (lb/lb-mole).

T_V = Temperature of vapor space (°R).

S = saturation factor of 0.5. The saturation factor value of 0.5 for an internal or domed external floating roof tank with a partial heel, as shown in Equation 3-18, may be reasonably chosen as an upper bound on the value of S for a fixed roof tank vapor space purge. It would be expected, for a given diameter of tank and type of liquid heel, that the accumulated vapors would be less concentrated in the larger vapor space of the fixed roof tank than under a landed floating roof, and thus a value of 0.5 should be a conservative upper bound for the fixed roof tank vapor space purge saturation factor. See Equation 4-8 of AP-42 Chapter 7.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Tank Cleaning Venting (MSS-Tank Cleaning)

Table 37.b. MSS Tank Cleaning Venting Emissions

Event Type	Weight % of Tank Cleaning/Degassing Losses [1]	Tank Cleaning/Degassing Emissions [1] (Uncontrolled)	
		(lb/hr)	(tpy)
VOC [1]	100%	458.29	0.68
Total CO_2e	0.00%	0.00	0.00
CH_4 (Methane)	0.00%	0.00	0.00
CO_2	0.00%	0.00	0.00
Total HAPs	2.90%	13.29	0.02
Benzene	0.25%	1.15	1.71E-03
Toluene	0.48%	2.20	3.27E-03
Ethylbenzene	0.12%	0.55	8.19E-04
Xylene	0.55%	2.52	3.75E-03
n-C6 (n-Hexane)	1.50%	6.87	0.01
2,2,4-Trimethylpentane	0.00%	0.00	0.00
H_2S	0.00%	0.00	0.00

[1] Speciated HAP emissions were estimated using the HAP composition of crude oil from EPA Document (EPA-453/R-94-079a), National Emission Standards for Hazardous Air Pollutants for Source Categories: Oil and Natural Gas Production and Natural Gas Transmission and Storage - Background Information for Proposed Standards, Table 2-1 (Average HAP Composition of Extracted Streams and Recovered Products).

[1] The non-methane, non-ethane VOC content is based on the crude oil composition.

[2] HAP emissions are based on the HAPs content in the crude composition.

[3] GHG emissions are estimated based on the GHG content in the crude composition.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
MSS-Tank Roof Landings/Cleaning/Venting (MSS-IFR Tanks)

Table 38.a. - Crude Oil MSS Characteristics

Parameter [1]	CT-1	CT-2	CT-3	Units
Liquid Heel	Full	Full	Full	N/A
Landed Roof Height	6.50	6.5	6.5	ft
Height of Liquid at Tank Shell	1	1	1	ft
Hours Roof was Landed and Tank Standing Idle Prior to Cleaning/Degassing	24	24	24	hours
Product Stored	Crude Oil	Crude Oil	Crude Oil	
Maximum Refilling Rate	157,500.00	157,500.00	210,000.00	gal/hr
Tank Cleaned Prior to Refilling?	Yes	Yes	Yes	N/A
Is Forced Ventilation Continuous? (e.g., if continuous venting ceases overnight and occurs over multiple days, then no).	Yes	Yes	Yes	N/A
Average Ventilation Rate During Forced Ventilation	1,000	1,000	1,000	ft^3/min
Duration of Continued Forced Ventilation (per Event)	1	1	1	day
Daily Period of Forced Ventilation (per Event)	3	5	3	hour/day
Vapor Concentration During Continued Forced Ventilation	10,000.00	10,000.00	10,000.00	ppm
Annual Emissions [1]	1.04	3.34	1.69	ton/yr
Hourly Emissions [2]	2,083.87			lb/hr

[1] Emissions are calculated based on AP-42 Chapter 7 guidance and best available information and estimates of typical MSS scenario. Actual MSS conditions may vary slightly. Based on one MSS event per year in hottest month - includes roof landing (standing idle losses), cleaning (vapor space purge and continued forced ventilation), and filling losses (losses occuring from tank prior to liquids reaching the landed roof).

[2] Maximum emissions are based on the maximum MSS activity type that would be representative in any given hour for each tank. It is reasonable to assume that MSS for these tanks would not be occurring simultaneously, therefore, the worst case emissions from all three tanks are represented as the lb/hr emissions. The maximum lb/hr losses in this case result from vapor space purge emissions which are assumed to occur within one hour.

Table 38.b. - Crude Oil Tank MSS Emissions

Parameter	Weight % of Working & Breathing Losses [1]	Uncontrolled	
		Working & Breathing Emissions per Tank, tpy [1]	Total Emissions per Tank, lb/hr [1]
VOC [2]	100%	6.07	2,083.87
Total CO_2e	0.00%	0.00	0.00
CH_4 (Methane)	0.00%	0.00	0.00
CO_2	0.00%	0.00	0.00
Total HAPs	2.90%	0.18	60.43
Benzene	0.25%	0.02	5.21
Toluene	0.48%	0.03	10.00
Ethylbenzene	0.12%	0.01	2.50
Xylene	0.55%	0.03	11.46
n-C6 (n-Hexane)	1.50%	0.09	31.26
2,2,4-Trimethylpentane	0.00%	0.00	0.00
H_2S	0.00%	0.00	0.00

[1] Speciated HAP emissions were estimated using the HAP composition of crude oil from EPA Document (EPA-453/R-94-079a), National Emission Standards for Hazardous Air Pollutants for Source Categories: Oil and Natural Gas Production and Natural Gas Transmission and Storage - Background Information for Proposed Standards, Table 2-1 (Average HAP Composition of Extracted Streams and Recovered Products).

[2] Non-methane, non-ethane VOC emissions.

Rough Rider Operating, LLC
Wild Basin Gas Plant
Watford City, ND
Diesel Tank (DT-2)

Table 39.a. - Diesel Tank Characteristics

Parameter [1]	Value	Units
Tank Capacity	1,000	gallons
Maximum Liquid Height	9.42	ft
Tank Working Capacity	778	gallons
Product Stored [1]	Lube Oil	
Shell Height	12.08	ft
Tank Diameter	3.75	ft
Daily Throughput per Tank	142.47	gallons/day/tank
Annual Throughput per Tank	52,000	gallons/year/tank
Quantity	1	tank(s)

[1] Tank Parameters are estimated above based on a similar-sized tank.

Table 39.b. - Diesel Tank Emissions

Parameter	Weight Fraction of Working & Breathing Losses, tpy [1]	Uncontrolled	
		Total Emissions per Tank, lb/hr [2]	Working & Breathing Emissions per Tank, tpy [1]
VOC [3]	1.00	0.06	2.95E-04

[1] Working and breathing emissions are calculated in a separate spreadsheet.

[2] Maximum hourly tank emissions are based on TCEQ Guidance document APDG 6419 - Short Term Emissions Rates from Floating Roof Storage Tanks dated February 2020. AP-42 methodologies are not appropriate to use to determine emission rates at timescales less than monthly.

[3] Non-methane, non-ethane VOC emissions. GHG and HAP emissions are assumed to be negligible.

DT-2

Rough Rider Operating, LLC

Tank Indentification and Physical Characteristics

Identification

Identification No.	DT-2
Description	1000-gal diesel tank
State	North Dakota
City	Watford City
Nearest Major City	Williston, ND
Company	Rough Rider Operating, LLC

Physical Characteristics - Tank Characteristics

Diameter	3.75	ft		
Shell Length/Height	10.42	ft		
Maximum Liquid height	9.42	ft		
Avg. Liquid height	5.21	ft		
Minimum Liquid height	1	ft		
Tank Volume	1,000	gal		
Maximum short-term filling rate	1,000	gal/hr		
Worst Case liquid Surface Temp	95	°F		
Net annual throughput	52,000	gal/yr		
Net Throughput January	4,416	gal/mo	**Turnovers**	6.35
Net Throughput February	3,989	gal/mo	**Turnovers**	5.74
Net Throughput March	4,416	gal/mo	**Turnovers**	6.35
Net Throughput April	4,274	gal/mo	**Turnovers**	6.15
Net Throughput May	4,416	gal/mo	**Turnovers**	6.35
Net Throughput June	4,274	gal/mo	**Turnovers**	6.15
Net Throughput July	4,416	gal/mo	**Turnovers**	6.35
Net Throughput August	4,416	gal/mo	**Turnovers**	6.35
Net Throughput September	4,274	gal/mo	**Turnovers**	6.15
Net Throughput October	4,416	gal/mo	**Turnovers**	6.35
Net Throughput November	4,274	gal/mo	**Turnovers**	6.15
Net Throughput December	4,416	gal/mo	**Turnovers**	6.35
Tank Type	Vertical			
Paint Color/Shade	Beige			
Paint Condition	Average			

Physical Characteristics - Roof Characteristics

Roof Type	Cone

Breather vent pressure setting	0.03	psia
Breather vent vacuum setting	-0.03	psia
Tank has Flash?	N	DO NOT LEAVE BLANK

DT-2
Rough Rider Operating, LLC
Liquid Contents of Storage Tank

Chemical Category of Liquid	Petroleum_Liquid	
Single/Multiple		
Chemical subtype	No. 2 Fuel Oil (Diesel)	
Vapor Pressure Calculation Method	Table 7.1-2	
Chemical Name	Diesel	
Average Liquid Surface Temperature, T_{LA}	45.11	F
Vapor Pressure at Liquid Surface Temperature	0.005	psia
Liquid Molecular Weight Default	188.000	lb/lb-mole
Vapor Molecular Weight Default	130.000	lb/lb-mole
Liquid Density Default	7.10	lb./gal
Liquid Molecular Weight User Input		lb/lb-mole
Vapor Molecular Weight User Input		lb/lb-mole
Liquid Density User Input		lb./gal
RVP		

Mixture Properties

Compound	Mole Fraction	A	B	C	Mi	M_L

Results Summary - Diesel Emissions

Month	Standing lb/month	Working lb/month	Total lb/month	Vapor Pressure @ Daily Average Surface Temp	Average Liquid Surface Temp °F	Liquid Bulk Temp °F
January	0.00	0.01	0.01	0.00	11.45	10.86
February	0.00	0.01	0.01	0.00	18.96	17.95
March	0.00	0.02	0.02	0.00	31.90	30.19
April	0.01	0.03	0.04	0.00	47.61	45.15
May	0.02	0.05	0.06	0.01	58.70	55.77
June	0.02	0.06	0.08	0.01	68.49	65.28
July	0.03	0.08	0.11	0.01	75.90	72.46
August	0.03	0.08	0.10	0.01	74.04	71.14
September	0.01	0.05	0.07	0.01	61.40	59.30
October	0.01	0.03	0.04	0.00	45.57	44.27
November	0.00	0.02	0.02	0.00	29.17	28.46
December	0.00	0.01	0.01	0.00	16.39	15.89
Total Annual lb or avg parameter	0.13	0.46	0.59	0.00	45.11	43.20
Ozone Season lb or Ozone Season average param.	0.10	0.32	0.43	0.01	67.74	64.82
Ozone Season lb/day	0.00	0.00	0.00	-	-	-

Worst Case Hourly Emissions	lb/hr
Diesel	0.0559

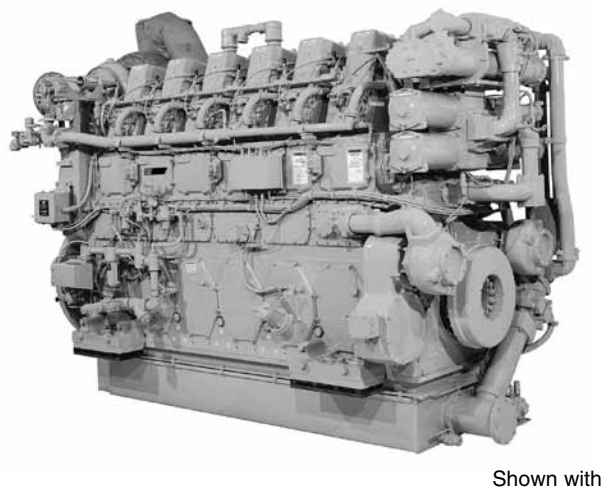
APPENDIX C

SUPPORTING DOCUMENTATION

G3608 LE Gas Petroleum Engine

1767-1823 bkW (2370-2445 bhp) 1000 rpm

0.5 g/bhp-hr NOx or 0.7 g/bhp-hr NOx (NTE)



Shown with Optional Equipment

CAT® ENGINE SPECIFICATIONS

In-Line 8, 4-Stroke-Cycle

Bore	300 mm (11.8 in.)
Stroke	300 mm (11.8 in.)
Displacement	169.6 L (10,350 cu. in.)
Aspiration	Turbocharged-Aftercooled
Digital Engine Management Governor and Protection	Electronic (ADEM™ A3)
Combustion	Low Emission (Lean Burn)
Engine Weight net dry (approx)	19,000 kg (41,888 lb)
Power Density	10.4 kg/kW (17.1 lb/hp)
Power per Displacement	14.5 bhp/L
Total Cooling System Capacity	530 L (140 gal)
Jacket Water	470 L (124 gal)
Aftercooler Circuit	60.6 L (16 gal)
Lube Oil System (refill)	912.3 L (241 gal)
Oil Change Interval	5000 hours
Rotation (from flywheel end)	Counterclockwise
Flywheel Teeth	255

FEATURES

Engine Design
- Proven reliability and durability
- Ability to burn a wide spectrum of gaseous fuels
- Robust diesel strength design prolongs life and lowers owning and operating costs
- Broad operating speed range

Emissions
Meets U.S. EPA Spark Ignited Stationary NSPS Emissions for 2010/11 with the use of an oxidation catalyst

Lean Burn Engine Technology
Lean-burn engines operate with large amounts of excess air. The excess air absorbs heat during combustion reducing the combustion temperature and pressure, greatly reducing levels of NOx. Lean-burn design also provides longer component life and excellent fuel consumption.

Ease of Operation
- High-strength pan and rails for excellent mounting and stability
- Side covers on block allow for inspection of internal components

Advanced Digital Engine Management
ADEM A3 engine management system integrates speed control, air/fuel ratio control, and ignition/detonation controls into a complete engine management system. ADEM A3 has improved: user interface, display system, shutdown controls, and system diagnostics.

Full Range of Attachments
Large variety of factory-installed engine attachments reduces packaging time.

Testing
Every engine is full-load tested to ensure proper engine performance.

Gas Engine Rating Pro
GERP is a PC-based program designed to provide site performance capabilities for Cat® natural gas engines for the gas compression industry. GERP provides engine data for your site's altitude, ambient temperature, fuel, engine coolant heat rejection, performance data, installation drawings, spec sheets, and pump curves.

Product Support Offered Through Global Cat Dealer Network
More than 2,200 dealer outlets

Cat factory-trained dealer technicians service every aspect of your petroleum engine

Cat parts and labor warranty

Preventive maintenance agreements available for repair-before-failure options

S•O•S℠ program matches your oil and coolant samples against Caterpillar set standards to determine:
- Internal engine component condition
- Presence of unwanted fluids
- Presence of combustion by-products
- Site-specific oil change interval

Over 80 Years of Engine Manufacturing Experience
Over 60 years of natural gas engine production

Ownership of these manufacturing processes enables Caterpillar to produce high quality, dependable products
- Cast engine blocks, heads, cylinder liners, and flywheel housings
- Machine critical components
- Assemble complete engine

Web Site
For all your petroleum power requirements, visit www.catoilandgas.cat.com.

STANDARD EQUIPMENT

Air Inlet System
Air cleaner — standard-duty
Inlet air adapter

Control System
ADEM A3 control system provides electronic governing integrated with air/fuel ratio control and individual cylinder ignition timing control

Cooling System
Jacket water pump
Jacket water thermostats and housing
Aftercooler pump
Aftercooler water thermostats and housing
Single-stage aftercooler

Exhaust System
Dry wrapped exhaust manifolds
Vertical outlet adapter

Flywheels & Flywheel Housings
SAE standard rotation

Fuel System
Gas admission valves with electronically controlled fuel supply pressure

Ignition System
A3 control system senses individual cylinder detonation and controls individual cylinder timing

Instrumentation
LCD display panel monitors engine parameters and displays diagnostic codes

Lube System
Crankcase breather — top mounted
Oil cooler
Oil filter
Oil pan drain valve

Mounting System
Engine mounting feet (six total)

Protection System
Electronic shutoff system with purge cycle
Crankcase explosion relief valves
Gas shutoff valve

Starting System
Air starting system

General
Paint — Cat yellow
Vibration dampers

OPTIONAL EQUIPMENT

Air Inlet System
Heavy-duty air cleaner — with precleaners
Heavy-duty air cleaner — with rain protection

Charging System
Charging alternators

Control System
Custom control system software is available for non-standard ratings. Software is field programmable using flash memory.

Cooling System
Expansion tank
Flexible connections
Jacket water heater

Exhaust System
Flexible bellows adapters
Exhaust expander
Weld flanges

Fuel System
Fuel filter
Gas pressure regulator
Flexible connection
Low energy fuel system
Corrosive gas fuel system

Ignition System
CSA certification

Instrumentation
Remote data monitoring and speed control
Compatible with Cat Electronic Technician (ET) and Data View
Communication Device — PL1000T/E
Display panel deletion is optional

Lube System
Air or electric motor-driven prelube
Duplex oil filter
LH or RH service
Lube oil makeup system

Mounting System
Mounting plates (set of six)

Power Take-Offs
Front stub shafts

Starting System
Air pressure reducing valve
Natural gas starting system

General
Engine barring device
Damper guard

TECHNICAL DATA

G3608 LE Gas Petroleum Engine — 1000 rpm

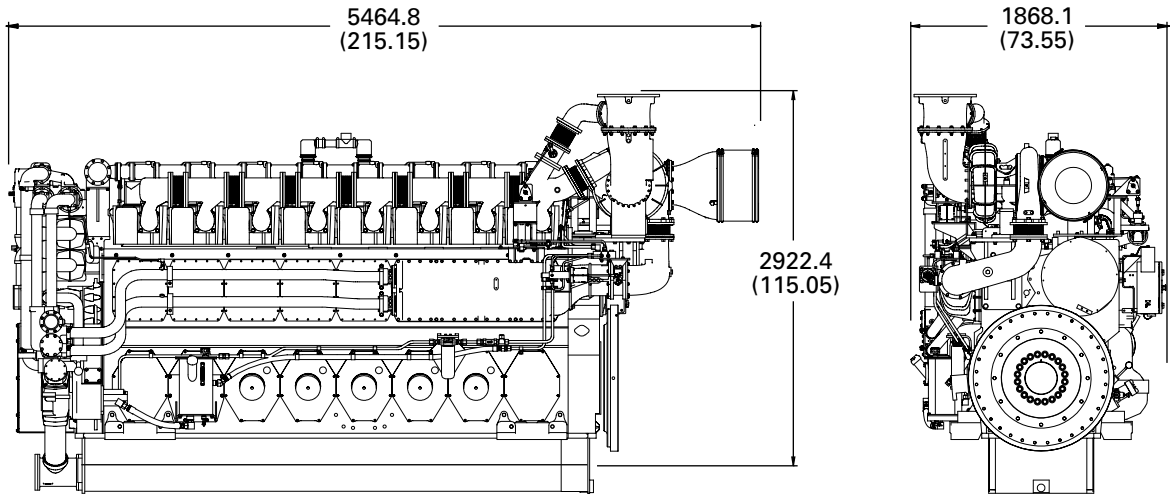
		DM5561-03	DM5562-03	DM5136-03	DM8606-02
Engine Power					
@ 100% Load	bkW (bhp)	1767 (2370)	1879 (2520)	1823 (2445)	1767 (2370)
@ 75% Load	bkW (bhp)	1326 (1778)	1409 (1890)	1367 (1834)	1326 (1778)
Engine Speed	rpm	**1000**	**1000**	**1000**	**1000**
Max Altitude @ Rated Torque and 38°C (100°F)	m (ft)	1219.2 (4000)	1219.2 (4000)	1219.2 (4000)	914.4 (3000)
Speed Turndown @ Max Altitude, Rated Torque, and 38°C (100°F)	%	20	20	20	20
SCAC Temperature	°C (°F)	54 (130)	32 (90)	43 (110)	54 (130)
Emissions*					
NOx	g/bkW-hr (g/bhp-hr)	.94 (0.7)	.94 (0.7)	.94 (0.7)	.67 (0.5)
CO	g/bkW-hr (g/bhp-hr)	3.35 (2.5)	3.4 (2.5)	3.4 (2.5)	3.7 (2.75)
CO_2	g/bkW-hr (g/bhp-hr)	589 (439)	584 (436)	587 (438)	591 (441)
VOC**	g/bkW-hr (g/bhp-hr)	0.81 (0.6)	0.76 (0.57)	0.79 (0.59)	0.85 (0.63)
Fuel Consumption***					
@ 100% Load	MJ/bkW-hr (Btu/bhp-hr)	9.34 (6600)	9.28 (6561)	9.31 (6580)	9.38 (6629)
@ 75% Load	MJ/bkW-hr (Btu/bhp-hr)	9.74 (6883)	9.66 (6829)	9.7 (6856)	9.78 (6914)
Heat Balance					
Heat Rejection to Jacket Water					
@ 100% Load	bkW (Btu/min)	420 (23,918)	449 (25,555)	435 (24,751)	420 (23,911)
@ 75% Load	bkW (Btu/min)	364 (20,697)	388 (22,055)	376 (21,389)	366 (20,824)
Heat Rejection to Aftercooler					
@ 100% Load	bkW (Btu/min)	297 (16,916)	394 (22,403)	344 (19,601)	310 (17,633)
@ 75% Load	bkW (Btu/min)	139 (7898)	207 (11,778)	172 (9794)	145 (8279)
Heat Rejection to Exhaust					
@ 100% Load	bkW (Btu/min)	1783 (101,403)	1792 (101,922)	1789 (101,728)	1790 (101,780)
@ 75% Load	bkW (Btu/min)	1437 (81,695)	1443 (82,061)	1441 (81,932)	1442 (82,023)
Exhaust System					
Exhaust Gas Flow Rate					
@ 100% Load	m^3/min (cfm)	451.80 (15,955)	463.55 (16,370)	457.83 (16,168)	457.15 (16,144)
@ 75% Load	m^3/min (cfm)	359.68 (12,702)	368.23 (13,004)	364.10 (12,858)	363.93 (12,852)
Exhaust Stack Temperature					
@ 100% Load	°C (°F)	470 (878)	450 (841)	460 (859)	459 (857)
@ 75% Load	°C (°F)	492 (918)	469 (877)	480 (897)	480 (897)
Intake System					
Air Inlet Flow Rate					
@ 100% Load	m^3/min (scfm)	170.07 (6006)	179.36 (6334)	174.71 (6170)	174.91 (6177)
@ 75% Load	m^3/min (scfm)	131.36 (4639)	138.58 (4894)	134.99 (4767)	135.13 (4772)
Gas Pressure	kPag (psig)	295-324 (42.8-47)	295-324 (42.8-47)	295-324 (42.8-47)	295-324 (42.8-47)

*at 100% load and speed, all values are listed as not to exceed

**Volatile organic compounds as defined in U.S. EPA 40 CFR 60, subpart JJJJ

***ISO 3046/1

GAS PETROLEUM ENGINE



DIMENSIONS		
Length	mm (in)	5464.8 (215.15)
Width	mm (in)	1868.1 (73.55)
Height	mm (in)	2922.4 (115.05)
Shipping Weight	kg (lb)	19,000 (41,888)

Note: General configuration not to be used for installation. See general dimension drawing number 246-1516 for detail.

RATING DEFINITIONS AND CONDITIONS

Engine performance is obtained in accordance with SAE J1995, ISO3046/1, BS5514/1, and DIN6271/1 standards.

Transient response data is acquired from an engine/generator combination at normal operating temperature and in accordance with ISO3046/1 standard ambient conditions. Also in accordance with SAE J1995, BS5514/1, and DIN6271/1 standard reference conditions.

Conditions: Power for gas engines is based on fuel having an LHV of 33.74 kJ/L (905 Btu/cu ft) at 101 kPa (29.91 in. Hg) and 15° C (59° F). Fuel rate is based on a cubic meter at 100 kPa (29.61 in. Hg) and 15.6° C (60.1° F). Air flow is based on a cubic foot at 100 kPa (29.61 in. Hg) and 25° C (77° F). Exhaust flow is based on a cubic foot at 100 kPa (29.61 in. Hg) and stack temperature.

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Houston, TX 77024
Office: 307.673.0883 | Direct: 307.675.5073
cparisi@emittechnologies.com

Prepared For:
David Wallis
EXTERRAN

QUOTE: QUO-13910-M3K6
Expires: November 12, 2014

INFORMATION PROVIDED BY CATERPILLAR

Engine:	G3608
Horsepower:	2370
RPM:	1000
Compression Ratio:	9.2
Exhaust Flow Rate:	16211 CFM
Exhaust Temperature:	858 °F
Reference:	DM8606-05-001
Fuel:	Natural Gas
Annual Operating Hours:	8760

Uncontrolled Emissions

	g/bhp-hr
NOx:	0.50
CO:	2.76
THC:	6.32
NMHC	2.39
NMNEHC:	0.63
HCHO:	0.26
O2:	12.00 %

POST CATALYST EMISSIONS

	g/bhp-hr
NOx:	Unaffected by Oxidation Catalyst
CO:	<0.19
VOC:	<0.25
HCHO:	<0.05
C2H4O:	>80% Reduction
C3H4O:	>80% Reduction
C6H6:	>80% Reduction

CONTROL EQUIPMENT

Catalyst Housing

Model:	EBH-7000-2022F-6C4E-36
Manufacturer:	EMIT Technologies, Inc
Element Size:	Rectangle 36" x 15" x 3.5"
Housing Type:	6 Element Capacity
Catalyst Installation:	Ground Level Accessible Housing
Construction:	3/16" Carbon Steel
Sample Ports:	9 (0.5" NPT)
Inlet Connections:	20" Flat Face Flange
Outlet Connections:	22" Flat Face Flange
Configuration:	Side In / End Out
Silencer:	Integrated
Silencer Grade:	Hospital
Insertion Loss:	35-40 dBA
Estimated Lead Time:	2-4 Weeks to Ship

Catalyst Element

Model:	RT-3615-Z
Catalyst Type:	Oxidation, Standard Precious Group Metals
Substrate Type:	BRAZED
Manufacturer:	EMIT Technologies, Inc
Element Quantity:	3
Element Size:	Rectangle 36" x 15" x 3.5"
Estimated Lead Time:	7-10 Business Days to Ship

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WARRANTY

EMIT Technologies, Inc. warrants that the goods supplied will be free from defects in workmanship by EMIT Technologies, Inc. for a period of two (2) years from date of shipment. EMIT Technologies, Inc. will not be responsible for any defects which result from improper use, neglect, failure to properly maintain or which are attributable to defects, errors or omissions in any drawings, specifications, plans or descriptions, whether written or oral, supplied to EMIT Technologies, Inc. by Buyer.

Catalyst performance using an EMIT Air/Fuel ratio controller is dependent upon properly defined set-points, variable with engine and fuel gas composition. Air/fuel ratio controller performance is guaranteed, but not limited, to fuel gas with a HHV content of 1400 BTU/SCF.

Catalyst performance will be guaranteed for a period of 1 year from installation, or 8760 operating hours, whichever comes first. The catalyst shall be operated with an automatic air/fuel ratio controller. The performance guarantee shall not cover the effects of excessive ash masking due to operation at low load, improper engine maintenance, or inappropriate lubrication oil. The performance guarantee shall not cover the effects of continuous engine misfires (cylinder or ignition) exposing the catalyst to excessive exothermic reaction temperatures. In most cases, excluding thermal deactivation, catalyst performance is redeemable by means of proper washing (refer to EMIT Catalyst/Silencer Housing Manual for element wash information, or contact a local EMIT Sales representative).

The exhaust temperature operating range at the converter inlet is a minimum of 600°F for oxidation catalyst and 750 ˚F for NSCR catalyst, and a maximum of 1250°F.

If a properly functioning, high temperature shut down switch is not installed, thermal deactivation of catalyst at sustained temperatures above 1250˚F is not covered. If excessive exposure to over oxygenation of NSCR catalyst occurs due to improperly functioning or non-existent Air/Fuel ratio control, then deactivation of catalyst is not warranted.

The catalyst conversion efficiencies (% reduction) will be guaranteed for engine loads of 50 to 100 percent. Standard Oxidation Catalyst conversion efficiencies (% reduction) will be guaranteed for fuel gas containing less than 1.5% mole fraction of non-methane, non-ethane hydrocarbons. Applications where fuel gas exceeds this level will require a Premium Oxidation Catalyst to maintain guaranteed VOC conversion efficiencies.

Engine lubrication oil shall contain less than 0.5 wt% Sulfated Ash with a maximum allowable specific oil consumption of 0.7 g/bhp-hr. The catalyst shall be limited to a maximum ash loading of 0.022 lb/ft3. Phosphorous and zinc additives are limited to 0.03 wt%. New or Reconstructed engines must operate for a minimum of 50 hours prior to catalyst installation, otherwise the warranty is void.

The catalyst must not be exposed to the following know poisoning agents, including: antimony, arsenic, chromium, copper, iron, lead, lithium, magnesium, mercury, nickel, phosphorous, potassium, silicon, sodium, sulfur, tin, and zinc. Total poison concentrations in the fuel gas must be limited to 0.25 ppm or less for catalyst to function properly.

Shipment - Promised shipping dates are approximate lead times from the point of manufacture and are not guaranteed. EMIT Technologies, Inc. will not be liable for any loss, damage or delay in manufacture or delivery resulting from any cause beyond its control including, but not limited to a period equal to the time lost by reason of that delay. All products will be crated as per best practice to prevent any damage during shipment. Unless otherwise specified, Buyer will pay for any special packing and shipping requirements. Acceptance of goods by common carrier constitutes delivery to Buyer. EMIT Technologies, Inc. shall not be responsible for goods damaged or lost in transit.

Terms: Credit is extended to purchaser for net 30 time period. If payment is not received in the net 30 timeframe, interest on the unpaid balance will accrue at a rate of 1.5% per month from the invoice date.

Order Cancellation Terms: Upon cancellation of an order once submittal of a Purchase Order has occurred, the customer will pay a 25% restocking fee for Catalyst Housings, Catalyst Elements, and Air/Fuel Ratio Controllers; 50% restocking fee for Cooler Top Solutions Exhaust System Accessories, and other Custom Built Products; 100% of all associated shipping costs incurred by EMIT; 100% of all project expenses incurred by EMIT for Field Services.

G3616

CATERPILLAR®

GAS ENGINE SITE SPECIFIC TECHNICAL DATA
Oasis Petroleum
Oasis Plant Expansion - 100F Ambient

GAS COMPRESSION APPLICATION

ENGINE SPEED (rpm):	1000	RATING STRATEGY:	STANDARD
COMPRESSION RATIO:	7.6	RATING LEVEL:	CONTINUOUS
AFTERCOOLER TYPE:	SCAC	FUEL SYSTEM:	GAV
AFTERCOOLER - STAGE 2 INLET (°F):	130		WITH AIR FUEL RATIO CONTROL
AFTERCOOLER - STAGE 1 INLET (°F):	174	**SITE CONDITIONS:**	
JACKET WATER OUTLET (°F):	190	FUEL:	Gas Analysis
ASPIRATION:	TA	FUEL PRESSURE RANGE(psig): (See note 1)	58.0-70.3
COOLING SYSTEM:	JW+1AC, OC+2AC	FUEL METHANE NUMBER:	64.3
CONTROL SYSTEM:	ADEM4	FUEL LHV (Btu/scf):	1051
EXHAUST MANIFOLD:	DRY	ALTITUDE(ft):	2275
COMBUSTION:	LOW EMISSION	MAXIMUM INLET AIR TEMPERATURE(°F):	100
NOx EMISSION LEVEL (g/bhp-hr NOx):	0.3	STANDARD RATED POWER:	5000 bhp@1000rpm
SET POINT TIMING:	17		

				MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE		
RATING		**NOTES**	**LOAD**	**100%**	**100%**	**75%**	**50%**
ENGINE POWER	(WITHOUT FAN)	(2)	bhp	5000	5000	3750	2500
INLET AIR TEMPERATURE			°F	100	100	100	100
ENGINE DATA							
FUEL CONSUMPTION (LHV)		(3)	Btu/bhp-hr	6782	6782	6949	7414
FUEL CONSUMPTION (HHV)		(3)	Btu/bhp-hr	7492	7492	7677	8190
AIR FLOW (@inlet air temp, 14.7 psia)	(WET)	(4)(5)	ft3/min	12734	12734	9612	6544
AIR FLOW	(WET)	(4)(5)	lb/hr	54142	54142	40870	27823
FUEL FLOW (60ºF, 14.7 psia)			scfm	538	538	413	294
INLET MANIFOLD PRESSURE		(6)	in Hg(abs)	106.8	106.8	79.8	55.7
EXHAUST TEMPERATURE - ENGINE OUTLET		(7)	°F	830	830	877	943
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(WET)	(8)(5)	ft3/min	31255	31255	24466	17522
EXHAUST GAS MASS FLOW	(WET)	(8)(5)	lb/hr	55820	55820	42160	28740
EMISSIONS DATA - ENGINE OUT							
NOx (as NO2)		(9)(10)	g/bhp-hr	0.30	0.30	0.30	0.30
CO		(9)(10)	g/bhp-hr	2.70	2.70	2.70	2.71
THC (mol. wt. of 15.84)		(9)(10)	g/bhp-hr	3.96	3.96	4.34	4.60
NMHC (mol. wt. of 15.84)		(9)(10)	g/bhp-hr	1.52	1.52	1.67	1.77
NMNEHC (VOCs) (mol. wt. of 15.84)		(9)(10)(11)	g/bhp-hr	0.25	0.25	0.27	0.29
HCHO (Formaldehyde)		(9)(10)	g/bhp-hr	0.14	0.14	0.15	0.19
CO2		(9)(10)	g/bhp-hr	422	422	439	464
EXHAUST OXYGEN		(9)(12)	% DRY	10.9	10.9	10.7	10.3
HEAT REJECTION							
HEAT REJ. TO JACKET WATER (JW)		(13)	Btu/min	53126	53126	43094	36201
HEAT REJ. TO ATMOSPHERE		(13)	Btu/min	17814	17814	16489	15091
HEAT REJ. TO LUBE OIL (OC)		(13)	Btu/min	30495	30495	27344	24077
HEAT REJ. TO A/C - STAGE 1 (1AC)		(13)(14)	Btu/min	56748	56748	29502	8330
HEAT REJ. TO A/C - STAGE 2 (2AC)		(13)(14)	Btu/min	12152	12152	8425	5114

COOLING SYSTEM SIZING CRITERIA			
TOTAL JACKET WATER CIRCUIT (JW+1AC)	(14)(15)	Btu/min	118024
TOTAL STAGE 2 AFTERCOOLER CIRCUIT (OC+2AC)	(14)(15)	Btu/min	49354
A cooling system safety factor of 0% has been added to the cooling system sizing criteria.			

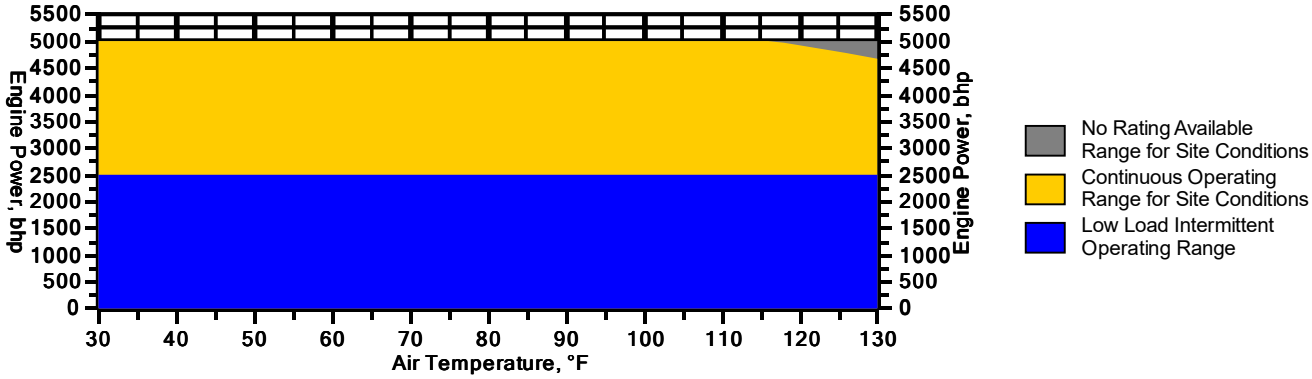
CONDITIONS AND DEFINITIONS

Engine rating obtained and presented in accordance with ISO 3046/1, adjusted for fuel, site altitude and site inlet air temperature. 100% rating at maximum inlet air temperature is the maximum engine capability for the specified fuel at site altitude and maximum site inlet air temperature. Maximum rating is the maximum capability at the specified aftercooler inlet temperature for the specified fuel at site altitude and reduced inlet air temperature. Lowest load point is the lowest continuous duty operating load allowed. No overload permitted at rating shown.

For notes information consult page three.

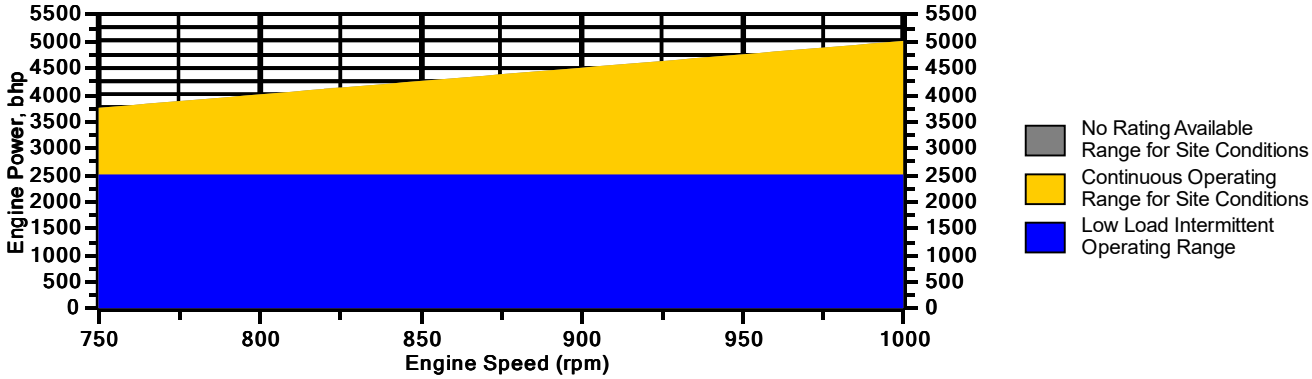
Engine Power vs. Inlet Air Temperature

Data represents temperature sweep at 2275 ft and 1000 rpm



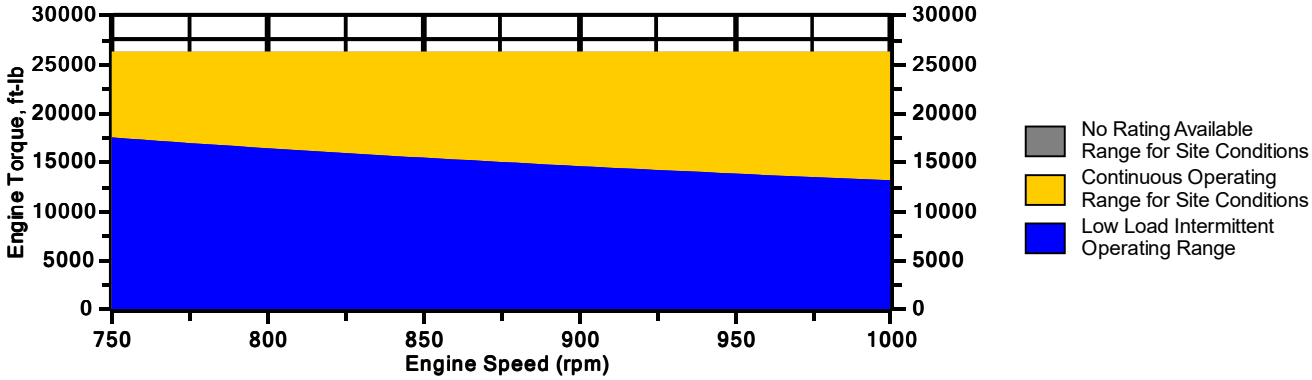
Engine Power vs. Engine Speed

Data represents speed sweep at 2275 ft and 100 ºF



Engine Torque vs. Engine Speed

Data represents speed sweep at 2275 ft and 100 ºF



Note: At site conditions of 2275 ft and 100°F inlet air temp., constant torque can be maintained down to 750 rpm. The minimum speed for loading at these conditions is 750 rpm.

GAS ENGINE SITE SPECIFIC TECHNICAL DATA
Oasis Petroleum
Oasis Plant Expansion - 100F Ambient

NOTES

1. Fuel pressure range specified is to the engine gas shutoff valve (GSOV). Additional fuel train components should be considered in pressure and flow calculations.

2. Engine rating is with two engine driven water pumps. Tolerance is ± 3% of full load.

3. Fuel consumption tolerance is ± 2.5% of full load data.

4. Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of ± 5 %.

5. Inlet and Exhaust Restrictions must not exceed A&I limits based on full load flow rates from the standard technical data sheet.

6. Inlet manifold pressure is a nominal value with a tolerance of ± 5 %.

7. Exhaust temperature is a nominal value with a tolerance of (+)63°F, (-)54°F.

8. Exhaust flow value is on a "wet" basis. Flow is a nominal value with a tolerance of ± 6 %.

9. Emissions data is at engine exhaust flange prior to any after treatment.

10. Values listed are higher than nominal levels to allow for instrumentation, measurement, and engine-to-engine variations. They indicate the maximum values expected under steady state conditions. Fuel methane number cannot vary more than ± 3. THC, NMHC, and NMNEHC do not include aldehydes. An oxidation catalyst may be required to meet Federal, State or local CO or HC requirements.

11. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ

12. Exhaust Oxygen level is the result of adjusting the engine to operate at the specified NOx level. Tolerance is ± 0.5.

13. Heat rejection values are nominal. Tolerances, based on treated water, are ± 10% for jacket water circuit, ± 50% for radiation, ± 20% for lube oil circuit, and ± 5% for aftercooler circuit.

14. Aftercooler heat rejection includes an aftercooler heat rejection factor for the site elevation and inlet air temperature specified. Aftercooler heat rejection values at part load are for reference only. Do not use part load data for heat exchanger sizing.

15. Cooling system sizing criteria are maximum circuit heat rejection for the site, with applied tolerances.

Constituent	Abbrev	Mole %	Norm
Water Vapor	H2O	0.0000	0.0000
Methane	CH4	74.0852	74.0857
Ethane	C2H6	22.9821	22.9823
Propane	C3H8	0.1083	0.1083
Isobutane	iso-C4H1O	0.0000	0.0000
Norbutane	nor-C4H1O	0.0000	0.0000
Isopentane	iso-C5H12	0.0000	0.0000
Norpentane	nor-C5H12	0.0000	0.0000
Hexane	C6H14	0.0000	0.0000
Heptane	C7H16	0.0000	0.0000
Nitrogen	N2	1.8932	1.8932
Carbon Dioxide	CO2	0.9305	0.9305
Hydrogen Sulfide	H2S	0.0000	0.0000
Carbon Monoxide	CO	0.0000	0.0000
Hydrogen	H2	0.0000	0.0000
Oxygen	O2	0.0000	0.0000
Helium	HE	0.0000	0.0000
Neopentane	neo-C5H12	0.0000	0.0000
Octane	C8H18	0.0000	0.0000
Nonane	C9H20	0.0000	0.0000
Ethylene	C2H4	0.0000	0.0000
Propylene	C3H6	0.0000	0.0000
TOTAL (Volume %)		99.9993	100.0000

Fuel Makeup:	Gas Analysis
Unit of Measure:	English
Calculated Fuel Properties	
Caterpillar Methane Number:	64.3
Lower Heating Value (Btu/scf):	1051
Higher Heating Value (Btu/scf):	1161
WOBBE Index (Btu/scf):	1272
THC: Free Inert Ratio:	34.41
Total % Inerts (% N2, CO2, He):	2.82%
RPC (%) (To 905 Btu/scf Fuel):	100%
Compressibility Factor:	0.997
Stoich A/F Ratio (Vol/Vol):	10.92
Stoich A/F Ratio (Mass/Mass):	15.98
Specific Gravity (Relative to Air):	0.683
Fuel Specific Heat Ratio (K):	1.285

CONDITIONS AND DEFINITIONS

Caterpillar Methane Number represents the knock resistance of a gaseous fuel. It should be used with the Caterpillar Fuel Usage Guide for the engine and rating to determine the rating for the fuel specified. A Fuel Usage Guide for each rating is included on page 2 of its standard technical data sheet.

RPC always applies to naturally aspirated (NA) engines, and turbocharged (TA or LE) engines only when they are derated for altitude and ambient site conditions.

Project specific technical data sheets generated by the Caterpillar Gas Engine Rating Pro program take the Caterpillar Methane Number and RPC into account when generating a site rating.

Fuel properties for Btu/scf calculations are at 60F and 14.696 psia.

Caterpillar shall have no liability in law or equity, for damages, consequently or otherwise, arising from use of program and related material or any part thereof.

FUEL LIQUIDS

Field gases, well head gases, and associated gases typically contain liquid water and heavy hydrocarbons entrained in the gas. To prevent detonation and severe damage to the engine, hydrocarbon liquids must not be allowed to enter the engine fuel system. To remove liquids, a liquid separator and coalescing filter are recommended, with an automatic drain and collection tank to prevent contamination of the ground in accordance with local codes and standards.

To avoid water condensation in the engine or fuel lines, limit the relative humidity of water in the fuel to 80% at the minimum fuel operating temperature.

Prepared For:
Scott Oltrogge
Bidell

Date: June 21, 2017

APPLICATION INFORMATION

DRIVER

Make:	Caterpillar
Model:	G3616A4
Horsepower:	5000
RPM:	1000
Compression Ratio:	7.6
Exhaust Flow Rate:	31255
Exhaust Temperature:	830
Reference:	EM1426-04-001
Fuel:	Custom
Annual Operating Hours:	8760

UNCONTROLLED EMISSIONS DATA

	g/bhp-hr	lb/hr	Tons/Year
NO_x:	0.30	3.31	14.48
CO:	2.70	29.76	130.36
THC:	3.96	43.65	191.19
NMHC:	1.52	16.76	73.39
NMNEHC:	0.25	2.76	12.07
HCHO:	0.14	1.54	6.76
Oxygen:	10.90%		

CATALYST ELEMENT

Model:	RT-4815-Z
Catalyst Type:	Oxidation, Standard Precious Metals Group
Substrate Type:	Brazed
Element Size:	Rectangle, 48" x 15" x 3.5"
Element Quantity:	3

POST CATALYST EMISSIONS DATA

	g/bhp-hr	lb/hr
NO_x:	Unaffected By Oxidation Catalyst	
CO:	< 0.20	2.20
VOC:	< 0.25	2.76
HCHO:	< 0.04	0.44
NMHC:	< 1.52	16.76

VOC Reduction: 40% at 725°F

WARRANTY

EMIT Technologies,Inc. warrants that the goods supplied will be free from defects in workmanship by EMIT Technologies, Inc. for a period of one (1) year from date of shipment. EMIT Technologies, Inc. will not be responsible for any defects which result from improper use, neglect, failure to properly maintain or which are attributable to defects, errors or omissions in any drawings, specifications, plans or descriptions, whether written or oral, supplied to EMIT Technologies, Inc. by Buyer.

Catalyst performance using an EMIT Air/Fuel ratio controller is dependent upon properly defined set-points, variable with engine and fuel gas composition. Air/fuel ratio controller performance is guaranteed, but not limited, to fuel gas with an HHV content of 1400 BTU/SCF.

Catalyst performance will be guaranteed for a period of 1 year from installation, or 8760 operating hours, whichever comes first. The catalyst shall be operated with an automatic air/fuel ratio controller. The performance guarantee shall not cover the effects of excessive ash masking due to operation at low load, improper engine maintenance, or inappropriate lubrication oil. The performance guarantee shall not cover the effects of continuous engine misfires (cylinder or ignition) exposing the catalyst to excessive exothermic reaction temperatures.

Unless otherwise stated the exhaust temperature operating range at the converter inlet is 600°F minimum for oxidation catalyst and 750°F for NSCR catalyst and 1250°F maximum.

If a high temperature shut down switch is not installed, thermal deactivation of catalyst at temperatures above 1300 °F is not covered.

The catalyst conversion efficiencies (% reduction) will be guaranteed for engine loads of 50 to 100 percent.

Engine lubrication oil shall contain less than 0.6% ash (by weight) with a maximum allowable specific oil consumption of 0.01 gal/bhp-hr. The maximum ash loading on the catalyst shall be limited to 350 g/m3. Phosphorous and zinc additives are limited to 0.03% (by weight).

The catalyst must not be exposed to the following known poisoning agents, including: iron, nickel, sodium, chromium, arsenic, zinc, lead, phosphorous, silicon, potassium, magnesium, copper, tin, and mercury. Total poison concentrations in the gas are limited to 0.3 ppm.

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FLARE SPECIFICATION SHEET

AZOTA, LTD.

			JOB NUMBER: 17100		REVISION: 0	
CUSTOMER:	OASIS PETROLEUM		ITEM NUMBER: F-7203		CASE:	
PLANT NAME:	WILD BASIN II GAS PROCESSING FACILITY		PREPARED BY: JLK		DATE:	4/24/2017
LOCATION:	MCKENZIE COUNTY, NORTH DAKOTA		CHECKED BY:		DATE:	
SERVICE:	FLARE		APPROVED BY:		DATE:	
MANUFACTURED BY:			PAGE: 1			1

1	TAG NUMBERS:	F-7203	F-7203	F-7203		F-7203
2	SERVICE:	NGL LIQUIDS	DEC2 OVERHEADS	REFRIG COMP VENT		FUEL GAS
3	CASE:	CASE 1	CASE 2	CASE 3		TO PILOTS
4	FLUID CIRCULATED:	FIRE	FULL FLOW	FULL FLOW		
5	**COMPOSITION (MOL %):**					
6	NITROGEN	0.0001	0.2788	61.9600		1.8933
7	CO2	0.0027	1.1099	0.0000		0.9305
8	H2S	0.0000	0.0014	0.0000		0.0006
9	METHANE	0.0391	35.6452	0.0000		74.0850
10	ETHANE	1.2039	61.7184	0.0000		22.9821
11	PROPANE	66.5103	1.2436	34.7800		0.1084
12	I-BUTANE	7.2336	0.0018	0.0000		0.0001
13	N-BUTANE	18.5191	0.0009	0.0000		0.0000
14	I-PENTANE	2.4819	0.0000	0.0000		0.0000
15	N-PENTANE	3.1404	0.0000	0.0000		0.0000
16	N-HEXANE	0.8683	0.0000	0.0000		0.0000
17	H2O	0.0004	0.0000	0.0000		0.0000
18	OXYGEN	0.0000	0.0000	3.2600		0.0000
19						
20						
21						
22	TOTAL:	100.0000	100.0000	100.0000		100.0000
23	**INLET FLOW CONDITIONS**					
24	FLOW (LB/HR):	305,837	231,606	245		AS NEEDED
25	VOLUME FLOW:	56.19 MMSCFD	82.90 MMSCFD	0.066 MMSCFD	MMSCFD	MMSCFD
26	MOLE WEIGHT:	49.472	25.394	33.740		19.784
27	TEMPERATURE (°F):	86.290	-8.690	100.000		120.000
28	PRESSURE (PSIA):	39.696	39.700	39.700		64.696
29	**DESIGN PARAMETERS**					
30	TYPE:	AIR ASSIST (NOTE 16)				
31	ELEVATION, FT	2275.00				
32	BAR. PRESS, PSIA	13.54				
33						
34	MAX TEMP., °F	90.00				
35	MIN TEMP., °F	-30.00				
36						
37	WIND DESIGN	NOTE 11				
38	SEISMIC DESIGN	NOTE 10				
39						

40 **NOTES:**

41 1. TOTAL GROUND RADIATION AT THE FLARE BASE SHALL BE 800 BTU/HR/FT2 OR LESS. THIS INCLUDES 250 BTU/HR/FT2
42 SOLAR RADIATION AT 20 MPH WIND SPEED.
43 2. VENDOR TO ENSURE GROUND LEVEL RADIATION OF 1500 BTU/HR/FT2 ANYWHERE AT GRADE (EXCLUDING SOLAR RADIATION).
44 3. VENDOR TO PROVIDE TOTAL GROUND RADIATION (INCLUDING SOLAR RADIATION OF 250 BTU/HR/FT2 AT 20 MPH) AT 100, 200,300 AND 400 FT
45 FROM FLARE STACK BASE.
46 4. VENDOR TO PROVIDE GRADE CONTOURS AT 500, 1000 AND 1500 BTU/HR/FT2 RADIATION LEVELS (EXCLUDING SOLAR RADIATION) AT CONTROLLING CASE.
47 5. SMOKELESS FLARING IS REQUIRED. SMOKELESS FLARING CAPACITY SHALL BE 100% OF ABOVE CASES, WHICHEVER REQUIRES MORE AIR.
48 6. FLARE SYSTEM TO HAVE MINIMUM OF 4 PILOTS EACH WITH TWO TYPE "K" THERMOCOUPLES.
49 7. VENDOR TO PROVIDE FOLLOWING ACCESSORIES:
50 a. TWO SPEED BLOWER 480V, SF=1.15
51 b. MOLECULAR SEAL OR VELOCITY SEAL (FUEL GAS IS USED FOR PURGE; VENDOR TO SPECIFY PURGE GAS RATE)
52 8. REMOTE IGNITION SYSTEM (VENDOR TO ADVISE TYPE OF IGNITION SYSTEM). IGNITION SYSTEM LOCATION SHALL BE AT DISTANCE
53 FROM FLARE STACK FOR SAFE OPERATION.
54 9. FLAME FRONT GENERATOR TO BE LOCATED 300 FEET FROM FLARE.
55 10. SEISMIC: SPECTRAL ACCELERATIONS (ASCE/SEI 7-10) - SS-7.0%g, S1 – 2.6%g, SITE SOIL CLASS - D, IMPORTANCE FACTOR - 1.1.
56 11. WIND (IBC 2012): BASIC SPEED - 100 MPH, ULTIMATE SPEED - 120 MPH, EXPOSURE (ASCE 7-10) - C, RISK CAT. - III/IV, KZT - 1.0
57 12. SOIL LOADING: 2000 PSF
58 13. RAINFALL AVERAGE - 4.0 INCHES/24 HRS, GROUND SNOW LOAD - 30 PSF, FROST DEPTH - 8 FEET
59 14. VENDOR TO PROVIDE A SONIC / AIR ASSIST FLARE (VENDOR TO ADVISE ON TYPE).
60 15. VENDOR TO LIMIT THE PRESSURE AT THE FLARE SUCTION TO A MAXIMUM OF 50 PSIG.
61 16. VENDOR TO EVALUATE BOTH PRESSURE ASSIST AND AIR ASSIST DESIGNS.
62
63
64
65

GENERAC®

Protector™ Series

Diesel Generator Set

INCLUDES:

- Two Line LCD Multilingual Digital Evolution™ Controller (English/Spanish/French/Portuguese) with external viewing window for easy indication of generator status and breaker position.
- Isochronous electronic governor
- Sound attenuated aluminum enclosure
- Smart battery charger
- UV / Ozone resistant hoses
- ±1% voltage regulation
- Integrated base tank options are available with run times over 90 hours without having to refuel*
- Five year limited warranty
- UL 2200 / UL142 / ULC S601 Listed
- Meets code requirements for external vent and fill

Standby Power Rating

Model RD015 - 15 kW 60 Hz
Model RD020 - 20 kW 60 Hz
Model RD030 - 30 kW 60 Hz
Model RD048 - 48 kW 60 Hz (single-phase only)
Model RD050 - 50 kW 60 Hz (three-phase only)

Intertek

QUIET TEST

USA ENGINEERED & BUILT*

*Assembled in the USA using domestic and foreign parts

Meets EPA Emission Regulations
CA/MA Emissions Compliant

* Time calculated at one-half maximum kW output.

FEATURES

- **INNOVATIVE DESIGN & PROTOTYPE TESTING** are key components of GENERAC'S success in "IMPROVING POWER BY DESIGN." But it doesn't stop there. Total commitment to component testing, reliability testing, environmental testing, destruction and life testing, plus testing to applicable CSA, NEMA, EGSA, and other standards, allows you to choose GENERAC POWER SYSTEMS with the confidence that these systems will provide superior performance.
- **TEST CRITERIA:**
  - √ PROTOTYPE TESTED
  - √ SYSTEM TORSIONALTESTED
  - √ NEMA MG1-22 EVALUATION
  - √ MOTOR STARTING ABILITY
- **TRUE POWER™ ELECTRICAL TECHNOLOGY:** Superior harmonics and sine wave form produce less than 5% Total Harmonic Distortion for utility quality power. This allows confident operation of sensitive electronic equipment and micro-chip based appliances, such as variable speed HVAC systems.
- **SOLID-STATE, FREQUENCY COMPENSATED VOLTAGE REGULATION:** This state-of-the-art power maximizing regulation system is standard on all Generac models. It provides optimized FAST RESPONSE to changing load conditions and MAXIMUM MOTOR STARTING CAPABILITY by electronically torque-matching the surge loads to the engine. Digital voltage regulation at ±1%.
- **SINGLE SOURCE SERVICE RESPONSE** from Generac's extensive dealer network provides parts and service know-how for the entire unit, from the engine to the smallest electronic component.
- **GENERAC TRANSFER SWITCHES:** Long life and reliability are synonymous with GENERAC POWER SYSTEMS. One reason for this confidence is that the GENERAC product line includes its own transfer systems and controls for total system compatibility.

GENERAC®

ISO 9001:2008

GENERAC

15 • 20 • 30 • 48 • 50 kW

Application and Engineering Data

GENERATOR SPECIFICATIONS

Type	Synchronous
Rotor Insulation Class	H (15 & 20 kW) or F (30, 48, & 50 kW)
Stator Insulation Class	H
Telephone Interference Factor (TIF)	<50
Alternator Output Leads 1-Phase	Three wire
Alternator Output Leads 3-Phase	Six wire
Bearings	Single Sealed Cartridge
Coupling	Direct, Flexible Disc
Excitation System	Direct
Total Harmonic Distortion	< 5%

VOLTAGE REGULATION

Type	Electronic
Sensing	Single-phase
Regulation	± 1%
Features	Adjustable voltage & gain

GOVERNOR SPECIFICATIONS

Type	Electronic isochronous
Steady State Regulation	± 0.25%

ELECTRICAL SYSTEM

Battery Charge Alternator	50 amp (15 & 20 kW), 65 amp (30 kW), and 50 amp (48 & 50 kW)
Static Battery Charger	2 amp
Recommended Battery (battery not included)	Group 27F, 700 CCA Group 31, 925 CCA batteries can also be used with 30kW units
System Voltage	12 volts

ALTERNATOR SPECIFICATIONS

Revolving field heavy duty generator
Directly connected to the engine
Operating temperature rise 120 °C above a 40 °C ambient
Class H insulation is NEMA rated
Class F insulation is NEMA rated
All models fully prototype tested

ENCLOSURE FEATURES

Aluminum weather protective enclosure	Provides protection against mother nature. Electrostatically applied textured epoxy paint for added durability.
Enclosed critical grade muffler	Quiet, critical grade muffler is mounted inside the unit to prevent injuries and maximize sound dampening.
Small, compact, attractive	Makes for an easy, eye appealing installation.
SAE	Sound attenuated enclosure ensures quiet operation.

15 • 20 • 30 • 48 • 50 kW

Application and Engineering Data

ENGINE SPECIFICATIONS: 15 & 20 KW

Make	Mitsubishi
Model	In-line
Cylinders	4
Displacement (Liters)	2.5
Bore (in / mm)	3.46 / 88
Stroke (in / mm)	4.06 / 103
Compression Ratio	22:1
Intake Air System	Naturally aspirated
Cylinder Head Type	Cast iron OHV
Piston Type	Aluminum

ENGINE SPECIFICATIONS: 30 KW

Make	Perkins
Model	In-line
Cylinders	4
Displacement (Liters)	2.2
Bore (in / mm)	3.30 / 84
Stroke (in / mm)	3.94 / 100
Compression Ratio	23.3:1
Intake Air System	Turbocharged / aftercooled
Cylinder Head Type	Cast iron OHV
Piston Type	Aluminum

ENGINE SPECIFICATIONS: 48 & 50 KW

Make	Mitsubishi
Model	In-line
Cylinders	4
Displacement (Liters)	3.3
Bore (in / mm)	3.70 / 94
Stroke (in / mm)	4.72 / 120
Compression Ratio	19:1
Intake Air System	Turbocharged / Aftercooled
Cylinder Head Type	Cast iron OHV
Piston Type	Aluminum

ENGINE LUBRICATION SYSTEM

Oil Pump Type	Gear
Oil Filter Type	Full flow spin-on canister
Crankcase Capacity (quarts / Liters)	6.87 / 6.5—15 & 20 kW 11.2 / 10.6 —30 kW 11.6 / 11—48 & 50 kW

ENGINE COOLING SYSTEM

Water Pump	Pre-lubed, self-sealing
Fan Speed (rpm)	2376—15 & 20 kW 1980—30 kW 2340—48 & 50 kW
Fan Diameter (in / mm)	18.11 / 460 (15 & 20 kW) 18 / 457.2 (30 kW) 17 / 431.8 (48 & 50 kW)
Fan Mode	Pusher

FUEL SYSTEM

Fuel Type	Ultra low sulfur diesel fuel
Fuel Pump Type	Mechanical engine driven gear
Injector Type	Mechanical
Fuel Supply Line (mm / in)	7.94 / 0.31 (ID)
Fuel Return Line (mm / in)	N/A—15 & 20 kW 4.76 / 0.19 (ID)—30 kW 7.94 / 0.31 (ID)—48 & 50 kW
Fuel Specification	ASTM
Fuel Filtering (microns)	6—15 & 20 kW 25—30 kW 6—48 & 50 kW

WEIGHTS AND DIMENSIONS

kW size	Tank size	Weight (lb / kg)	Dimensions (L x W x H) (in / cm)
15 kW	32 Gal	1528 / 693	81 x 31 x 51 / 206 x 79 x 129
	95 Gal	1757 / 797	81 x 31 x 61 / 206 x 79 x 165
20 kW	32 Gal	1528 / 693	81 x 31 x 51 / 206 x 79 x 129
	95 Gal	1757 / 797	81 x 31 x 61 / 206 x 79 x 165
30 kW	57 Gal	1857 / 842	95 x 35 x 59 / 241 x 89 x 150
	132 Gal	2070 / 939	95 x 35 x 68 / 241 x 89 x 173
48 & 50 kW	57 Gal	2215 / 1102	95 x 35 x 57 / 241 x 89 x 145
	132 Gal	2429 / 1102	95 x 35 x 66 / 241 x 89 x 168

GENERAC

15 • 20 • 30 • 48 • 50 kW

Application and Engineering Data

TANK SPECIFICATIONS

			Total Capacity	Usable Capacity	Run Time at 1/2 Load (hrs)
kW size	15 kW	32 Gal Tank (gal / L)	33.5 / 127	32 / 121	39
		95 Gal Tank (gal / L)	98.5 / 372.9	95 / 359.6	115.8
	20 kW	32 Gal Tank (gal / L)	33.5 / 127	32 / 121	31
		95 Gal Tank (gal / L)	98.5 / 372.9	95 / 359.6	92.2
	30 kW	57 Gal Tank (gal / L)	61 / 233	57 / 215	41.6
		132 Gal Tank (gal / L)	138.5 / 524	132 / 500	96.4
	48 & 50 kW	57 Gal Tank (gal / L)	62 / 234.7	57 / 215	28.2
		132 Gal Tank (gal / L)	138.5 / 524	132 / 500	65.3

GENERATOR OUTPUT VOLTAGE / KW–60 HZ

		kW (standby)	Amp (standby)	kW (Prime)	Amp (Prime)	CB Size
RD015	120/240 V, 1Ø, 1.0 pf	15	62	12	50	70
	120/208 V, 3Ø, 0.8 pf	15	52	12	42	60
	120/240 V, 3Ø, 0.8 pf	15	45	12	36	50
RD020	120/240 V, 1Ø, 1.0 pf	20	83	16	67	100
	120/208 V, 3Ø, 0.8 pf	20	69	16	56	80
	120/240 V, 3Ø, 0.8 pf	20	60	16	48	70
RD030	120/240 V, 1Ø, 1.0 pf	30	125	24	100	150
	120/208 V, 3Ø, 0.8 pf	30	104	24	83	125
	120/240 V, 3Ø, 0.8 pf	30	90	24	72	100
	277/480 V, 3Ø, 0.8 pf	30	45	24	36	50
RD048 RD050	120/240 V, 1Ø, 1.0 pf	48	200	38.4	183	200
	120/208 V, 3Ø, 0.8 pf	50	173	40	153	200
	120/240 V, 3Ø, 0.8 pf	50	150	40	132	175
	277/480 V, 3Ø, 0.8 pf	50	75	40	66	90

SURGE CAPACITY IN AMPS

		Voltage Dip @ < 0.4 pf 15%	30%
RD015	120/240 V, 1Ø	53	129
	120/208 V, 3Ø	37	90
	120/240 V, 3Ø	32	78
RD020	120/240 V, 1Ø	87	211
	120/208 V, 3Ø	59	143
	120/240 V, 3Ø	51	124
RD030	120/240 V, 1Ø	66	168
	120/208 V, 3Ø	59	144
	120/240 V, 3Ø	51	125
	277/480 V, 3Ø	26	64
RD048 RD050	120/240 V, 1Ø	69	189
	120/208 V, 3Ø	90	218
	120/240 V, 3Ø	78	189
	277/480 V, 3Ø	36	87

ENGINE FUEL CONSUMPTION

		gal / hr	L / hr
RD015	25% of rated load	0.60	2.27
	50% of rated load	0.85	3.22
	75% of rated load	1.10	4.16
	100% of rated load	1.46	5.53
RD020	25% of rated load	0.77	2.9
	50% of rated load	1.03	3.90
	75% of rated load	1.46	5.53
	100% of rated load	1.97	7.46
RD030	25% of rated load	0.97	3.67
	50% of rated load	1.37	5.19
	75% of rated load	1.97	7.46
	100% of rated load	2.77	10.49
RD048 RD050	25% of rated load	1.23	4.66
	50% of rated load	2.02	7.66
	75% of rated load	3.02	11.43
	100% of rated load	4.02	15.22

15 • 20 • 30 • 48 • 50 kW

Operating Data

ENGINE COOLING

	15 kW	20 kW	30 kW	48 kW & 50 kW
Air flow (inlet air including alternator and combustion air in cfm / cmm)	2750 / 78	2750 / 78	2800 / 79	2824 / 80
System coolant capacity (gal / Liters)	3.0 / 11.4	3.0 / 11.4	2.5 / 9.5	3.0 / 11.4
Heat rejection to coolant (BTU per hr / MJ per hr)	95,220 / 100.5	95,220 / 100.5	128,638 / 135.7	135,900 / 143.4
Maximum operation air temperature on radiator (°C / °F)	50 / 122			
Maximum ambient temperature (°C / °F)	50 / 122			

COMBUSTION REQUIREMENTS

Flow at rated power (cfm / cmm)	86.3 / 2.4	86.3 / 2.4	88 / 2.5	190 / 5.38

SOUND EMISSIONS

Sound output in dB(A) at 23 ft (7 m) with generator in exercise mode*	65
Sound output in dB(A) at 23 ft (7 m) with generator operating at normal load*	70

EXHAUST

Exhaust flow at rated output (cfm / cmm)	98.88 / 2.8	98.88 / 2.8	296.6 / 8.4	448 / 12.7
Exhaust temperature at rated output (°C / °F)	482 / 900	482 / 900	499 / 930	499 / 930

ENGINE PARAMETERS

Rated Synchronous Rpm	1800			
HP at rated kW	26.4	33.5	49	85

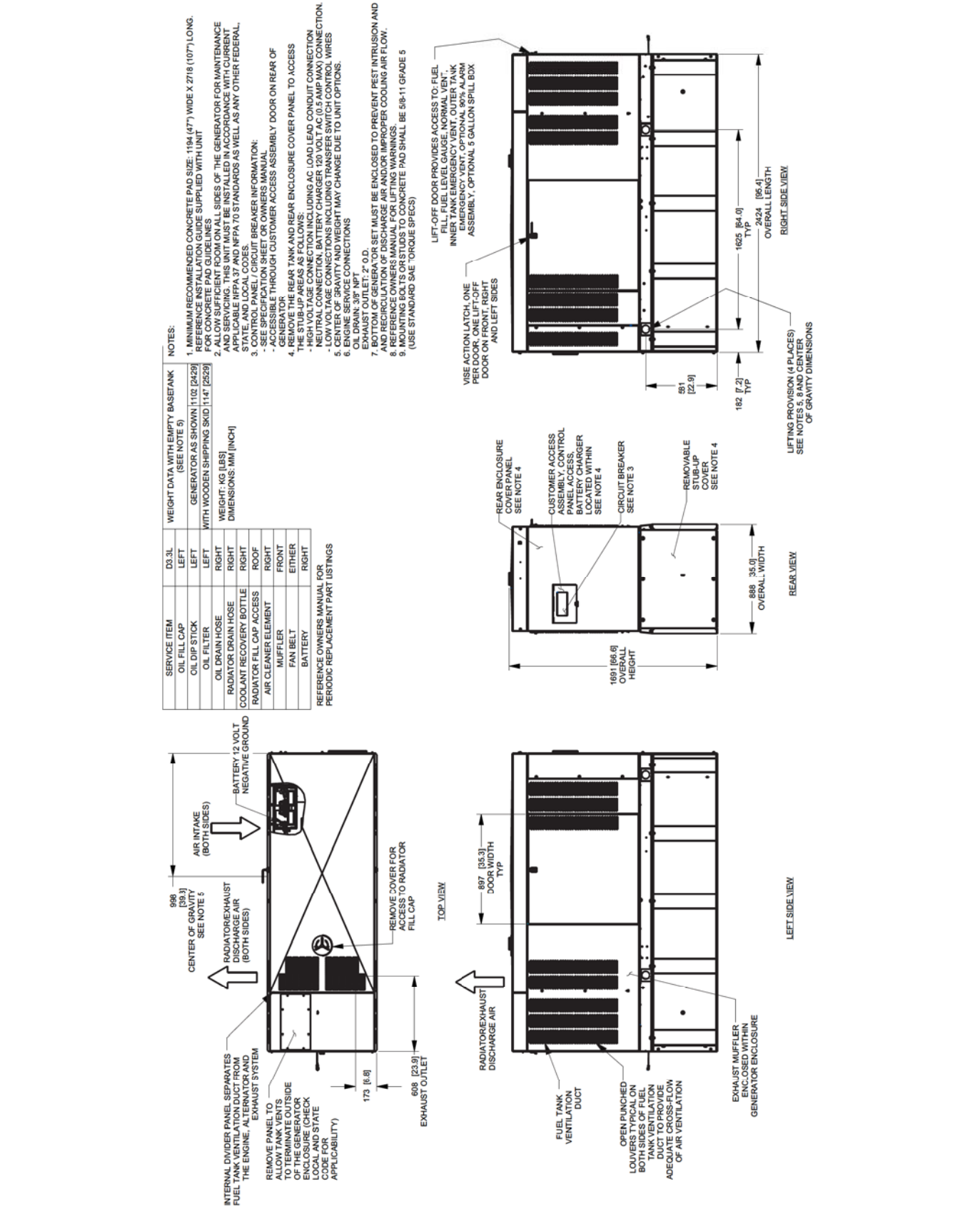
POWER ADJUSTMENT FOR AMBIENT CONDITIONS

Temperature Deration ..... 3% for every 5 °C above 25 °C or 1.7% for every 5 °F above 77 °F
Altitude Deration (15, 30, 48, and 50 kW) ..... 1% for every 100 m above 915 m or 3% for every 1,000 ft above 3,000 ft
Altitude Deration (20 kW) ..... 1% for every 100 m above 305 m or 3% for every 1,000 ft above 1,000 ft

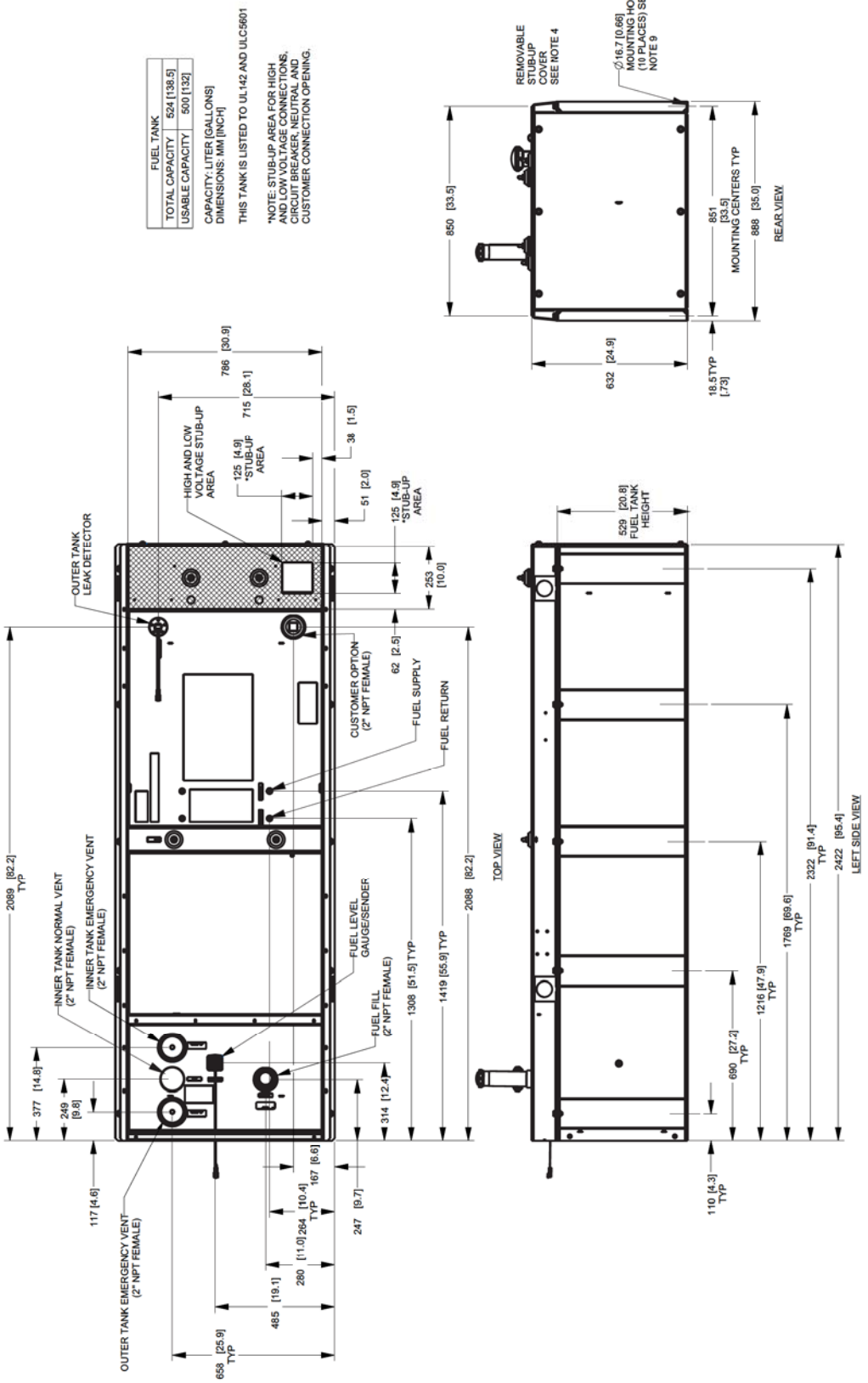
CONTROLLER FEATURES

2-Line Plain Text Multilingual LCD Display ..... Simple user interface for ease of operation
Mode Buttons: Auto ..... Automatic Start on Utility failure. Programmable 7 day exerciser
Manual ..... Start with starter control, unit stays on. If utility fails, transfer to load takes place
Off ..... Stops unit. Power is removed. Control and charger still operate
Ready to Run/Maintenance Message ..... Standard
Engine Run Hours Indication ..... Standard
Programmable start delay between 2-1500 seconds ..... Standard (programmable by dealer only)
Utility Voltage Loss/Return to Utility Adjustable ..... From 140-171 V/190-216 V
Future Set Capable Exerciser/Exercise Set Error Warning ..... Standard
Run/Alarm/Maintenance Logs ..... 50 Events Each
Engine Start Sequence ..... Cyclic cranking: 16 sec on, 7 rest (90 sec maximum duration)
Starter Lock-out ..... Starter cannot re-engage until 5 seconds after engine has stopped
Smart Battery Charger ..... Standard
Charger Fault/Missing AC Warning ..... Standard
Low Battery/Battery Problem Protection and Battery Condition Indication ..... Standard
Automatic Voltage Regulation with Over and Under Voltage Protection ..... Standard
Under-Frequency/Overload/Stepper Overcurrent Protection ..... Standard
Safety Fused/Fuse Problem Protection ..... Standard
Automatic Low Oil Pressure ..... Standard
Overcrank/Overspeed (@ 72 Hz)/rpm Sense Loss Shutdown ..... Standard
High Engine Temperature Shutdown ..... Standard
Internal Fault/Incorrect Wiring Protection ..... Standard
Common External Fault Capability ..... Standard
Field Upgradeable Firmware ..... Standard
Low Coolant Level Shutdown ..... Standard

D3.3L G16 132 Gal Tank (1 of 2)



D3.3L G16 132 Gal Tank (2 of 2)



APPENDIX D

BLOCK FLOW DIAGRAMS

PROCESS FLOW DIAGRAM

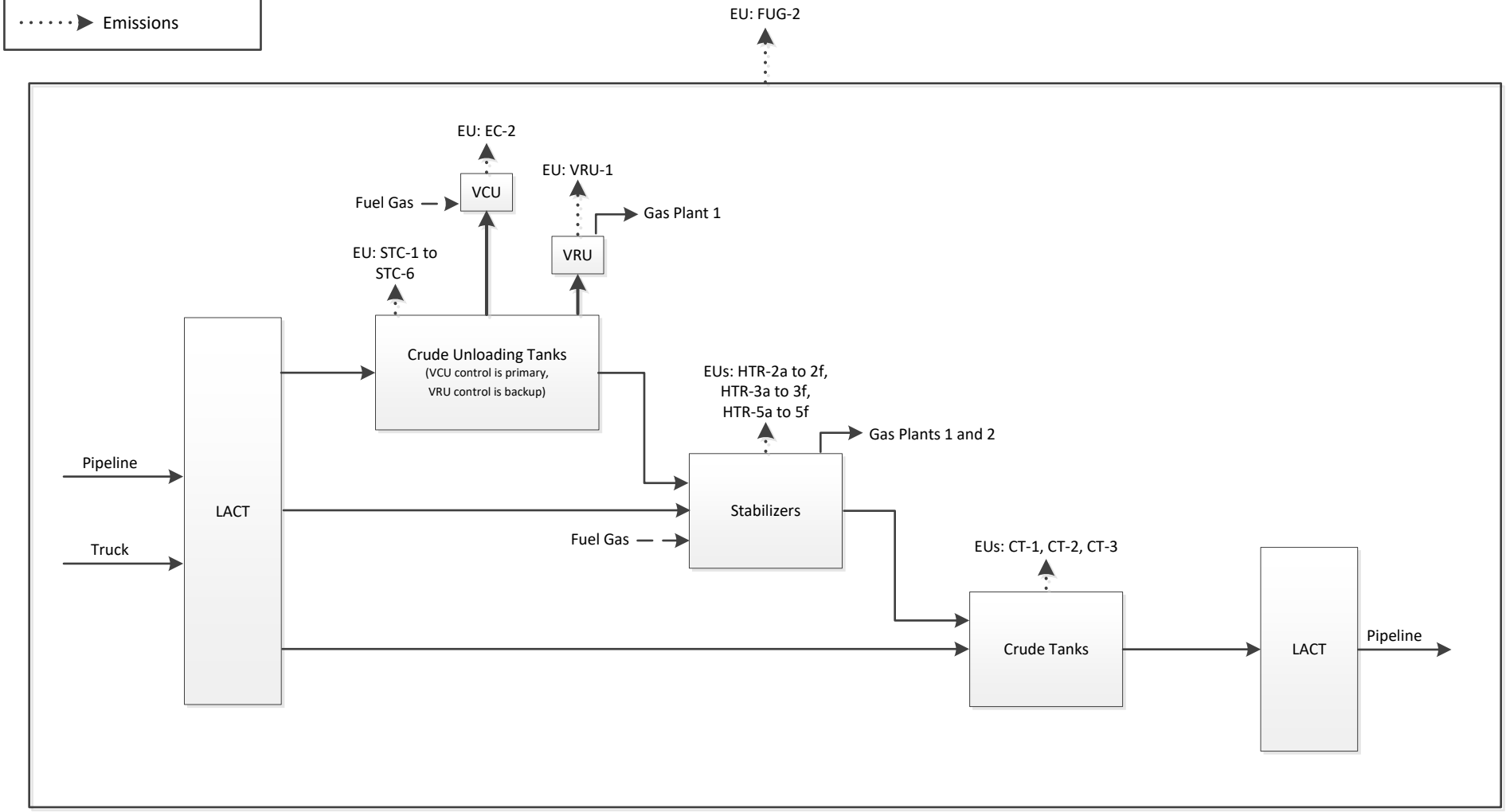


Figure D-1
Process Flow Diagram – Crude Handling Facility
Rough Rider Operating, LLC
Wild Basin Gas Processing and Crude Handling Facility
Watford City, McKenzie County, North Dakota

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March 2024
Drawn by: JLR

PROCESS FLOW DIAGRAM

LEGEND

Process Stream

Emissions

Plant Office, Control Room, and Warehouse

MCC Equipment and Buildings

Buildings for Equipment and Compressors

Instrument Air System and Drain Systems

Safety Shutdown Systems

EU: FUG-1

MSS to Plant 1 Flare (EU: E-1)

Gas Plant 1

EUs: ENG-1 to ENG-4

EUs: ENG-5 to ENG-7

Slug Catchers

Inlet Compression

Mole Sieve Dehydration and NGL Recovery

Residue Compression

EU: HTR-1

Circulation System Combustion Heater

Hot Oil to Gas Plant 1

Propane Refrigeration (electric)

Low Pressure Wellhead Gas

Field Gas Compressor Stations (*not part of Wild Basin Gas Plants*)

Distillate Stabilizer

NGL Recovery

EU: DT-1

EU: GEN-1

Diesel Tank

Emergency Generator

EU: ST-1

EU: STL-1

Slop Tank

Tank Trucks

LACT

Residue Gas Metering (*not part of Wild Basin Gas Plants*)

Residue Pipeline

Field Gas Compressor Station Fuel Gas (*not part of Wild Basin Gas Plants*)

Fuel Gas Pipeline

MSS to Plant 2 Flare (EU: FLR-1)

Gas Plant 2

EUs: ENG-8 to ENG-11

EU: DEHY-1

EUs: ENG-12 to ENG-14

Slug Catchers

Inlet Compression

TEG Dehydration and NGL Recovery

Residue Compression

Rich TEG

EU: EC-3

VCU

Propane Refrigeration (electric)

EU: HTR-7

Hot Oil Heater

Hot Oil to Gas Plant 2

Flash Vessel (V-6011)

Regen (E-6032)

Lean TEG

Figure D-2
Process Flow Diagram – Gas Plants 1 and 2
Rough Rider Operating, LLC
Wild Basin Gas Processing and Crude Handling Facility
Watford City, McKenzie County, North Dakota

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