Hiland Partners Holdings LLC
a Kinder Morgan company

5151 E. Broadway, Suite 1680, Tucson, Arizona 85711

December 29, 2022

Mr. Craig Thorstenson
North Dakota Department of Environmental Quality
Division of Air Quality
4201 Normandy Street, 2nd floor
Bismarck, ND 58503-1324

Re: Modification Application for Air Quality Permit to Operate
Hiland Partners Holdings LLC
Edgewater Compressor Station
Permit to Operate PTO O18007 and PTC 20034
Permit to Operate ACP-17987 v1.0 and ACP-28033 v1.0
Mountrail County, North Dakota

Dear Mr. Thorstenson:

Hiland Partners Holdings LLC (Hiland) owns and operates the Edgewater Compressor Station.

In 2021, an application was submitted to install two new 1900 hp engines (new EU1 and new EU2) and remove two engines, EU8 and EU9. Currently, there are (3) engines operating at the station. Engines EU8 and EU9 were removed.

Attached is an application to install one Caterpillar engine, increase dehydrator throughput from 25 MMSCFD to 27 MMSCFD , and update PTE for the station. The Project Engineer is anticipating installation of the new Caterpillar unit in early April 2023 upon permit issuance.

Please contact me at 520-663-4249 or by email at anu_pundari@kindermorgan.com if you have any questions or need additional information.

Sincerely,

Anu Pundari

Anu Pundari
Sr. Engineer

AIR QUALITY PERMIT TO CONSTRUCT

APPLICATION FOR

NATURAL GAS COMPRESSOR STATION

Hiland Partners Holdings LLC

Edgewater Compressor Station

Mountrail County, North Dakota

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1.0 INTRODUCTION

1.1 Introduction

Hiland Partners Holdings LLC (Hiland) is submitting this permit to construct application for the Edgewater Compressor Station located approximately 11 miles northwest of New Town, North Dakota, in Mountrail County. The station will be used to compress natural gas from nearby wells for pipeline transmission.

Detailed information for the proposed equipment can be found in Section 2.0.

1.2 Application

In accordance with North Dakota Division of Air Quality requirements, permit application forms have been completed and are included in Appendix A.

1.3 Public Notice

Per North Dakota Administrative Code (NDAC) Section 33-15-14-02.6 - Public participation - Final action on application, this facility does qualify as a source category not subject to public participation procedures. The following discussion substantiates this claim:

NDAC Section	
33-15-14-02-6.a.(1)	This facility is not an affected facility per 40 CFR 61 - National Emission Standards For Hazardous Air Pollutants as incorporated by NDAC Chapter 33-15-13.
33-15-14-02-6.a.(2)	Since the Four Runner Compressor Station does not have the potential to emit more than 100 tons per year of any criteria pollutant, the facility will not be subject to the Title V operating permit program.
33-15-14-02-6.a.(3)	This application is for a new facility, not a modification to an existing facility.
33-15-14-02-6.a.(4)	Potential emissions as reported in Appendix B are not expected to have a “major impact on air quality.”
33-15-14-02-6.a.(5) & (6)	As of the application date, no request for a public comment period has been received.
33-15-14-02-6.a.(7)	Hiland is not requesting a federally enforceable permit which limits their potential to emit.

1.4 Site Location

The Edgewater Compressor Station is located approximately 11 miles northwest of New Town, North Dakota, in the SE ¼ SE ¼ of Section 4, Township 153 North, Range 93 West, in Mountrail County, North Dakota. The coordinates for the facility are Latitude: 48° 5'48.83" North and Longitude: 102°38'8.11" West. The site elevation is approximately 2,100 feet above sea level. A facility plot plan is presented in Appendix G.

1.5 Site Description

The terrain surrounding the facility is characterized as flat to rolling hills. The surrounding area is mainly used for agriculture and livestock grazing. The air quality classification for the area is "Better than National Standards" or unclassifiable/ attainment for the National Ambient Air Quality Standards for criteria pollutants (40 CFR 81.335). There are no non-attainment areas within a reasonable distance of the site.

2.0 PROJECT SUMMARY

2.1 Process Description

The Edgewater Compressor Station compresses natural gas from nearby wells for pipeline transmission to a local gas plant. The field gas is dehydrated and compressed into the pipeline.

Minor Permit PTC 17008 was issued in 2017 for construction of Edgewater Compressor Station with (2) Waukesha engines.

Minor Permit Revision PTC17030 was issued in 2017 to increase dehydrator throughput from 20 MMCFD to 25 MMCFD and add (3) Waukesha Units to the station.

Minor Source Permit to Operate O18007 was issued in 2019 for operation (5) Waukesha engines . The facility consisted of five natural gas-fired compressor engines, two 400-barrel (bbl) atmospheric tanks storing produced water, one TEG dehydration unit rated at 25 million standard cubic feet per day (MMscfd), one 0.5 million British

Thermal Units per hour (MMBtu/hr) reboiler, and one 30,000-gallon pressurized storage tank storing natural gas liquids (NGL).

Minor Permit Revision PTC 20034 in 2021 was issued to replace two existing 1380 hp compressor engines with two new 1900 hp compressor engines and remove two engines.

Currently, gas compression is achieved by (3) existing compressors driven by (3) natural gas fired Waukesha engines.

This application is to add (1) new natural gas fired Caterpillar engine and increase the dehydrator throughput from 25 MMSCFD to 27 MMSCFD. The Waukesha engines are equipped with Non-Selective Catalytic Reduction (NSCR) catalysts for control of emissions. The Caterpillar engine will be equipped with oxidation catalysts.

The gas is dehydrated using a 27 MMcf/day TEG dehydration unit and associated 0.5 MMBTU/hr TEG reboiler. Emissions from the dehydrator flash tank are recycled back into the process. Emissions from the regenerator still column are routed to a BTEX condenser system, with non-condensable vapors exiting the condenser combusted in the TEG reboiler firebox. Condensed vapors (liquids) are routed to the Produced Water Tanks. The reboiler also uses natural gas as fuel in addition to the uncondensed vapors. The two existing 400 barrel atmospheric tanks are used to store produced water for eventual shipment offsite via tank truck loading. All combustion equipment at the site is fired with a portion of natural gas after it has been processed at the station.

Emission sources with minor emissions include three 500 gallon methanol tanks, one 60,000 gallon natural gas liquid (NGL) pressurized bullet tank, pig launchers and receivers, compressor blowdowns required for maintenance, and NGL unloading. The majority of compressor blowdowns will be routed to the suction header with a few blowdowns vented to atmosphere.

A representative plot plan is provided in Appendix G showing the general layout of the site.

2.2 Proposed Construction

Hiland is proposing to authorize an Edgewater CS minor permit revision under Air Pollution Control Permit to Construct 33.1-15-14-02. A 4th unit, a Caterpillar unit, will be brought onsite approximately April 8, 2023 upon air permit issuance, Table 2.1 summarizes Caterpillar engine information.

Table 2.1: Natural Gas-Driven Engine Specifications

Emitting Unit Description	Engine Type	Design Horsepower Rating	Max. Fuel Consumption (HHV)	Pollution Control Device
Compressor Engine #4	4-Stroke Lean-Burn	1,380	8,103 Btu/bhp-hr	Oxidation Catalyst

3.0 EMISSION SOURCES

3.1 Criteria Pollutant Emission Inventory

The criteria air pollutants that will be emitted from Edgewater Compressor Station are as follows: nitrogen oxides (NOx), particulate matter with an aerodynamic diameter less than 10 microns (PM_{10}), sulfur dioxide (SO_2), volatile organic compounds (VOCs), and carbon monoxide (CO).

Appendix B provides tables which summarizes the potential emissions from the proposed sources.

3.2 Compressor Engine Emissions

The existing site consists of the following:

- Two Waukesha L7044 GSI rich-burn engines for compression of natural gas. These engines are rated 1,900 bhp and are equipped with Non-Selective Catalytic Reduction (NSCR).
- One Waukesha L5794 GSI rich-burn engine for compression of natural gas. The engine is rated at 1380 bhp and is equipped with Non-Selective Catalytic Reduction (NSCR).

This application is for installation of a new Caterpillar G3516 lean burn engines for compression of natural gas. The engine will be rated at 1380 bhp at 1400 rpm and will be equipped with an oxidation catalyst.

There are no changes to the existing Waukesha compressor engines NO_x and CO emissions estimates and permit limits.

The Caterpillar compressor engine NO_x emissions are based on the NSPS Lean Burn limit of 1.0 g/hp-hr. The CO emissions are based on the NSPS Lean Burn limit of permit limit of 2.0 g/hp-hr although the manufacturer estimates 1.0 g/hp-hr after controls. The VOC

emissions are based on the NSPS Subpart JJJJ limit of 0.7 g/hp-hr. Formaldehyde emissions are based on information from the vendor. PM/PM_{10} and SO_2 emissions were based on AP-42 Table 3.2-3 emission factors. Per AP-42, all particulate emissions from natural gas combustion are considered to be less than 1.0 micrometer in diameter.

Emission calculations are provided in Appendix B. The engine specifications including information of controlled and uncontrolled emission rates are provided in Appendix F.

3.3 Glycol Reboiler Emissions

For the TEG reboiler, AP-42, Section 1.4 emission factors were used to calculate the NO_x, CO, VOC, PM/PM_{10} and SO_2 emissions. Per AP-42, all particulate emissions from natural gas combustion are considered to be less than 1.0 micrometer in diameter. Emission calculations are provided on Appendix B.

3.4 Glycol Dehydrator Emissions

The gas is dehydrated using a 27 MMcf/day TEG dehydration unit and associated 0.5 MMBTU/hr TEG reboiler. VOC emissions from the dehydrator still vent were calculated using GRI-GLYCalc Version 4.0. The flash tank off-gas will be recycled back into the process. A condenser system will be used to reduce the VOC emissions in the overhead stream from the reboiler. Emissions from the regenerator still column are routed to a BTEX condenser system, with non-condensable vapors exiting the condenser combusted in the TEG reboiler firebox. Condensed vapors (liquids) are routed to the Produced Water Tanks. Non-condensable gas from the condenser will be routed to the reboiler firebox with an assumed destruction efficiency of 95%. A wet gas analysis for Edgewater Station utilized in the GRI-GLYCalc model is found in Appendix E. The GRI-GLYCalc input and output reports are found in Appendix C. Emission calculations are provided in Appendix B.

3.5 Produced Water Storage Tank Emissions

The station receives an oil/water mixture which is routed to a slug catcher. The slug catcher separates the oil fraction and water fraction. The oil fraction routes to one pressurized Natural Gas Liquids (NGL) tank. The water fraction routes to two atmospheric produced water storage tanks. As part of the 2021 audit, Hiland obtained pressurized liquid samples from the slug catcher drain that routes to the produced water storage tanks. A liquid sample was obtained from Sacramento Compressor Station as a representative site.

Using ProMax estimation software, working, breathing, and flashing losses were calculated for a tank with 15,000 bbls/year throughput. ProMax is a chemical process simulator that uses thermodynamic flash algorithms to determine flashing losses and follows AP-42 regulation to calculate working and breathing losses. Historical throughput has been less than 15,000 bbls/year.

Condensed vapors (liquids) from the BETX condenser are routed to the Produced Water Tanks. The Condenser Produced Water Stream flowrate/composition and Condenser Recovered Oil Stream flowrate/composition from GLYCALC aggregate report was inputted into the ProMax model. The ProMax output assume (3) streams into the produced water tanks ; a) water fraction from slug catcher b) oil fraction from dehydrator condenser and c) water fraction from dehydrator condenser.

The ProMax simulation reports are found in Appendix D and the analyses are found in Appendix E. The Sacramento Compressor Station (representative of Edgewater Compressor Station) analytical results show that Produced Water tanks contain primarily water (>99 % water).

3.6 Produced Water Truck Loading Emissions

The VOC emissions from tank truck loading were estimated using the equation from EPA's AP-42 Section 2, 5th Edition, June 2008, Equation 1:

$$L = \frac{12.46 * S * P * M}{T}$$

where:

L = Loading Losses, lb/1000 gallons

S = Saturation Factor, see Table 5.2-1 in AP-42, Section 5.2.

P = True vapor pressure, psia

M = Molecular weight of vapors, lb/lb-mol

T = Temperature of bulk liquid loaded, R (F + 460)

The contents being transported from the tanks will be mainly produced water. To be conservative, a 90% water content reduction has been taken on the total emissions. Emission calculations are provided in Appendix B.

3.7 Pigging Emissions

Gas lines are pigged to perform various maintenance activities on a pipeline. Emissions associated with pigging result from gaseous releases when the “pig” is loaded into a pig launcher or removed from a pig receiver.

The estimated MCF per event was calculated considering pig receiver/pig launcher volume, pressure, temperature, gas quality parameters, and gas compressibility. The estimated MCF per event was multiplied by lb/scf based on site specific gas analysis to calculate VOC emissions. To be conservative, pigging emissions are assumed to be 1.0 tpy of VOC. Emission calculations are provided in Appendix B.

3.8 Compressor Blowdown Emissions

At Hiland stations, compressor blowdowns are controlled manually. During the recycle process a pressure reduction valve is used to route compressor blowdowns directly into the suction header. Technicians manually open the valve during a blowdown event to route compressor discharge back to the suction header to be recycled back into the system. The discharge pressures range from 700 psig to 1250 psig. Technicians monitor a pressure gauge and when pressures reach 100 psig or lower the blowdown is vented to atmosphere. Emission calculations for compressor blowdowns assume the majority of compressor blowdowns occur at approximately 100 psig using this recycle design.

In certain instances the compressor blowdown must be vented directly to atmosphere. In these cases, there is a second compressor blowdown valve that a technician manually opens allowing the blowdown to vent directly to atmosphere.

Technicians monitor and document the number of blowdowns, discharge pressure and temperatures of each blowdown event.

The estimated MCF per event was calculated considering compressor volume, pressure, temperature, gas quality parameters, and gas compressibility. The estimated MCF per event was multiplied by lb/scf based on site specific gas analysis to calculate VOC emissions. To be conservative, the number of blowdowns at 100 psig was

assumed to be the same as noted in the 2021 PTE updates. Emission calculations are provided in Appendix B.

3.9 NGL Truck Loading Emissions

There is one 60,000 gallon NGL tank at Edgewater Station. NGL truck loading emissions calculations are provided in Appendix B.

3.10 Fugitives Estimate

Fugitive emissions are based on emission factors are from EPA's "Protocol for Equipment Leak Emission Estimates" EPA-453/R-95-017, 11/1995, Table 2-4. The total component count is based on estimated number of components for each compressor, tank, and TEG glycol dehydrator unit at the station. Emission calculations are provided in Appendix B.

3.11 HAP Emissions

HAP emissions from natural gas combustion in the Waukesha compressor engines (except formaldehyde) and glycol reboiler were estimated using data from the following AP-42 tables: Table 3.2-3, Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, dated July 2000; Table 1.4-3, Emission Factors for Speciated Organic Compounds from Natural Gas Combustion; and Table 1.4-4, Emission Factors for Metals from Natural Gas Combustion, dated July 1998.

HAP emissions from natural gas combustion in the Caterpillar engines were estimated using emission factors based on AP-42 Section 3.2, Table 3.2-2 (07/00) for 4 stroke lean burn engines.

Manufacturer’s information was used for the compressor engine formaldehyde emissions.

HAP emissions from the TEG dehydrator still vent were calculated using GRI GlyCalc Version 4.0.

Vendor information was used for the compressor engine formaldehyde emissions. HAP emissions from the TEG dehydrator still vent were calculated using GRI GlyCalc Version 4.0. The flash tank off-gas will be recycled. A condenser system will be used to reduce the VOC emissions in the overhead stream from the reboiler; non-condensable gas from the condenser will be routed to the reboiler firebox. A condenser system is used to reduce the VOC emissions in the overhead stream from the reboiler. Non-condensable gas from the

condenser will be routed to the reboiler firebox with an assumed destruction efficiency of 95%.

Potential HAP emissions at the Edgewater Compressor Station will not exceed the major source thresholds of 10 tpy of any individual HAP or 25 tpy of any combination of HAPs. The total HAP emission rate from the facility is approximately 4.71 tons per year. Emission calculations are provided in Appendix B.

4.0 REGULATORY ANALYSIS

4.1 Permit Requirements

Hiland is required to obtain an air quality preconstruction permit for the proposed construction at the Edgewater Compressor Station per NDAC 33-15-14-02: Permit to Construct**.**

4.2 Regulatory Requirements

Table 4.1 lists the rules potentially applicable to the Four Runner Compressor Station. The rules are addressed individually in the following sections as they pertain to the facility.

Table 4.2 Potentially Applicable Rules

Rule Citation	Subject of the Rule
NDAC 33-15-01	General Provisions
NDAC 33-15-02	Ambient Air Quality Standards
NDAC 33-15-03	Restriction of Emission of Visible Air Contaminants
NDAC 33-15-04	Open Burning Restrictions
NDAC 33-15-05	Emissions of Particulate Matter Restricted
NDAC 33-15-06	Emissions of Sulfur Compounds Restricted
NDAC 33-15-07	Control of Organic Compounds Emissions
NDAC 33-15-08	Control of Air Pollution From Vehicles and Other Internal Combustion Engines
NDAC 33-15-10	Control of Pesticides

NDAC 33-15-11	Prevention of Air Pollution Emergency Episodes
NDAC 33-15-12	Standards of Performance for New Stationary Sources
NDAC 33-15-13	Emission Standards for Hazardous Air Pollutants
NDAC 33-15-14	Designated Air Contaminant Sources, Permit to Construct, Minor Source Permit to Operate, Title V Permit to Operate
NDAC 33-15-15	Prevention of Significant Deterioration of Air Quality
NDAC 33-15-16	Restriction of Odorous Air Contaminants
NDAC 33-15-17	Restriction of Fugitive Emissions
NDAC 33-15-18	Stack Heights
NDAC 33-15-19	Visibility Protection
NDAC 33-15-20	Control of Emissions From Oil and Gas Well Production Facilities
NDAC 33-15-21	Acid Rain Program
NDAC 33-15-22	Emissions Standards for Hazardous Air Pollutants for Source Categories
NDAC 33-15-23	Fees
NDAC 33-15-24	Standards for Lead-Based Paint Activities
NDAC 33-15-25	Regional Haze Requirements
	Policy for the Control of Hazardous Air Pollutant Emissions In North Dakota (Air Toxics Policy)

4.2.1 General Provisions (NDAC 33-15-01)

This facility is subject to all general requirements of this section (i.e., inspection, circumvention, shutdown/malfunction, compliance, enforcement, confidentiality of records, etc.).

4.2.2 Ambient Air Quality Standards (NDAC 33-15-02)

The air quality of the area is classified as "Better than National Standards" or unclassifiable/attainment of the National Ambient Air Quality Standards (NAAQS) for criteria pollutants (40 CFR 81.335). There are no nonattainment areas within a reasonable distance of the site.

Per the Criteria Pollutant Modeling Requirements for a Permit to Construct modeling policy memo, modeling is required when:

- The emissions vent from a stack with a height greater than or equal to 1.5 times the height of any nearby building, and potential emissions exceed 100 tons per year of NOx or SO_2 or 40 tons per year of PM_{10}.
- The emissions vent from a stack with a height less than 1.5 times the height of any nearby building, and potential emissions exceed 40 tons per year of NOx or SO_2 or 15 tons per year of PM_{10}.

The emissions at Edgewater Compressor Station will vent from stacks with a height greater than or equal to 1.5 times the height of any nearby building. Because the facility's potential emissions will be lower than the modeling thresholds, modeling for criteria pollutants is not required for this application.

Hiland will abide by all standards set forth in these regulations.

4.2.3 Restriction of Emission of Visible Air Contaminants (NDAC 33-15-03)

NDAC 33-15-03 contains regulations governing particulate matter and opacity limits from new and existing sources. Hiland will comply with all applicable standards.

4.2.4 Open Burning Restrictions (NDAC 33-15-04)

Hiland will comply with all open burning regulations at the Four Runner Compressor Station.

4.2.6 Emissions of Particulate Matter Restricted (NDAC 33-15-05)

This facility will operate four natural gas-fired stationary combustion engines and will comply with the provisions of Sections 33-15-05-01 and 33-15-05-04. Fuel is also consumed for the purposes of indirect heating; therefore, Section 33-15-05-02 does apply.

4.2.6 Emissions of Sulfur Compounds Restricted (NDAC 33-15-06)

This facility combusts pipeline quality natural gas and, per Section 33-15-06-01.1.e, is not subject to the regulations of this Chapter.

4.2.7 Control of Organic Compounds Emissions (NDAC 33-15-07)

There is no water-oil separator or flare at this facility. The produced water tanks will be equipped with submerged fill pipes. Hiland will comply with the provisions of Section 33-15-07-02.

4.2.8 Control of Air Pollution From Vehicles and Other Internal Combustion Engines (NDAC 33-15-08)

This facility is proposing to operate four natural gas-fired stationary combustion engines, and Hiland will comply with the restricted emissions regulation of Section 33-15-08-01. Hiland will also comply with Section 33-15-08-02.

4.2.9 Control of Pesticides (NDAC 33-15-10)

Hiland will comply with the provisions of NDAC 33-15-10 should pesticides be used at this facility.

4.2.10 Prevention of Air Pollution Emergency Episodes (NDAC 33-15-11)

Hiland will comply with any applicable source curtailment regulations when notified by the Department of an Air Pollution Emergency Episode.

4.2.11 Standards of Performance for New Stationary Sources (NDAC 33-15-12)

The Edgewater Compressor Station does qualify as a designated source for NSPS per certain subparts of 40 CFR 60, as incorporated by Section 33-15-12-01.1.

New Source Performance Standards (NSPS) apply to certain source categories. Five subparts were reviewed for applicability in regards to the proposed construction.

NSPS Subpart Dc

Subpart Dc is applicable to steam generating units for which construction, modification, or reconstruction is commenced after June 9, 1989, and which have a maximum design heat input capacity greater than or equal to 10 MMBtu/hr but less than 100 MMBtu/hr. The TEG reboiler has a maximum design heat input capacity of less than 10 MMBtu/hr; therefore, the reboiler will not be subject to Subpart Dc.

NSPS Subpart Kb

NSPS Kb applies to each storage vessel with a capacity greater than or equal to 75 cubic meters (m3) (17,027 gal or 648.6 bbl) that is used to store volatile organic liquids for which construction, reconstruction, or modification is commenced after July 23, 1984. The capacity of the produced water/condensate tanks is below the NSPS Kb applicability threshold. The pressurized NGL tank will have a capacity above the applicability threshold. However, the tank is exempt from this regulation per 60.110b(d)(4) which exempts vessels with a design capacity less than or equal to 1,589.874 m3 (360,934,388 gal) used for petroleum or condensate stored, processed, or treated prior to custody transfer.

NSPS Subpart JJJJ

Owners and operators are subject to Subpart JJJJ if construction, reconstruction, or modification of the spark ignition internal combustion engine (SI ICE) commenced after June 12, 2006, and if the engine was manufactured:

- On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 HP (except lean-burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP);
- On or after January 1, 2008, for lean-burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP;
- On or after July 1, 2008, for engines with a maximum engine power less than 500 HP; or
- On or after January 1, 2009, for emergency engines with a maximum engine power greater than 19 KW (25 HP).

NSPS JJJJ is applicable to the existing engines and to the proposed Caterpillar engine. Hiland will comply with the requirements of Subpart JJJJ.

NSPS Subpart OOOOa

Owners and operators are subject to Subpart OOOOa if they commence construction, modification or reconstruction after September 18, 2015, of one or more affected facilities. For a natural gas compressor station, an affected facility could include centrifugal compressors, reciprocating compressors, storage vessels, certain pneumatic pumps/controllers, and equipment leaks.

There will be no centrifugal compressors at the Edgewater Compressor Station.

Since none of the produced water storage vessels will have potential VOC emissions greater than six tons per year, the vessels are not subject to the requirements in Subpart OOOOa.

The facility will include reciprocating compressors subject to this regulation. Hiland will comply with the requirements for reciprocating compressors as applicable.

The facility will not be designed with continuous bleed natural gas driven pneumatic controllers.

The existing facility is subject to requirements for performing surveys with the purpose of identifying fugitive emissions using optical gas imaging (OGI). The existing facility is subject to the recordkeeping and reporting requirements associated with this regulation.

4.2.12 Emission Standards for Hazardous Air Pollutants (NDAC 33-15-13)

The process fluids at this facility (field gas) will not contain 10% or greater of Volatile Hazardous Air Pollutant (VHAP) as defined by §61.241 of 40 CFR 61; therefore, this facility is not subject to Subpart V, as incorporated by Section 33-15-13-01.1.

4.2.13 Designated Air Contaminant Sources, Permit to Construct, Minor Source Permit to Operate, Title V Permit to Operate (NDAC 33-15-14)

Since Edgewater Compressor Station is not a major listed source, i.e., its PTE for all criteria pollutants and HAPS is below the major source thresholds, the facility is subject to the requirements of Section 33-15-14-03 - Minor Source Permit to Operate.

Edgewater Compressor Station will not have the potential to emit more than 100 tons per year of any criteria pollutant and will not be a major source of HAPs, the facility will not be subject to the Title V operating permit program per NDAC 33-15-14-06.

Per the Criteria Pollutant Modeling Requirements for a Permit to Construct modeling policy memo, modeling is required when:

- The emissions vent from a stack with a height greater than or equal to 1.5 times the height of any nearby building, and potential emissions exceed 100 tons per year of NOx or SO_2 or 40 tons per year of PM_{10}.
- The emissions vent from a stack with a height less than 1.5 times the height of any nearby building, and potential emissions exceed 40 tons per year of NOx or SO_2 or 15 tons per year of PM_{10}.

The emissions will vent from stacks with a height greater than or equal to 1.5 times the height of any nearby building. Because the facility's potential emissions will be lower than the modeling thresholds, modeling for criteria pollutants is not required for this application.

In North Dakota, Best Available Control Technology (BACT) is not required for any source unless it is a PSD major source for criteria pollutants or HAPs, regardless if a construction permit is required.

4.2.14 Prevention of Significant Deterioration of Air Quality (NDAC 33-15-15)

PSD permitting regulations apply to major PSD stationary sources. A major PSD stationary source is defined as a listed facility with the potential to emit 100 tons per year or more of any regulated pollutant or a non-listed facility with the potential to emit 250 tons per year or more of any regulated pollutant.

Since Edgewater Compressor Station is not a listed facility and does not have the potential to emit greater than 250 tons per year of any regulated pollutant, PSD is not applicable.

4.2.15 Restriction of Odorous Air Contaminants (NDAC 33-15-16)

Hiland will comply with all requirements concerning odorous air contaminants at Edgewater Compressor Station as applicable to sources outside a city or outside the area over which a city has exercised extraterritorial zoning as defined in North Dakota Century Code Section 40-47-01.1.

4.2.16 Restriction of Fugitive Emissions (NDAC 33-15-17) and Stack Heights (NDAC 33-15-18)

This facility is subject to the requirements of these chapters.

4.2.17 Visibility Protection (NDAC 33-15-19)

The Edgewater Compressor Station is not a major PSD stationary source as defined by Section 33-15-15-01; therefore, these regulations do not apply per Section 33-15-19-01.

4.2.18 Control of Emissions From Oil and Gas Well Production Facilities (NDAC 33-15-20)

This facility does not meet the definition of an oil and gas production facility. Therefore, the requirements of this chapter do not apply to the compressor station.

4.2.19 Acid Rain Program (NDAC 33-15-21)

This facility is not a listed source per 40 CFR 72 and 73, as incorporated by Section 33-15-21-08.1; therefore, these rules do not apply.

4.2.20 Emissions Standards for Hazardous Air Pollutants for Source Categories (NDAC 33-15-22)

Title 40 CFR Part 63, National Emission Standards for Hazardous Air Pollutants (NESHAPs) for Source Categories, is incorporated into the North Dakota rules at NDAC 33-15-22-01.

Two NESHAP subparts were reviewed for applicability in regard to the facility: Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines) and Subpart HH (National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities).

NESHAP Subpart HH

Subpart HH sets standards for reducing HAPs from TEG dehydration units, fugitives and storage vessels at major source or area sources of HAP emissions. This facility is an area source of HAPs; therefore, is subject to the certain requirements applicable to TEG dehydrators. If the TEG dehydrator throughput is less than 85 MCFD or emissions are less than 0.9 megagrames/yr (1.0 tpy), the dehydrator is exempt from Subpart HH.

The TEG dehydrator at Edgewater Compressor Station will process up to 27 MMcfd of gas which is higher than exemption threshold of 85 Mcfd. The TEG dehydration unit includes emission controls to limit annual potential benzene emissions to less than 0.9 megagrams/yr (1.0 tpy), an exemption threshold. Therefore, the facility is exempt from the standards listed in Subpart HH.

NESHAP Subpart ZZZZ

Owners and operators are subject to Subpart ZZZZ if they own or operate a stationary RICE at an area or major source of HAP emissions. Edgewater Compressor Station is an area source of HAPs. The engines are considered to be new stationary RICE because construction will commence after June 12, 2006. Therefore, Subpart ZZZZ is applicable to the compressor engines.

The engines were manufactured after July 1, 2007; therefore, they must meet the requirements in Subpart ZZZZ by meeting the requirements in NSPS Subpart JJJJ. There are no further requirements for any of the engines under Subpart ZZZZ. If any of the proposed engines will have a manufacture date before July 1, 2007, the applicability of NESHAP Subpart ZZZZ will be revisited.

4.2.21 Fees (NDAC 33-15-23)

NDAC 33-15-23 sets out applicable fees that will apply to the Edgewater Compressor Station. Hiland submitted $325 for the associated permit application fee. Hiland will pay the required annual operating fees based on the specifications in Section 33-15-23-03.

4.2.22 Standards for Lead-Based Paint Activities (NDAC 33-15-24)

This facility is not involved in lead-based paint activities as defined in 40 CFR 745 Subpart 745.223 as incorporated in NDAC 33-15-24-01; therefore, the requirements of this chapter do not apply.

4.2.23 Regional Haze Requirements (NDAC 33-15-25)

This facility is not located in a Class I Federal Area per 40 CFR Part 81 as incorporated in NDAC 33-15-25-02; therefore, the requirements of this chapter do not apply.

4.2.24 Policy for the Control of Hazardous Air Pollutant Emissions In North Dakota (Air Toxics Policy)

The compressor engines at Edgewater Compressor Station are listed sources in NDAC 33-15-14-01. Therefore, per the applicability section of the North Dakota Air Toxics Policy, this facility is subject to these regulations. However, per the *Dispersion Modeling Requirements, Compressor Engines and Glycol Dehydration Memorandum,* dispersion modeling for air toxics is not required to be submitted with a permit application if all of the conditions in the memorandum are met.

1. *Emissions from all compressor engines at the facility are controlled with catalytic emissions control systems (or an equivalent control technology) which is designed to reduce non-methane hydrocarbons by at least 50%.*

   As described in Section 3.0, all of the Waukesha compressor engines are controlled by NSCRs. The NSCRs will reduce non-methane hydrocarbons (NMHC) emissions by over 80% and VOC emissions by over 80%.

   As described in Section 3.0, the Caterpillar compressor engine is controlled by an oxidation catalyst. Although the oxidation catalysts will reduce VOC emissions (non methane, non ethane) by approximately 17 %, the post catalyst concentration will meet NSPS JJJJ emissions limit of 0.7 g/hp-hr. The vendor has not provided percent reduction information regarding non-methane hydrocarbons (NMHC) emissions but it is assumed NMHC emissions will be reduced by a similar percentage. The Caterpillar vendor estimated a 50 % percent reduction of formaldehyde emissions with oxidation catalysts. Formaldehyde is the predominant hazardous air pollutant of concern from engines.

2. *Emissions from all compressor engines at the facility are vented from a stack height which is greater than or equal to 1.5 times the nearest building height.*

   The emissions from the compressor engines at the facility will be vented from a stack height greater than or equal to 1.5 times the nearest building height.

3. *For glycol dehydration unit(s):*

   a. *Emissions from all glycol dehydration units(s) at the facility are controlled by combustion in the flare, process heater, boiler or other combustion device; or*

   b. *Emissions from all glycol dehydration unit(s) at the facility are controlled by a control technology with a VOC destruction and removal efficiency of at least 90%; or*

   c. *Combined air toxics emissions from all glycol dehydration units at the facility are less than 5.0 tons/year.*

   As specified in Section 3.0, the emissions from the glycol dehydration units are controlled by a condenser and the non-condensable gas from the condenser will be routed to the reboiler firebox. Combined air toxics emissions from the glycol dehydration unit is approximately 0.18 tpy, which is well below 5.0 tons/year.

4. *If the facility is less than ¼ mile from a residence: combined air toxics emissions from the entire facility are less than 10.0 tons/year, benzene emissions are less than 2.0 tons/year, and formaldehyde emissions are less than 2.0 tons/year.*

   The facility is located approximately 1.31 miles from a residence; therefore, this section is not applicable.

5. *If the facility is at least ¼ mile from a residence: combined air toxics emissions from the entire facility are less than 10.0 tons/year, benzene emissions are less than 3.0 tons/year, and formaldehyde emissions are less than 3.0 tons/year.*

   The facility is located approximately 1.31 mile from a residence. The combined toxic emissions from the entire facility are well below 10.0 tons per year (approximately 47 % of 10 tpy) and benzene emissions are less than 3.0 tons per year (less than 1 % of 3 tpy) and formaldehyde emissions are less than 3.0 tons per year .

Since the facility meets conditions 2, 3, 4 and 5 and VOC emission rates from the engines will meet NSPS JJJJ requirements, dispersion modeling for air toxics is not being submitted with this application. A dispersion modeling for air toxics will be submitted if requested by the Department.

APPENDIX A: STATE PERMIT APPLICATION FORMS

PERMIT APPLICATION FOR AIR CONTAMINANT SOURCES

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 8516 (3-2019)

SECTION A - FACILITY INFORMATION

Name of Firm or Organization Hiland Partners Holdings LLC		
Applicant's Name Anu Pundari		
Title Sr. Engineer	Telephone Number 520-663-4249	E-mail Address anu_pundari@kindermorgan.com
Contact Person for Air Pollution Matters Anu Pundari		
Title Sr. Engineer	Telephone Number 520-663-4249	E-mail Address anu_pundari@kindermorgan.com
Mailing Address (Street & No.) 5151 E. Broadway, Suite 1680		
City Tucson	State AZ	ZIP Code 85711
Facility Name Edgewater Compressor Station		
Facility Address (Street & No.) 47th Street NW (approximately 11 miles northwest of New Town, ND)		
City New Town	State ND	ZIP Code 58763

County Mountrail	Latitude (Nearest Second) 48° 5' 48.83" N	Longitude (Nearest Second) 103° 38' 8.11" W

Legal Description of Facility Site

Quarter SE	Quarter SE	Section 4	Township 153N	Range 93W

Land Area at Facility Site 10 Acres (or) Sq. Ft.	MSL Elevation at Facility 2100

SECTION B – GENERAL NATURE OF BUSINESS

Describe Nature of Business	North American Industry Classification System Number	Standard Industrial Classification Number (SIC)
Natural gas compressor station	213112	1311

SECTION C – GENERAL PERMIT INFORMATION

Type of Permit? ☒ Permit to Construct (PTC) ☐ Permit to Operate (PTO)

If application is for a Permit to Construct, please provide the following data:

Planned Start Construction Date	Planned End Construction Date
Installation of new Caterpillar unit upon permit issuance 4/8/23	July 2023

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

		Permit to Construct				Minor Source Permit to Operate						
Your Source ID Number	Source or Unit (Equipment, Machines, Devices, Boilers, Processes, Incinerators, Etc.)	New Source	Existing Source Modification	Existing Source Expansion	Existing Source Change of Location	New Source	Existing Source Initial Application	Existing Source After Modification	Existing Source After Expansion	Existing Source After Change of Location	Existing Source After Change of Ownership	Other
8	Compressor Engine	✓										
4	TEG Still Vent (27 MMscfd)											✓
5	Produced Water Tank											✓
6	Produced Water Tank											✓
BD	Compressor Blowdowns											✓
FUG	Fugitives											✓
	* Other means updated PTE											

Add additional pages if necessary

SECTION D2 – APPLICABLE REGULATIONS

Source ID No.	Applicable Regulations (NSPS/MACT/NESHAP/etc.)
Facility-wide	NSPS OOOOa - Fugitive Emissions at a Compressor Station
1 and 2	NSPS OOOOa - Reciprocating Compressors
1,2,7,8	NSPS JJJJ - Compressor Engines
4	MACT HH - TEG Still Vent
1,2,7,8	MACT ZZZZ - Compressor Engines

SECTION E – TOTAL POTENTIAL EMISSIONS

Pollutant	Amount (Tons Per Year)
NO_x	63.56
CO	76.85
PM	4.68

Pollutant	Amount (Tons Per Year)
PM_{10} (filterable and condensable)	4.68
$PM_{2.5}$ (filterable and condensable)	4.68
SO_2	0.14
VOC	75.73
GHG (as CO_2e)	26658
Largest Single HAP	2.84
Total HAPS	4.71

*If performance test results are available for the unit, submit a copy of test with this application. If manufacturer guarantee is used provide spec sheet.

SECTION F1 – ADDITIONAL FORMS

Indicate which of the following forms are attached and made part of the application	
■ Air Pollution Control Equipment (SFN 8532)	☐ Fuel Burning Equipment Used for Indirect Heating (SFN 8518)
☐ Construct/Operate Incinerators (SFN 8522)	■ Hazardous Air Pollutant (HAP) Sources (SFN 8329)
☐ Natural Gas Processing Plants (SFN 11408)	☐ Manufacturing or Processing Equipment (SFN 8520)
■ Glycol Dehydration Units (SFN 58923)	■ Volatile Organic Compounds Storage Tank (SFN 8535)
☐ Flares (SFN 59652)	■ Internal Combustion Engines and Turbines (SFN 8891)
☐ Grain, Feed, and Fertilizer Operations (SFN 8524)	☐ Oil/Gas Production Facility Registration (SFN 14334)

SECTION F2 – OTHER ATTACHMENTS INCLUDED AS PART OF THIS APPLICATION

1.	Application	4.	Gas Analysis
2.	Emission Calculations	5.	GRI-GLY Calc Reports
3.	Caterpillar Engine Specifications	6.	Area Map, Plot Plan

I, the undersigned applicant, am fully aware that statements made in this application and the attached exhibits and statements constitute the application for Permit(s) to Construct and/or 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	Date
Ann Pundari	12/22/22

PERMIT APPLICATION FOR INTERNAL COMBUSTION ENGINES AND TURBINES

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 8891 (3-2019)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.
- Must include SFN 8516 or SFN 52858

SECTION A – GENERAL INFORMATION

Name of Firm or Organization	Facility Name
Hiland Partners Holdings LLC	Edgewater Compressor Station

SECTION B – FACILITY AND UNIT INFORMATION

Source ID Number (From form SFN 8516): EU8

Type of Unit (check all that apply)		
	■ Stationary Natural Gas-Fired Engine	☐ Emergency Use Only
	☐ Stationary Diesel and Dual Fuel Engine	■ Non-Emergency Use
	☐ Stationary Gasoline Engine	☐ Peaking
	☐ Stationary Natural Gas-Fired Turbine	☐ Demand Response
	☐ Other – Specify:	

SECTION C – MANUFACTURER DATA

Make	Model	Date of Manufacture
Caterpillar	G3516J	Post July 2010

Reciprocating Internal Combustion Engine

■ Spark Ignition ☐ Compression Ignition

☐ 4 Stroke ■ 2 Stroke ☐ Rich Burn ■ Lean Burn

Maximum Rating (BHP @ rpm)	Operating Capacity (BHP @ rpm)
1380 @ 1400 rpm	1380 @1400 rpm

Engine Subject to:
☐ 40 CFR 60, Subpart IIII ■ 40 CFR 60, Subpart JJJJ ■ 40 CFR 63, Subpart ZZZZ
☐ 40 CFR 60, Subpart OOOO ☐ 40 CFR 60, Subpart OOOOa

Turbine Dry Low Emissions? ☐ Yes ☐ No

Heat Input (MMBtu/hr)	Maximum Rating (HP)	75% Rating (HP)	Efficiency

Turbine Subject to: ☐ 40 CFR 60, Subpart GG ☐ 40 CFR 60, Subpart KKKK

SECTION D – FUELS USED

Natural Gas (10^6 cu ft/year)	Percent Sulfur	Percent H_2S
114.747 MMscf/year	Neglible	Negligible
Oil (gal/year)	Percent Sulfur	Grade No.
LP Gas (gal/year)	Other – Specify:	

SECTION E – NORMAL OPERATING SCHEDULE

Hours Per Day	Days Per Week	Weeks Per Year	Hours Per Year	Peak Production Season (if any)
24	7	52	8760	

SECTION F – STACK PARAMETERS

Emission Point ID Number		Stack Height Above Ground Level (feet)	
EU8		1.5 X Building Height (approximately 35 feet)	
Stack Diameter (feet at top)	Gas Discharged (SCFM)	Exit Temp (°F)	Gas Velocity (FPS)
16 inches	8038	824	96

SECTION G – EMISSION CONTROL EQUIPMENT

Is any emission control equipment installed on this unit?

☐ No ■ Yes – Complete and attach form SFN 8532

SECTION H – MAXIMUM AIR CONTAMINANTS EMITTED

Pollutant	Maximum Pounds Per Hour	Amount (Tons Per Year)	Basis of Estimate*
NO_x	3.04	13.33	NSPS JJJJ Standard
CO	6.08	26.65	NSPS JJJJ Standard
PM	0.22	0.95	AP-42 Table 3.2-3
PM_{10} (filterable and condensable)	0.22	0.95	AP-42 Table 3.2-3
$PM_{2.5}$ (filterable and condensable)	0.22	0.95	AP-42 Table 3.2-3
SO_2	0.01	0.03	AP-42 Table 3.2-3
VOC	2.74	11.99	NSPS JJJJ Standard
GHG (as CO_2e)	1299	5691	AP-42 Table 3.2-3
Largest Single HAP	0.61	2.67	Vendor Data
Total HAPS	0.61	2.67	Vendor Data/AP-42

* If performance test results are available for the unit, submit a copy of test with this application, if manufacture data used, submit manufacturers specification sheets.

IS THIS UNIT IN COMPLIANCE WITH ALL APPLICABLE AIR POLLUTION RULES AND REGULATIONS?

■ YES ☐ NO

If "NO" a Compliance Schedule (SFN 61008) must be completed and attached.

Attach and label separate sheet(s) if you need more space to explain any system or answers or to provide complete listings of Emissions, Contaminants, or other items.

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Environmental Quality
Division of Air Quality
918 E Divide Avenue, 2nd Floor
Bismarck, ND 58501-1947
(701) 328-5188

PERMIT APPLICATION FOR AIR POLLUTION CONTROL EQUIPMENT

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 8532 (3-2019)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.
- Must also include forms SFN 8516 or SFN 52858

SECTION A – GENERAL INFORMATION

Name of Firm or Organization	Facility Name
Hiland Partners Holdings LLC	Edgewater Compressor Station
Source ID No. of Equipment being Controlled EU8	

SECTION B – EQUIPMENT

Type: ☐ Cyclone ☐ Multiclone ☐ Baghouse ☐ Electrostatic Precipitator
☐ Wet Scrubber ☐ Spray Dryer ☐ Flare/Combustor
☒ Other – Specify: Oxidation Catalyst

Name of Manufacturer	Model Number	Date to Be Installed
Caterpillar G3516J	Catalyst Combustion - Model Unknown	upon startup

Application:
☐ Boiler ☐ Kiln ☒ Engine ☐ Other – Specify:

Pollutants Removed	CO	HCHO		
Design Efficiency (%)	96 % conversion	85 % conversion		
Operating Efficiency (%)	TBD	TBD		

Describe method used to determine operating efficiency:
Specification sheet from Catalyst vendor denoting performance.

SECTION CD – GAS CONDITIONS

Gas Conditions			Inlet	Outlet
Gas Volume (SCFM; 68°F; 14.7 psia)				8038
Gas Temperature (°F)				828
Gas Pressure (in. H_2O)				
Gas Velocity (ft/sec)				96
Pollutant Concentration (Specify Pollutant and Unit of Concentration)	Pollutant	Unit of Concentration		
	CO	g/bhp-hr	2.42	1.0 (permitting 2.0)
	HCHO	g/bhp-hr	0.4	0.2

Pressure Drop Through Gas Cleaning Device (in. H_2O)
TBD

PERMIT APPLICATION FOR HAZARDOUS AIR POLLUTANT (HAP) SOURCES

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 8329 (3-2019)

SECTION A1 - APPLICANT INFORMATION

Name of Firm or Organization Hiland Partners Holding LLC		
Applicant's Name Anu Pundari		
Title Sr. Engineer	Telephone Number 520-663-4249	E-mail Address anu_pundari@kindermorgan.com
Mailing Address (Street & No.) 5151 E. Broadway, Suite 1680		
City Tucson	State AZ	ZIP Code 85711

SECTION A2 - FACILITY INFORMATION

Contact Person for Air Pollution Matters Anu Pundari		
Title Sr. Engineer	Telephone Number 520-663-4249	E-mail Address anu_pundari@kindermorgan.com
Facility Address (Street & No. or Lat/Long to Nearest Second) 47th Street NW (approximately 11 miles northwet of New Town, ND)		
City New Town	State ND	ZIP Code 58763
County Mountrail	Number of Employees at Location 0	
Land Area at Plant Site 10 Acres (or) _____ Sq. Ft.	MSL Elevation at Plant 2100	

Describe Nature of Business/Process

Natural Gas Compressor Station

SECTION B – STACK DATA

Inside Diameter (ft) Unknown	Height Above Grade (ft) Unknown	
Gas Temperature at Exit (°F) 824	Gas Velocity at Exit (ft/sec) 96	Gas Volume (scfm) 8038
Basis of any Estimates (attach separate sheet if necessary) Catalyst Vendor Data		
Are Emission Control Devices in Place? If YES – Complete SFN 8532	(●) Yes	( ) No
Nearest Residences or Building Farmyard	Distance (ft) approx 1.31 miles	Direction Southeast
Nearest Property Line	Distance (ft)	Direction

SECTION C – EMISSION STREAM DATA

Source ID No. From SFN 8516 EU8	Mean Particle Diameter (um) Unknown
Flow Rate (scfm) 8038	Drift Velocity (ft/sec) Unknown
Stream Temperature (°F) 824	Particulate Concentration (gr/dscf) Unknown
Moisture Content (%) Unknown	Halogens or Metals Present? Unknown
Pressure (in. Hg) Unknown	Organic Content (ppmv) Unknown
Heat Content (Btu/scfm) Unknown	O_2 Content (%) Unknown

SECTION D – POLLUTANT SPECIFIC DATA
(Complete One Box for Each Pollutant in Emission Stream)

Pollutant Emitted Formaldehyde	Chemical Abstract Services (CAS) Number 50-00-0
Proposed Emission Rate (lb/hr) 0.61	Emission Source (describe) 1380 hp Compressor Engine
Source Classification (process point, process fugitive, area fugitive) process point	Pollutant Class and Form (organic/inorganic - particulate/vapor) Organic-vapor
Concentration in Emission Stream (ppmv) Unknown	Vapor Pressure (in. Hg @ °F) 3890 mm Hg at 25 degree Celius
Solubility greater than 100g/100 ml (20 degree Celius)	Molecular Weight (lb/lb-mole) 30
Absorptive Properties Unknown	

Pollutant Emitted	Chemical Abstract Services (CAS) Number
Proposed Emission Rate (lb/hr)	Emission Source (describe)
Source Classification (process point, process fugitive, area fugitive)	Pollutant Class and Form (organic/inorganic - particulate/vapor)
Concentration in Emission Stream (ppmv)	Vapor Pressure (in. Hg @ °F)
Solubility	Molecular Weight (lb/lb-mole)
Absorptive Properties	

(Add additional pages if necessary)

Signature of Applicant Ann Pundari	Date 12/22/22

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Environmental Quality
Division of Air Quality
918 E Divide Avenue, 2nd Floor
Bismarck, ND 58501-1947
(701) 328-5188

PERMIT APPLICATION FOR GLYCOL DEHYDRATION UNITS

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 58923 (3-2019)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.
- Must include SFN 8516 or SFN 52858

SECTION A – GENERAL INFORMATION

Name of Firm or Organization	Facility Name
Hiland Partners Holdings LLC	Edgewater Compressor Station

SECTION B - 40 CFR 63, SUBPART HH APPLICABILITY DETERMINATION

The facility is a (check one): ☐ major, or ■ area source of hazardous air pollutants (HAP) as defined in §63.761. Attach calculations showing expected HAP emissions in accordance with §63.760(a)(1).

The facility (check all that apply):

■ Processes, upgrades or stores hydrocarbon liquids prior to the point of custody transfer.

■ Processes, upgrades or stores natural gas prior to the point at which natural gas enters the transmission and storage source category or is delivered to a final end user.

Identify the 40 CFR 63 Subpart HH (MACT HH) affected source:

☐ Glycol (ethylene, diethylene, or triethylene) dehydration unit & associated equipment (located at a major source), or

■ Tryiethylene glycol (TEG) dehydration unit (located at an area source)

The facility is exempt from MACT HH because it:

☐ Is a qualifying black oil facility, or

☐ Is a major source facility, prior to the point of custody transfer, with a facility-wide actual annual average natural gas throughout less than 18.4 thousand standard cubic meters per day and a facility-wide actual annual average hydrocarbon liquid throughput less than 39,700 liters per day.

■ The facility is not exempt from MACT HH.

SECTION C – EMISSION UNIT INFORMATION

Emission Unit Description	Emission Unit Identifier (EU)	Emission Point Number (EP)	Pollutant*	Emission Rate lb/hr	Emission Rate ton/yr	Air Pollution Control Equipment
TEG Still Vent	4	3	VOC	0.2	1.06	Condenser and reboiler firebox.
TEG Still Vent	4	3	HAPs	0.04	0.18	Condenser and reboiler firebox.
TEG Still Vent	4	3	BTEX	0.36	0.16	Condenser and reboiler firebox.

* *Includes an estimate of greenhouse gas emissions (CO2e).*

Complete the following for each glycol and triethylene glycol dehydration unit.								
EU	Design Capacity (MMSCFD)	Actual Throughput (MMSCFD)	Gas Pressure (psig)	Gas Temp (°F)	Water Content (lb/MMSCF)		Glycol Recirc. Rate (gal/min)	VOC Emissions (ton/yr)
					Wet Gas	Dry Gas		
4	27	27	1100	100	Saturated	4.0	3.5	1.06

SECTION D – STACK DATA

Inside Diameter (ft) NA	Height Above Grade (ft) NA	Gas Volume (scfm) unknown
Gas Temperature at Exit (°F) unknown	Gas Velocity at Exit (ft/sec) unknown	
Are Emission Control Devices in Place? If YES – Complete SFN 8532	☒ Yes	☐ No
Nearest Residence or Building Farmyard	Distance (ft) ~1.31 miles	Direction Southeast
Nearest Property Line	Distance (ft)	Direction

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Environmental Quality
Division of Air Quality
918 E Divide Avenue, 2nd Floor
Bismarck, ND 58501-1947
(701)328-5188

PERMIT APPLICATION FOR HAZARDOUS AIR POLLUTANT (HAP) SOURCES

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 8329 (3-2019)

SECTION A1 - APPLICANT INFORMATION

Name of Firm or Organization Hiland Partners Holding LLC		
Applicant's Name Anu Pundari		
Title Sr. Engineer	Telephone Number 520-663-4249	E-mail Address anu_pundari@kindermorgan.com
Mailing Address (Street & No.) 5151 E. Broadway, Suite 1680		
City Tucson	State AZ	ZIP Code 85711

SECTION A2 - FACILITY INFORMATION

Contact Person for Air Pollution Matters Anu Pundari		
Title Sr. Engineer	Telephone Number 520-349-0611	E-mail Address anu_pundari@kindermorgan.com
Facility Address (Street & No. or Lat/Long to Nearest Second) 47th Street NW (approximately 11 miles northwet of New Town, ND)		
City New Town	State ND	ZIP Code 58763
County Mountrail	Number of Employees at Location 0	
Land Area at Plant Site 10 Acres (or) _____ Sq. Ft.	MSL Elevation at Plant 2100	

Describe Nature of Business/Process

Natural Gas Compressor Station

SECTION B – STACK DATA

Inside Diameter (ft) Unknown	Height Above Grade (ft) Unknown	
Gas Temperature at Exit (°F) Unknown	Gas Velocity at Exit (ft/sec) Unknown	Gas Volume (scfm) Unknown
Basis of any Estimates (attach separate sheet if necessary)		
Are Emission Control Devices in Place? If YES – Complete SFN 8532	◯ Yes	◯ No
Nearest Residences or Building Farmyard	Distance (ft) approx 1.31 miles	Direction Southeast
Nearest Property Line	Distance (ft)	Direction

PERMIT APPLICATION FOR HAZARDOUS AIR POLLUTANT (HAP) SOURCES

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 8329 (3-2019)

SECTION A1 - APPLICANT INFORMATION

Name of Firm or Organization Hiland Partners Holding LLC		
Applicant's Name Anu Pundari		
Title Sr. Engineer	Telephone Number 520-663-4249	E-mail Address anu_pundari@kindermorgan.com
Mailing Address (Street & No.) 5151 E. Broadway, Suite 1680		
City Tucson	State AZ	ZIP Code 85711

SECTION A2 - FACILITY INFORMATION

Contact Person for Air Pollution Matters Anu Pundari		
Title Sr. Engineer	Telephone Number 520-349-0611	E-mail Address anu_pundari@kindermorgan.com
Facility Address (Street & No. or Lat/Long to Nearest Second) 47th Street NW (approximately 11 miles northwet of New Town, ND)		
City New Town	State ND	ZIP Code 58763
County Mountrail	Number of Employees at Location 0	
Land Area at Plant Site 10 Acres (or) _____ Sq. Ft.	MSL Elevation at Plant 2100	

Describe Nature of Business/Process

Natural Gas Compressor Station

SECTION B – STACK DATA

Inside Diameter (ft) Unknown	Height Above Grade (ft) Unknown	
Gas Temperature at Exit (°F) Unknown	Gas Velocity at Exit (ft/sec) Unknown	Gas Volume (scfm) Unknown
Basis of any Estimates (attach separate sheet if necessary)		
Are Emission Control Devices in Place? If YES – Complete SFN 8532	◯ Yes	◯ No
Nearest Residences or Building Farmyard	Distance (ft) approx 1.31 miles	Direction Southeast
Nearest Property Line	Distance (ft)	Direction

PERMIT APPLICATION FOR VOLATILE ORGANIC COMPOUNDS STORAGE TANK

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 8535 (3-2019)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.
- Must include SFN 8516 or SFN 52858

SECTION A – GENERAL INFORMATION

Name of Firm or Organization	Facility Name
Hiland Partners Holdings LLC	Edgewater Compressor Station

SECTION B – TANK DATA

Source ID Number (From SFN 8516)
EU5 and EU6

Capacity	Barrels 400		Gallons 16800	
Dimensions	Diameter 12	Height 20	Length	Width

Shape: ☒ Cylindrical ☐ Spherical ☐ Other – Specify:

Materials of Construction (i.e., steel): Steel

Construction: ☐ Riveted ☒ Welded ☐ Other – Specify:

Color: Tan

Condition: ☒ Good ☐ Fair ☐ Poor

Status: ☐ New Construction ☐ Alteration ☒ Existing (Give Date Constructed): Existing onsite

Type of Tank:
☒ Fixed Roof
☐ Variable Vapor Space
☐ Pressure (low or high)
☐ External Floating
☐ Internal Floating
☐ Other – Specify:

Type of Roof: ☐ Pan ☐ Double Deck ☐ Pontoon ☒ Other – Specify:

Type of Seal	Metallic Shoe Seal	Liquid Mounted Resilient Seal	Vapor Mounted Resilient Seal
	☐ Primary Seal Only ☐ With Rim Mounted Seal ☐ With Shoe Mounted Secondary Seal	☐ Primary Seal Only ☐ With Rim Mounted Seal ☐ With Weather Shield	☐ Primary Seal Only ☐ With Rim Mounted Seal ☐ With Weather Shield

SECTION C – TANK CONTENTS

Name all liquids, vapors, gases, or mixtures of such materials to be stored in the tank.
Give density (lbs per gal) or A.P.I.

Produced Water - RVP 13.0

SECTION D – VAPOR DISPOSAL

☒ Atmosphere ☐ Vapor Recovery Unit ☐ Flare ☐ Enclosed Combustor ☐ Other – Specify:

SECTION E – VAPOR PRESSURE DATA

psia	
Maximum True Vapor Pressure 9.1036	Maximum Reid Vapor Pressure 13.0

SECTION F – OPERATIONAL DATA

Maximum Filling Rate (barrels per hour or gallons per hour) 48 bbls per hour	Vapor Space Outage (See AP-42, 7.1-92, Equation 1-15) 10 feet (assume tank half full)
Average Throughput (barrels per day or gallons per day) 41 bbls per day	Tank Turnovers per Year 37.5

SECTION G – SOLUTION STORAGE

If material stored is a solution, supply the following information:	
Name of Solvent	Name of Material Dissolved
Concentration of Material Dissolved (% by weight or % by volume or lbs/gal)	

SECTION H – AIR CONTAMINANATS EMITTED

Pollutant*	Maximum Pounds Per Hour	Tons Per Year	Basis and Calculations for Quantities (Attach separate sheet if needed)
VOC	0.30	1.31	Promax Calculations

* Include an estimate of greenhouse gas emissions (CO_2e)

SECTION I – STANDARDS OF PERFORMANCE

Tank subject to: ☐ 40 CFR 60, Subpart K ☐ 40 CFR 60, Subpart Ka ☐ 40 CFR 60, Subpart Kb

☐ 40 CFR 60, Subpart OOOO ☐ 40 CFR 60, Subpart OOOOa

Are the standards of performance for new stationary sources; petroleum liquid storage vessels, 40 CFR Part 60, Subparts K, Ka, and Kb, OOOO, OOOOa being adhered to, where applicable?

☐ Yes ■ No – Explain:

The capacity of the produced water/condensate tanks is below the NSPS Kb applicability threshold. The pressurized NGL tanks will have a capacity above the applicability threshold. However, these tanks are exempt from this regulation per 60.110b(d)(4) which exempts vessels with a design capacity less than or equal to 1,589.874 m3 (360,934,388 gal) used for petroleum or condensate stored, processed, or treated prior to custody transfer.

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Environmental Quality
Division of Air Quality
918 E Divide Avenue, 2nd Floor
Bismarck, ND 58501-1947
(701) 328-5188

APPENDIX B: EMISSIONS CALCULATIONS

Site Emissions Summary
Hiland Partners Holdings LLC
Edgewater Compressor Station
Mountrail County, North Dakota

Emission Unit #	Emission Unit Description	Engine Model	PM_{10} (tpy)	NO_x (tpy)	CO (tpy)	SO_x (tpy)	VOC (tpy)	HAPS (tpy)	Formaldehyde (tpy)	CO2e (tpy)	GHG (tpy)
Existing Sources											
C1 (EU1)	Compressor Engine #1 - 1,900 bhp w/NSCR	Waukesha L7044 GSI	1.34	18.35	18.35	0.04	12.86	0.43	0.02	7,999.24	7,589.21
C2 (EU2)	Compressor Engine #2 - 1,900 bhp w/NSCR	Waukesha L7044 GSI	1.34	18.35	18.35	0.04	12.86	0.43	0.02	7,999.24	7,589.21
3	TEG Reboiler - 0.5 MMBtu/hr	--	0.02	0.21	0.18	0.00	0.01	0.00	0.00	176.24	175.21
4	TEG Still Vent - 27 MMscfd	--	--	--	--	--	1.06	0.18	--	--	--
5	Produced Water Tank - 400 bbl - 15,000 bbl/year	--	--	--	--	--	1.31	--	--	--	--
6	Produced Water Tank - 400 bbl - 15,000 bbl/year	--	--	--	--	--	1.31	--	--	--	--
C3 (EU7)	Compressor Engine # 3 - 1,380 bhp w/NSCR	Waukesha 5794 GSI	1.04	13.33	13.33	0.03	9.46	0.45	0.13	6,225.02	5,905.93
BD	Compressor Blowdowns	--	--	--	--	--	18.33	0.54	--	--	--
PW-TL	Produced Water Truck Loading	--	--	--	--	--	0.44	--	--	--	--
PW-NGL	NGL Truck Loading						0.82				
FUG	Fugitives	--	--	--	--	--	4.24	--	--	--	--
TK	Three Methanol Chemical Storage Tanks	--	--	--	--	--	0.03	--			
PIG	Pigging	--	--	--	--	--	1.00	--	--	--	--
New Source											
C4 (EU8)	Compressor Engine # 4 - 1,380 bhp w/NSCR	Caterpillar G3516J	0.95	13.33	26.65	0.03	11.99	2.67	2.67	5,690.58	5,398.89
	TOTAL POTENTIAL TO EMIT		**4.68**	**63.56**	**76.85**	**0.14**	**75.73**	**4.71**	**2.84**	**28090**	**26658**

Notes:

1. Pigging emissions are conservatively assumed to be 1.00 tpy of VOC.
2. Methanol storage tank emissions are conservatively assumed to be 0.01 tpy of VOC for each tank.

EU1 and EU2 Engine Emissions
Hiland Partners Holdings LLC
Edgewater Compressor Station
Mountrail County, North Dakota

Equipment Data:

Emission Unit (EU):	EU1	EU2
Emission Unit Name:	Waukesha L7044 GSI	Waukesha L7044 GSI
Engine Type:	4SRB	4SRB

Emissions Data:

Fuel Usage =	91.797	MMscf/yr (Calculated value based on max fuel combustion rate)
Horsepower =	1,900	bhp
Speed =	1,200	rpm
Hours of Operation =	8,760	hr/yr
Max. Fuel Combustion Rate (HHV) =	8,273	Btu/bhp-hr
Fuel Heating Value (HHV) =	1,500	MMBtu/MMscf
Max. Heat Rate (HHV) =	15.72	MMBtu/hr

Pollutant	Emission Factor	Units	Emission Factor Reference	Hourly Emissions (lb/hr)	Annual Emissions (ton/yr)
PM_{10}	0.01941	lb/MMBtu	AP-42 Table 3.2-3	0.31	1.34
NOx	1.0	g/bhp-hr	NSPS Subpart JJJJ	4.19	18.35
CO	1.0	g/bhp-hr	Vendor Data	4.19	18.35
SOx	5.88E-04	lb/MMBtu	AP-42 Table 3.2-3	0.01	0.04
VOC	0.70	g/bhp-hr	NSPS Subpart JJJJ	2.94	12.86
Total HAPs			Engine Vendor/AP-42	0.10	0.43
Formaldehyde	0.001	g/bhp-hr	Vendor Data	0.004	0.02
Pollutant	**Emission Factor**	**Units**	**Emission Factor Reference**	**Hourly Emissions (lb/hr)**	**Annual Emissions (ton/yr)**
CO_2e	--	--	--	1,826	7,999
GHG	--	--	--	1,733	7,589
CO_2	110	lb/MMBtu	AP-42	1,729	7,573
CH_4	0.23	lb/MMBtu	AP-42	3.62	15.84
N_2O	2.2	lb/MMscf	AP-42	0.02	0.10

Notes:

1. NO_x and VOC emissions based on 40 CFR 60 Subpart JJJJ standards. CO emissions based on data from the catalyst vendor indicating a post-catalyst emission rate of 1.0 g/hp-hr. Formaldehyde emissions are based on manufacturer data. PM/PM_0 and SO_2 emissions based on AP-42 Table 3.2-3.
1. Per AP-42, all particulate is considered to be less than 1.0 micrometer in diameter.
2. VOC emissions include formaldehyde.

Sample Calculation:

PM_{10} Emissions (ton/yr) = (Emission Factor, lb/MMBtu) x (Max Heat Input Rate (HHV), MMBtu/hr) x (Hours of Operation, hr/yr) / (2,000 lb/ton)

PM_{10} Emissions (ton/yr) = (0.01941 lb/MMBtu) x (15.72 MMBtu/hr) x (8,760 hr/yr) / (2,000 lb/ton) = 1.34 ton/yr

VOC Emissions (ton/yr) = (Emission Factor, g/bhp-hr) x (Horsepower, bhp) x (Hours of Operation, hr/yr) / (2,000 lb/ton) / (453.59 grams/1 lb)

VOC Emissions (ton/yr) = (0.7 g/bhp-hr) x (1900 bhp) x (8,760 hr/yr) / (2,000 lb/ton) / (453.59 g/lb) = 12.86 ton/yr

CO_2e Emissions (ton/yr) = (CO_2 emissions x 1) + (CH_4 emissions x 25) + (N_2O emissions x 298)

CO_2e Emissions (ton/yr) = ((7573.27 ton/yr x 1) + (15.84 ton/yr x 25) + (0.10 ton/yr x 298)) = 7999.24 ton/yr

GHG Emissions (ton/yr) = (CO_2 emissions) + (CH_4 emissions) + (N_2O emissions)

GHG Emissions (ton/yr) = (7573.27 ton/yr) + (15.84 ton/yr) + (0.10 ton/yr) = 7589.21 ton/yr

Engine EU1 and EU2 Emissions (HAPs)
Hiland Partners Holdings LLC
Edgewater Compressor Station
Mountrail County, North Dakota

Engines	Horsepower (hp)	Hours per Year	Heat Input (MMBtu/yr)	Fuel Input (MMscf/yr)
EU1 and EU2	1,900	8,760	137,696	91.80

HAP	Emission Factor (lb/MMBtu)	Emission Factor (g/bhp-hr)	Control Efficiency (%)	Emissions (tpy) (Controlled)
1,1,2,2-Tetrachloroethane	2.53E-05	--	50%	8.71E-04
1,1,2-Trichloroethane	1.53E-05	--	50%	5.27E-04
1,1-Dichloroethane	1.13E-05		50%	3.89E-04
1,2-Dichloroethane	1.13E-05		50%	3.89E-04
1,2-Dichloropropane	1.30E-05		50%	4.48E-04
1,3-Butadiene	6.63E-04	--	50%	2.28E-02
1,3-Dichloropropene	1.27E-05	--	50%	4.37E-04
Acetaldehyde	2.79E-03	--	50%	9.60E-02
Acrolein	2.63E-03	--	50%	9.05E-02
Benzene	1.58E-03	--	50%	5.44E-02
Carbon Tetrachloride	1.77E-05	--	50%	6.09E-04
Chlorobenzene	1.29E-05	--	50%	4.44E-04
Chloroform	1.37E-05	--	50%	4.72E-04
Ethylbenzene	2.48E-05	--	50%	8.54E-04
Ethylene Dibromide	2.13E-05	--	50%	7.33E-04
Formaldehyde	--	1.00E-03	NA	0.02
Methanol	3.06E-03	--	50%	1.05E-01
Methylene Chloride	4.12E-05	--	50%	1.42E-03
Naphthalene	9.71E-05	--	50%	3.34E-03
PAH	1.41E-04	--	50%	4.85E-03
Styrene	1.19E-05	--	50%	4.10E-04
Toluene	5.58E-04	--	50%	1.92E-02
Vinyl Chloride	7.18E-06	--	50%	2.47E-04
Xylene	1.95E-04	--	50%	6.71E-03
HAP	**Emission Factor (lb/MMscf)**		**Control Efficiency (%)**	**Emissions (tpy) (Uncontrolled)**
Arsenic	2.04E-04	--	0%	9.36E-06
Beryllium	1.20E-05	--	0%	5.51E-07
Cadmium	1.10E-03	--	0%	5.05E-05
Chromium	1.40E-03	--	0%	6.43E-05
Cobalt	8.40E-05	--	0%	3.86E-06
Manganese	3.80E-04	--	0%	1.74E-05
Mercury	2.60E-04	--	0%	1.19E-05
Nickel	2.10E-03	--	0%	9.64E-05
Selenium	2.40E-05	--	0%	1.10E-06
Total HAP Emissions				**0.43**

Notes:

1. Emission factor from AP-42 Table 3.2-3, Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines (July 2000) and AP-42 Table 1.4-4, Emission Factors for Metals from Natural Gas Combustion (July 1998).
2. Formaldehyde emission factor is from manufacturer data.
3. Control efficiency from the dual catalytic converter unit was conservatively assumed to be 50% per verbal guidance by NDDEQ on 4/29/10.

Glycol Reboiler Emissions
Hiland Partners Holdings LLC
Edgewater Compressor Station
Mountrail County, North Dakota

Equipment Data:

Emission Unit (EU):	**EU3**
Emission Unit Name:	TEG Reboiler
Rating:	0.5 MMBtu/hr

Emissions Data:

Maximum Fuel Usage =	2.92	MMscf/yr	(Calculated value based on max fuel combustion rate)
Maximum Fuel Usage =	0.0003	MMscf/hr	
Hours of Operation =	8,760	hr/yr	
Design Heat Input Rate =	0.50	MMBtu/hr	
Fuel Heating Value (HHV) =	1,500	MMBtu/MMscf	
CO_2 GWP (100 year) =	1		
CH_4 GWP (100 year) =	25		
N_2O GWP (100 year) =	298		

Pollutant	Emission Factor	Units	Emission Factor Reference	Hourly Emissions (lb/hr)	Annual Emissions (ton/yr)
PM_{10}	7.6	lb/MMscf	AP-42	0.004	0.02
NOx	100	lb/MMscf	AP-42	0.049	0.21
CO	84	lb/MMscf	AP-42	0.041	0.18
SOx	0.6	lb/MMscf	AP-42	0.0003	0.001
VOC	5.5	lb/MMscf	AP-42	0.003	0.01
Pollutant	**Emission Factor**	**Units**	**Emission Factor Reference**	**Hourly Emissions (lb/hr)**	**Annual Emissions (tons/yr)**
CO_2e	--	--	--	40.24	176.24
GHG	--	--	--	40.00	175.21
CO_2	120,000	lb/MMscf	AP-42	40.00	175.20
CH_4	2.3	lb/MMscf	AP-42	0.001	0.003
N_2O	2.2	lb/MMscf	AP-42	0.001	0.003

Notes:

1. Emission factors based on AP-42 Table 1.4-1 and Table 1.4-2. Per AP-42, all particulate is considered to be less than 1.0 micrometer in diameter.

Sample Calculation:

Fuel Usage (MMscf/yr) = (Design Heat Input Rate, MMBtu/hr) / (Fuel heating Value, MMBtu/MMscf) * (Hours of Operation, hr/yr)
Fuel Usage (MMscf/yr) = (0.5 MMBtu/hr) / (1500 MMBtu/MMscf) x (8,760 hr/yr) = 2.92 MMscf/yr

PM_{10} Emissions (lb/hr) = (Emission Factor, lb/MMscf) x (Fuel Heating Value, MMBtu/MMscf) / (1,020 MMBtu/MMscf) x (Fuel Usage, MMscf/yr) / (Hours of Operation, hr/yr)
PM_{10} Emissions (lb/hr) = (7.6 lb/MMscf) x (1500 MMBtu/scf) / (1,020 MMBtu/MMscf) x (7.6 MMscf/yr) / (8760 hr/yr) = 0.004 lb/hr

PM_{10} Emissions (ton/yr) = (Hourly Emissions, lb/hr) x (8,760 hrs/yr) / (2,000 lb/ton)
PM_{10} Emissions (ton/yr) = (0.004 lb/hr) x (8760 hr/yr) / (2000 lb/ton) = 0.02 ton/yr

Glycol Reboiler Emissions (HAPs)
Hiland Partners Holdings LLC
Edgewater Compressor Station
Mountrail County, North Dakota

Equipment	Heat Input Rate (MMBtu/hr)	Fuel Consumption (MMscf/yr)
Emission Unit 3 - TEG Reboiler	0.5 MMBtu/hr	2.92

HAP	Emission Factor[1] (lb/MMscf)	Control Efficiency (%)	Emissions (tpy) (Uncontrolled)
2-Methylanpthalene	2.40E-05	0%	5.15E-08
3-Methylchloranthrene	1.80E-06	0%	3.86E-09
7,12-Dimethylben(a)anthracene	1.60E-05	0%	3.44E-08
Acenapthene	1.80E-06	0%	3.86E-09
Acenapthylene	1.80E-06	0%	3.86E-09
Anthracene	2.40E-06	0%	5.15E-09
Benz(a)anthracene	1.80E-06	0%	3.86E-09
Benzene	2.10E-03	0%	4.51E-06
Benzo(a)pyrene	1.20E-06	0%	2.58E-09
Benzo(b)fluorathene	1.80E-06	0%	3.86E-09
Benzo(g,h,i)perylene	1.20E-06	0%	2.58E-09
Benzo(k)fluorathene	1.80E-06	0%	3.86E-09
Chrysene	1.80E-06	0%	3.86E-09
Dibenzo(a,h)anthracene	1.20E-06	0%	2.58E-09
Dichlorobenzene	1.20E-03	0%	2.58E-06
Fluoranthene	3.00E-06	0%	6.44E-09
Fluorene	2.80E-06	0%	6.01E-09
Formaldehyde	7.50E-02	0%	1.61E-04
Hexane	1.80E+00	0%	3.86E-03
Indeno(1,2,3-cd)pyrene	1.80E-05	0%	3.86E-08
Napthalene	6.10E-04	0%	1.31E-06
Phenanathrene	1.70E-05	0%	3.65E-08
Pyrene	5.00E-06	0%	1.07E-08
Toluene	3.40E-03	0%	7.30E-06
HAP	**Emission Factor[2] (lb/MMscf)**	**Control Efficiency (%)**	**Emissions (tpy) (Uncontrolled)**
Arsenic	2.04E-04	0%	2.98E-07
Beryllium	1.20E-05	0%	1.75E-08
Cadmium	1.10E-03	0%	1.61E-06
Chromium	1.40E-03	0%	2.04E-06
Cobalt	8.40E-05	0%	1.23E-07
Manganese	3.80E-04	0%	5.55E-07
Mercury	2.60E-04	0%	3.80E-07
Nickel	2.10E-03	0%	3.07E-06
Selenium	2.40E-05	0%	3.50E-08
Total HAP Emissions			**0.004**

Notes:

1. Emission factor from AP-42 Table 1.4-3, Emission Factors for Speciated Organic Compounds from Natural Gas Combustion (July 1998).

2. Emission factor from AP-42 Table 1.4-4, Emission Factors for Metals from Natural Gas Combustion (July 1998).

Edgewater Compressor Station
Glycol Still Vent Emissions

Equipment Data:

Emission Unit (EU):	EU4
Emission Unit Name:	TEG Dehydrator Still Vent

Emissions Data:

	Model
Wet Gas Pressure (psig)	1100
Wet Gas Temperature (°F)	100
Gas Throughput (mmscf/day)	27
Dry Gas Water Content (lb/H2O/mmscf)	4
Glycol Type =	TEG
Lean Glycol Water Content (wt% H20)	1.5
Lean Glycol Flow Rate (gpm)	3.5
Glycol Pump Type	Gas Injection
Gas Injection Pump Ratio (acfm gas/gpm glycol)	0.08
Flash Tank Pressure (psig)	55
Flash Tank Temperature (°F)	150
Flash Tank Control	Recycle/Recomp.
Regen Controls:	
Condenser Pressure (psig)	14.7
Condenser Temperature (°F)	100
Combustion Device:	
Destruction Efficiency:	95
Excess Oxygen:	5
Ambient Air Temperature (°F)	100

Pollutant	Controlled	
	Hourly Emissions	Annual Emissions
	lb/hr	tpy
-Propane	0.0514	0.2251
-Isobutane	0.0105	0.0460
-n-Butane	0.0477	0.2088
-Isopentane	0.0100	0.0438
-n-Pentane	0.0183	0.0802
-Cyclopentane	0.0020	0.0087
-n-Hexane	0.0060	0.0261
-Cyclohexane	0.0064	0.0281
-Other Hexanes	0.0068	0.0296
-Heptanes	0.0035	0.0154
-Methylcyclohexane	0.0018	0.0078
-2,2,4-Trimethylpentane	0.0001	0.0004
-Benzene	0.0256	0.1123
-Toluene	0.0073	0.0320
-Ethylbenzene	0.0006	0.0025
-Xylenes	0.0021	0.0093
-C8+ Heavies	0.0001	0.0001
Total VOC	**0.2000**	**1.0612**
Total HAPs	**0.0417**	**0.1825**
Total BTEX	**0.0356**	**0.1560**

Notes:

1. The flash tank off-gas will be recycled.
2. There is a condenser controlling the BTEX emissions.
3. The non-condensable gas from the condenser will be routed to the reboiler firebox.

Hiland Partners Holdings LLC
Edgewater Compressor Station
Mountrail County, North Dakota
Fugitive Emissions

Component Type	Service	Emission Factor [1] (lb/hr/comp)	Component Count	Total Loss (lb/hr)	Total Loss (tpy)
Valves	Gas/Vapor	0.00992	73	0.72	3.17
	Light Liquid	0.0055	29	0.16	0.70
Pumps	Gas Vapor	0.00529	0	0.00	0.00
	Light Liquid	0.02866	1	0.03	0.13
Flanges [2]	Gas/Vapor	0.00086	1311	1.13	4.94
	Light Liquid	0.000243	60	0.01	0.06
Connectors	Gas/Vapor	0.00044	0	0.00	0.00
	Light Liquid	0.000463	0	0.00	0.00
Open Ended Lines	Gas/Vapor	0.00441	0	0.00	0.00
	Light Liquid	0.00309	0	0.00	0.00
Other [3]	Gas/Vapor	0.0194	0	0.00	0.00
	Light Liquid	0.0165	0	0.00	0.00
Compressors	Gas/Vapor	0.0194	4	0.08	0.34
	Light Liquid	0.0165	0	0.00	0.00
Component Emission Total Losses				2.13	9.34
Gas/Vapor Emissions				1.93	8.45
Light Liquid Emissions				0.20	0.89

Component	Gas (wt%)	Gas/Vapor Emissions		Total Emissions [4]	
		(lb/hr)	(tpy)	(lb/hr)	(tpy)
CO_2	1.5425	0.030	0.130	0.030	0.130
Nitrogen	3.1735	0.061	0.268	0.061	0.268
H_2S	0.0000	0.00E+00	0.00E+00	0.000	0.000
Methane	34.2319	0.660	2.893	0.660	2.893
Ethane	21.3305	0.412	1.802	0.412	1.802
Propane	18.0624	0.348	1.526	0.348	1.526
i-Butane	2.6945	0.052	0.228	0.052	0.228
n-Butane	9.5175	0.184	0.804	0.184	0.804
i-Pentane	2.2729	0.044	0.192	0.044	0.192
n-Pentane	3.5252	0.068	0.298	0.068	0.298
Benzene	0.0671	0.001	0.006	0.001	0.006
n-Hexane	1.0101	0.019	0.085	0.019	0.085
Hexanes	1.2578	0.024	0.106	0.024	0.106
Toluene	0.0413	0.001	0.003	0.001	0.003
Heptanes	0.6695	0.013	0.057	0.013	0.057
Ethylbenzene	0.0079	0.000	0.001	0.000	0.001
Xylenes	0.0277	0.001	0.002	0.001	0.002
Octanes	0.1236	0.002	0.010	0.002	0.010
Nonanes	0.0096	0.000	0.001	0.000	0.001
C10+	0.4340	0.008	0.037	0.008	0.037
Total	**100.000**	**1.929**	**8.450**	**1.929**	**8.450**
Total VOC	**39.721**	**0.766**	**3.356**	**0.969**	**4.244**
Total HAPs	**1.154**	**0.022**	**0.098**	**0.022**	**0.098**

Notes:

1. Emission factors are from EPA's "Protocol for Equipment Leak Emission Estimates" EPA-453/R-95-017, 11/1995, Table 2-4.

2. Maintenance Plugs & Blind Flanges are treated as screwed connectors. Per TCEQ's "Air Permit Technical Guidance for Chemical Sources: Equipment Leak Fugitives" dated October 2000, screwed fittings should be estimated as flanges.

3. For Oil and Gas Production Operations, "Other" includes compressors, diaphrams, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, relief valves, and vents.

4. The total emissions include the light liquid emissions assuming 100% VOC of light liquid.

5. Water/Oil emissions are assumed to be 100% VOC.

Produced Water Storage Tank Emissions
Hiland Partners Holdings LLC
Edgewater Compressor Station
Mountrail County, North Dakota

Equipment Data:

Emission Unit (EU):	EU5	EU6
Emission Unit Name:	Produced Water Storage Tank	Produced Water Storage Tank

Emissions Data:

Tank Contents = Produced Water
Tank Type = Vertical Fixed Roof
Tank Capacity = 16,800 gallons
Annual Throughput = 15,000 bbl/year per tank
Annual Throughput = 630,000 gallons/year per tank

Emission Unit	Standing Losses (lb/hr)	Working Losses (lb/hr)	Total Losses (lb/hr)	Standing Losses (ton/yr)	Working Losses (ton/yr)	Total Losses (ton/yr)
Produced Water Storage Tank EU5	0.10	0.20	0.30	0.42	0.89	1.31
Produced Water Storage Tank EU6	0.10	0.20	0.30	0.42	0.89	1.31

Notes:
1. Emissions calculated using ProMax model
2. The liquid stored is essentially water.

Engine EU7 Emissions
Hiland Partners Holdings LLC
Edgewater Compressor Station
Mountrail County, North Dakota

Equipment Data:

Emission Unit (EU):	**EU7**
Emission Unit Name:	Waukesha L5794 GSI
Engine Type:	4SRB

Emissions Data:

Fuel Usage =	71.437	MMscf/yr (Calculated value based on max fuel combustion rate)
Horsepower =	1,380	bhp
Hours of Operation =	8,760	hr/yr
Max. Fuel Combustion Rate (HHV) =	8,864	Btu/bhp-hr
Fuel Heating Value (HHV) =	1,500	MMBtu/MMscf
Max. Heat Rate (HHV) =	12.23	MMBtu/hr

Pollutant	Emission Factor	Units	Emission Factor Reference	Hourly Emissions (lb/hr)	Annual Emissions (ton/yr)
PM_{10}	0.01941	lb/MMBtu	AP-42 Table 3.2-3 (07/00)	0.24	1.04
NOx	1.0	g/bhp-hr	NSPS Subpart JJJJ	3.04	13.33
CO	1.0	g/bhp-hr	Vendor Data	3.04	13.33
SOx	5.88E-04	lb/MMBtu	AP-42	0.01	0.03
VOC	0.70	g/bhp-hr	NSPS Subpart JJJJ	2.16	9.46
Total HAPs			Vendor Data/AP-42 Table 3.2-3 (07/00)	0.10	0.45
Formaldehyde	0.010	g/bhp-hr	Vendor Data	0.030	0.13
Pollutant	**Emission Factor**	**Units**	**Emission Factor Reference**	**Hourly Emissions (lb/hr)**	**Annual Emissions (ton/yr)**
CO_2e	--	--	--	1,421	6,225
GHG	--	--	--	1,348	5,906
CO_2	110	lb/MMBtu	AP-42	1,346	5,894
CH_4	0.23	lb/MMBtu	AP-42	2.81	12.32
N_2O	2.2	lb/MMscf	AP-42	0.02	0.08

Notes:
1. NO_x and VOC emissions based on 40 CFR 60 Subpart JJJJ standards. CO emissions based on data from the catalyst vendor indicating a post-catalyst emission rate of 1.0 g/hp-hr. Formaldehyde emissions are based on manufacturer data. PM/PM_{10} and SO_2 emissions based on AP-42 Table 3.2-3.
1. Per AP-42, all particulate is considered to be less than 1.0 micrometer in diameter.
2. VOC emissions include formaldehyde.

Sample Calculation:

PM_{10} Emissions (ton/yr) = (Emission Factor, lb/MMBtu) x (Max Heat Input Rate (HHV), MMBtu/hr) x (Hours of Operation, hr/yr) / (2,000 lb/ton)
PM_{10} Emissions (ton/yr) = (0.01941 lb/MMBtu) x (12.23 MMBtu/hr) x (8,760 hr/yr) / (2,000 lb/ton) = 1.04 ton/yr

VOC Emissions (ton/yr) = (Emission Factor, g/bhp-hr) x (Horsepower, bhp) x (Hours of Operation, hr/yr) / (2,000 lb/ton) / (453.59 grams/1 lb)
VOC Emissions (ton/yr) = (0.7 g/bhp-hr) x (1380 bhp) x (8,760 hr/yr) / (2,000 lb/ton) / (453.59 g/lb) = 9.46 ton/yr

CO_2e Emissions (ton/yr) = (CO_2 emissions x 1) + (CH_4 emissions x 25) + (N_2O emissions x 298)
CO_2e Emissions (ton/yr) = ((5893.53 ton/yr x 1) + (12.32 ton/yr x 25) + (0.08 ton/yr x 298)) = 6225.02 ton/yr

GHG Emissions (ton/yr) = (CO_2 emissions) + (CH_4 emissions) + (N_2O emissions)
GHG Emissions (ton/yr) = (5893.53 ton/yr) + (12.32 ton/yr) + (0.08 ton/yr) = 5905.93 ton/yr

Hiland Partners Holdings LLC
Edgewater Compressor Station
Mountrail County, North Dakota
Engine EU7 HAPs Emissions

Engines	Horsepower (hp)	Hours per Year	Heat Input (MMBtu/yr)	Fuel Input (MMscf/yr)
Waukesha 5794 GSI	1,380	8,760	107,155	77.931

HAP	Emission Factor[1] (lb/MMBtu)	Emission Factor[2] (g/hp-hr)	Control Efficiency[4] (%)	Emissions Controlled (tpy)
1,1,2,2-Tetrachloroethane	2.53E-05	--	50%	6.78E-04
1,1,2-Trichloroethane	1.53E-05	--	50%	4.10E-04
1,1-Dichloroethane	1.13E-05		50%	3.03E-04
1,2-Dichloroethane	1.13E-05		50%	3.03E-04
1,2-Dichloropropane	1.30E-05		50%	3.48E-04
1,3-Butadiene	6.63E-04	--	50%	1.78E-02
1,3-Dichloropropene	1.27E-05	--	50%	3.40E-04
Acetaldehyde	2.79E-03	--	50%	7.47E-02
Acrolein	2.63E-03	--	50%	7.05E-02
Benzene	1.58E-03	--	50%	4.23E-02
Carbon Tetrachloride	1.77E-05	--	50%	4.74E-04
Chlorobenzene	1.29E-05	--	50%	3.46E-04
Chloroform	1.37E-05	--	50%	3.67E-04
Ethylbenzene	2.48E-05	--	50%	6.64E-04
Ethylene Dibromide	2.13E-05	--	50%	5.71E-04
Formaldehyde	--	1.00E-02	0%	0.13
Methanol	3.06E-03	--	50%	8.20E-02
Methylene Chloride	4.12E-05	--	50%	1.10E-03
Naphthalene	9.71E-05	--	50%	2.60E-03
PAH	1.41E-04	--	50%	3.78E-03
Styrene	1.19E-05	--	50%	3.19E-04
Toluene	5.58E-04	--	50%	1.49E-02
Vinyl Chloride	7.18E-06	--	50%	1.92E-04
Xylene	1.95E-04	--	50%	5.22E-03
HAP	**Emission Factor[3] (lb/MMscf)**	**Emission Factor[2] (g/bhp-hr)**	**Control Efficiency (%)**	**Emissions Controlled (tpy)**
Arsenic	2.04E-04	--	0%	7.95E-06
Beryllium	1.20E-05	--	0%	4.68E-07
Cadmium	1.10E-03	--	0%	4.29E-05
Chromium	1.40E-03	--	0%	5.46E-05
Cobalt	8.40E-05	--	0%	3.27E-06
Manganese	3.80E-04	--	0%	1.48E-05
Mercury	2.60E-04	--	0%	1.01E-05
Nickel	2.10E-03	--	0%	8.18E-05
Selenium	2.40E-05	--	0%	9.35E-07
Total HAP Emissions				**0.45**

1. Emission factor from AP-42 Table 3.2-3, Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines (July 2000).
2. Catalyst vendor.
3. Emission factor from AP-42 Table 1.4-4, Emission Factors for Metals from Natural Gas Combustion (July 1998).
4. Control efficiency from the dual catalytic converter unit was conservatively assumed to be 50% per verbal guidance by NDDH on 4/29/10.

Edgewater Compressor Station
Engine Emissions

Equipment Data:

Emission Unit (EU):	EU8
Emission Unit Name:	Caterpillar G3516J 1380 bhp
Engine Type:	4SLB

Fuel Usage =	65.304	MMscf/yr	(Calculated value based on max fuel combustion rate.)
Horsepower =	1,380	bhp	
Speed =	1,400	rpm	
Hours of Operation =	8,760	hr/yr	
Max. Fuel Combustion Rate (HHV) =	8,103	Btu/bhp-hr	(Based on Manufacturer Specs)
Fuel Heating Value (HHV) =	1,500	MMBtu/MMscf	estimated
Max. Heat Rate (HHV) =	11.18	MMBtu/hr	

Pollutant	Emission Factor	Units	Emission Factor Reference	Hourly Emissions (lb/hr)	Annual Emissions (ton/yr)
PM-10 (Front and Back Half)	0.01941	lb/MMBtu	AP-42 Table 3.2-3 (07/00)	0.22	0.95
NOx	1.00	g/BHP-hr	NSPS JJJJ Lean Burn Limit	3.04	13.33
CO	2.00	g/BHP-hr	NSPS JJJJ Lean Burn Limit	6.08	26.65
SOx	5.88E-04	lb/MMBtu	AP-42 Table 3.2-3 (07/00)	0.01	0.03
VOC	0.70	g/BHP-hr	NSPS JJJJ Lean Burn Limit	2.74	11.99
Total HAPs			Engine Vendor/AP-42 Table 3.2-3	0.61	2.67
Formaldehyde	0.20	g/BHP-hr	Manufacturer Estimate	0.61	2.67
Pollutant	**Emission Factor**	**Units**	**Emission Factor Reference**	**Hourly Emissions (lb/hr)**	**Annual Emissions (ton/yr)**
CO_2e	--	--	--	1,299	5,691
GHG	--	--	--	1,233	5,399
CO_2	110	lb/MMBtu	AP-42 Table 3.2-3 (07/00)	1,230	5,388
CH_4	0.23	lb/MMBtu	AP-42 Table 3.2-3 (07/00)	2.57	11.26
N_2O	2.2	lb/MMscf	AP-42 Table 1.4-2 (07/00)	0.02	0.07

Notes:

1. NO_x and VOC emissions based on manufacturer data. Formaldehyde emissions are based on manufacturer data with assumption of 50 % reduction, similar to VOC percent reduction. PM/PM_{10} and SO_2 emissions based on AP-42 Table 3.2-3.

2. Per AP-42, all particulate is considered to be less than 1.0 micrometer in diameter.
3. VOC emissions include formaldehyde.

Sample Calculation:

PM-10 Emissions (ton/yr) = (Emission Factor, lb/MMBtu) x (Max Heat Input Rate (HHV), MMBtu/hr) x (Hours of Operation, hr/yr) / (2,000 lb/ton)
PM-10 Emissions (ton/yr) = (0.01941 lb/MMBtu) x (11.18 MMBtu/hr) x (8,760 hr/yr) / (2,000 lb/ton) = 0.95 ton/yr

VOC Emissions (ton/yr) = (Emission Factor, g/bhp-hr) x (Horsepower, bhp) x (Hours of Operation, hr/yr) / (2,000 lb/ton) / (453.59 grams/1 lb)
VOC Emissions (ton/yr) = (0.7 g/bhp-hr) x (1380 bhp) x (8,760 hr/yr) / (2,000 lb/ton) / (453.59 g/lb) = 11.99 ton/yr

CO_2e Emissions (ton/yr) = (CO_2 emissions x 1) + (CH_4 emissions x 25) + (N_2O emissions x 298)
CO_2e Emissions (ton/yr) = ((5387.56 ton/yr x 1) + (11.26 ton/yr x 25) + (0.07 ton/yr x 298)) = 5690.58 ton/yr

GHG Emissions (ton/yr) = (CO_2 emissions) + (CH_4 emissions) + (N_2O emissions)
GHG Emissions (ton/yr) = (5387.56 ton/yr) + (11.26 ton/yr) + (0.07 ton/yr) = 5398.89 ton/yr

Edgewater Compressor Station
Site Emissions Summary

HAP Emissions from 4 Stroke Lean-Burn Compressor Engines

Engines	Horsepower (hp)	Hours per Year	Heat Input (MMBtu/yr)	Fuel Input (MMscf/yr)
Engine EU8	1,380	8,760	11.18	65.30

HAP	Emission Factor (lb/MMBtu)	Emission Factor (g/bhp-hr)	Control Efficiency (%)	Emissions (tpy) (Controlled)	Notes
1,1,2,2-Tetrachloroethane	4.00E-05	--	0%	2.24E-07	1
1,1,2-Trichloroethane	3.18E-05	--	0%	1.78E-07	1
1,3-Butadiene	2.67E-04	--	0%	1.49E-06	1
1,3-Dichloropropene	2.64E-05	--	0%	1.48E-07	1
2-Methylnaphthalene	3.32E-05	--	0%	1.86E-07	1
2,2,4-Trimethylpentane	2.50E-04	--	0%	1.40E-06	1
Acenaphthene	1.25E-06	--	0%	6.99E-09	1
Acenaphthylene	5.53E-06	--	0%	3.09E-08	1
Acetaldehyde	8.36E-03	--	0%	4.67E-05	1
Acrolein	5.14E-03	--	0%	2.87E-05	1
Benzene	4.40E-04	--	0%	2.46E-06	1
Benzo(e)fluoranthene	1.66E-07	--	0%	9.28E-10	1
Benzo(e)pyrene	4.15E-07	--	0%	2.32E-09	1
Benzo(e)perylene	4.14E-07	--	0%	2.31E-09	1
Biphenyl	2.12E-04	--	0%	1.19E-06	1
Carbon Tetrachloride	3.67E-05	--	0%	2.05E-07	1
Chlorobenzene	3.04E-05	--	0%	1.70E-07	1
Chloroform	2.85E-05	--	0%	1.59E-07	1
Chrysene	6.93E-07	--	0%	3.87E-09	1
Ethylbenzene	3.97E-05	--	0%	2.22E-07	1
Ethylene Dibromide	4.43E-05	--	0%	2.48E-07	1
Fluoranthene	1.11E-06	--	0%	6.21E-09	1
Fluorene	5.67E-06	--	0%	3.17E-08	1
Formaldehyde	--	0.200	NA	2.67	1
Methanol	2.50E-03	--	0%	1.40E-05	1
Methylene Chloride	2.00E-05	--	0%	1.12E-07	1
n-Hexane	1.11E-03	--	0%	6.21E-06	1
Naphthalene	7.44E-05	--	0%	4.16E-07	1
PAH	2.69E-05	--	0%	1.50E-07	1
Phenanthrene	1.04E-05	--	0%	5.81E-08	1
Phenol	2.40E-05	--	0%	1.34E-07	1
Pyrene	1.36E-06	--	0%	4.44E-08	1
Styrene	2.36E-05	--	0%	7.71E-07	1
Tetrachloroethane	2.48E-06	--	0%	8.10E-08	1
Toluene	4.08E-04	--	0%	1.33E-05	1
Vinyl Chloride	1.49E-05	--	0%	4.87E-07	1
Xylene (mixed isomers)	1.84E-04	--	0%	6.01E-06	1
Total				**2.67**	

1) Emission factor based on EPA's AP-42 Section 3.2, Table 3.2-2 (07/00) [4-Stroke Lean-Burn Engines].

Edgewater Compressor Station
Compressor Blowdown Emissions

Emission Units	Designation	Compressor Volume	Compressor Pressure	Number of Events	Gas VOC Weight %	Gas MW	Average Gas Temperature	Estimated MCF per event	Estimated SCF per event	Estimated SCF per year	Potential VOC Emissions		
		(ft^3)	(psig)	(#/ per Year)	(%)	(lb/lb-mol)	(°F)				lb/scf	lb/year	(tpy)
4	Compressor	197	100	70	39.72	26.79	60	1.6	1600	448000	0.028	12563	6.28
1	Compressor	197	1,250	24	39.72	26.79	60	35.8	35800	859200	0.028	24093	12.05
												Total Losses	**18.33**

Emission Units	Designation	Compressor Volume	Compressor Pressure	Number of Events	Gas HAPs Weight %	Gas MW	Average Gas Temperature	Estimated MCF per event	Estimated SCF per event	Estimated SCF per year	Potential HAPs Emissions		
		(ft^3)	(psig)	(#/ per Year)	(%)	(lb/lb-mol)	(°F)				lb/scf	lb/year	(tpy)
4	Compressor	197	100	70	1.18	26.79	60	1.6	1600	448000	0.00083	372	0.19
1	Compressor	197	1,250	24	1.18	26.79	60	35.8	35800	859200	0.00083	713	0.36
												Total Losses	**0.54**

Notes:
1. To be conservative, a 20% buffer is added to the total number of controlled blowdown events at 100 psig
2. Assumes the majority of blowdowns are using the recycle process of reducing the pressure to 100 psig
3. Assumes 24 blowdowns/year released to atmosphere at 1250 psig
4. To be conservative, number of blowdowns at 100 psig assumed to be same as noted in 2021 PTE update

Calculation:
VOC weight percentage is from Edgewater Inlet Gas Analysis 10/28/2022.

Molecular Weight of Gas = 26.79 approx
VOC Weight Percent = 39.72% approx
Molecular Weight of Gas = 26.79
HAPs Weight Percent = 1.1756%

Universal Gas Content = 379.5 ft^3/lb-mol @ 60 F and 14.696 psia
Specific Gravity = 0.92517
Calculation:
Pound " X"/ scf = Wt Fraction (wt%) * MW of Gas * 1 lb mol/379.5 scf

lbs NM/E VOC/scf = 0.028
lb HAPs/scf = 0.00083

Estimated MCF per event from using Blowdown Volumes Compressibility Spreadsheet
Emissions (tpy) = (Estimated scf/event * number of events per year * lb/scf)/2000 (lb/ton

Edgewater Compressor Station
Tank Truck Loading Emissions

Parameter		
Product	Produced Water	
Saturation Factor, S [1]	0.6	
Vapor MW [2]	62.00	lb/lb-mol
Maximum Vapor Pressure	10.06	psia
Average Vapor Pressure	7.93	psia
Max Temperature	78.28	°F
Average Temperature	64.9	°F
Short-Term Loading Loss Factor [4, 5]	8.67	lb/1000 gal
Annual Loading Loss Factor [4, 5]	7.01	lb/1000 gal
Hourly Throughput	7,560	gal/hr
Annual Throughput	1,260,000	gal/yr
Water Content Reduction (%) [7]	90%	

Fugitive Losses		
Hourly Losses	65.52	lb/hr
Annual Losses	4.41	tpy
Hourly Losses (minus water)	6.55	lb/hr
Annual Losses (minus water)	0.44	tpy

Notes:
1. Saturation factor is from EPA's AP-42, 5th Edition, Section 5.2, Table 5.2-1; for submerged loading; dedicated normal service.
2. Molecular weight of vapors was taken from Tanks 4.09d.
3. Vapor pressure was determined using AP-42, Figure 7.1-13b.
4. Losses are based on the loading losses equation from EPA's AP-42, Section 2, 5th Edition, June, 2008, Equation 1:

$$L = \frac{12.46 * S * P * M}{T}$$

where:

L = Loading Losses, lb/1000 gallons
S = Saturation Factor, see Table 5.2-1 in AP-42, Section 5.2.
P = True vapor pressure, psia
M = Molecular weight of vapors, lb/lb-mol
T = Temperature of bulk liquid loaded, R (F + 460)

5. Short-term loading loss factor is calculated based on the worst-case (highest) temperature and vapor pressure.
6. Annual loading loss factor is calculated based on the average temperature and vapor pressure.
7. The volume of liquids loaded are estimated to be 90% water; therefore, overall fugitive losses from loading are assumed to be 10% of the total emissions.

Edgewater Compressor Station
NGL Truck Loading Emissions
NGL Truck Loading Calculation Method Utilized with ND Audits

Emissions Data:

Emission Unit (EU):	NA
Expected Max NGL Daily Volume =	40,000 gal/day
Expected Max NGL Annual Volume =	14,600,000 gal/yr
Average Tank Truck Capacity =	9,000 gal

Loading Arm Diameter	Soft Hose Length	Loading Arm Pipe Length	Loading Arm Overpressure	Depressurized Volume
(in)	(ft)	(ft)	(psig)	(ft^3/truck)
4	6	10	1	0.62

Product Transferred	Vapor Molecular Weight	Vapor Pressure at 60ºF	Unloading Emissions	VOC Content	Loading VOC Emissions	Loading VOC Emissions
	(lb/lb-mole)	(psia)	(lb/truck)	wt. %	(lb/truck)	(tpy)
Y-Grade	56	164	1.01	100%	1.01	0.82

Notes:
1. The calculation of depressurized volume assumes that any residual vapors in the loading arm at 1 psig and all vapors from the soft loading hose depressurize to atmospheric pressure.

Number of Trucks (#/yr) = Expected Max NGL Volume (gal/yr) /Avg Tank Truck capacity (gal)
Number of Trucks (#/yr) = 1,623 per year

Emissions (lb/truck) = Depr. Vol (ft^3/truck)/St. Pressure (psia) * TVP (psia) / Gas Constant (scf/lb-mole) * MW (lb/lbmole)
Emissions (lb/truck) = 1.01 lb/truck
Emissions (tpy) = Number of Trucks x Emissions (lb/truck) / 2000 lb/ton
Emissions (tpy) = 0.82 tpy

Edgewater Compressor Station
Gas Analysis

Sample name	Gas Taken Before Dehydrator
Sample location	Edgewater Compressor Station
Sample temperature and pressure	105 °F, 1200 psig
Date of sample	10/28/2022

Component	**MW (g/mol)**	**Mole %**	**Gas Weight (lb/lbmol)**	**Weight %**
CO2	44.010	0.9390	0.413	1.5425
Nitrogen	28.013	3.0350	0.850	3.1735
methane (C1)	16.042	57.1670	9.171	34.2319
ethane (C2)	30.069	19.0050	5.715	21.3305
propane (C3)	44.096	10.9740	4.839	18.0624
iso-butane (C4)	58.122	1.2420	0.722	2.6945
nor-butane (C4)	58.122	4.3870	2.550	9.5175
iso-pentane (C5)	72.149	0.8440	0.609	2.2729
n-pentane	72.149	1.3090	0.944	3.5252
Cyclopentane	72.149	0.0280	0.020	0.0754
2,2,4 Trimethyl pentane	72.149	0.0080	0.006	0.0215
n-Hexane	86.180	0.3140	0.271	1.0101
Cyclohexane	86.180	0.0720	0.062	0.2316
Other Hexanes	86.180	0.3910	0.337	1.2578
Methylcyclohexane	86.180	0.0280	0.024	0.0901
heptane (C7+)	100.200	0.1790	0.179	0.6695
octane (C8+)	114.230	0.0290	0.033	0.1236
nonane (C9+)	128.260	0.0020	0.003	0.0096
decane (C10+)	142.290	0.0030	0.004	0.0159
benzene	78.110	0.0230	0.018	0.0671
toluene	92.140	0.0120	0.011	0.0413
Ethylbenzene	106.170	0.0020	0.002	0.0079
xylenes (M, P, O)	106.170	0.0070	0.007	0.0277
H2S	34.082	0.0000	0.000	0.0000
Total		100.0000	26.7908	100.0000
Vapor MW (lb/lb-mol)		**26.791**		
VOC Weight (%)		**39.7216**		
HAPs Weight (%)		**1.1756**		

Specific Gravity = 0.92517

APPENDIX C: GRI-GLYCalc Reports

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Edgewater CS Revision December 2022
File Name: Z:\Edgewater\Permits\Edgewater 2022 Permit Revision to Add One Unit\Dehy\Edgewater Rev 2022.ddf
Date: December 07, 2022

DESCRIPTION:

Description: Edgewater CS Revision December 2022

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 100.00 deg. F
Pressure: 1100.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.9390
Nitrogen	3.0350
Methane	57.1670
Ethane	19.0050
Propane	10.9740
Isobutane	1.2420
n-Butane	4.3870
Isopentane	0.8440
n-Pentane	1.3090
Cyclopentane	0.0280
n-Hexane	0.3140
Cyclohexane	0.0720
Other Hexanes	0.3910
Heptanes	0.1790
Methylcyclohexane	0.0280
2,2,4-Trimethylpentane	0.0080
Benzene	0.0230
Toluene	0.0120
Ethylbenzene	0.0020
Xylenes	0.0070
C8+ Heavies	0.0300

DRY GAS:

Flow Rate: 27.0 MMSCF/day
Water Content: 4.0 lbs. H2O/MMSCF

LEAN GLYCOL:

Glycol Type: TEG
Water Content: 1.5 wt% H2O
Flow Rate: 3.5 gpm

PUMP:

Glycol Pump Type: Gas Injection
Gas Injection Pump Volume Ratio: 0.080 acfm gas/gpm glycol

FLASH TANK:

Flash Control: Recycle/recompression
Temperature: 150.0 deg. F
Pressure: 55.0 psig

REGENERATOR OVERHEADS CONTROL DEVICE:

Control Device: Condenser
Temperature: 100.0 deg. F
Pressure: 14.7 psia

Control Device: Combustion Device
Destruction Efficiency: 95.0 %
Excess Oxygen: 5.0 %
Ambient Air Temperature: 100.0 deg. F

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Edgewater CS Revision December 2022
File Name: Z:\Edgewater\Permits\Edgewater 2022 Permit Revision to Add One Unit\Dehy\Edgewater Rev 2022.ddf
Date: December 07, 2022

DESCRIPTION:

Description: Edgewater CS Revision December 2022

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0133	0.319	0.0582
Ethane	0.0290	0.695	0.1269
Propane	0.0514	1.234	0.2251
Isobutane	0.0105	0.252	0.0460
n-Butane	0.0477	1.144	0.2088
Isopentane	0.0100	0.240	0.0438
n-Pentane	0.0183	0.440	0.0802
Cyclopentane	0.0020	0.047	0.0087
n-Hexane	0.0060	0.143	0.0261
Cyclohexane	0.0064	0.154	0.0281
Other Hexanes	0.0068	0.162	0.0296
Heptanes	0.0035	0.084	0.0154
Methylcyclohexane	0.0018	0.043	0.0078
2,2,4-Trimethylpentane	0.0001	0.002	0.0004
Benzene	0.0256	0.615	0.1123
Toluene	0.0073	0.175	0.0320
Ethylbenzene	0.0006	0.014	0.0025
Xylenes	0.0021	0.051	0.0093
C8+ Heavies	<0.0001	<0.001	<0.0001
Total Emissions	0.2423	5.815	1.0612
Total Hydrocarbon Emissions	0.2423	5.815	1.0612
Total VOC Emissions	0.2000	4.801	0.8762
Total HAP Emissions	0.0417	1.000	0.1825
Total BTEX Emissions	0.0356	0.855	0.1560

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.2663	6.392	1.1666
Ethane	0.5841	14.019	2.5585
Propane	1.0696	25.670	4.6847
Isobutane	0.2280	5.473	0.9988
n-Butane	1.0749	25.798	4.7081
Isopentane	0.2641	6.338	1.1567
n-Pentane	0.5202	12.486	2.2786
Cyclopentane	0.0631	1.515	0.2765
n-Hexane	0.2511	6.026	1.0997

Cyclohexane	0.3308	7.940	1.4491
Other Hexanes	0.2343	5.624	1.0264
Heptanes	0.3190	7.657	1.3973
Methylcyclohexane	0.1555	3.731	0.6809
2,2,4-Trimethylpentane	0.0074	0.176	0.0322
Benzene	1.4944	35.866	6.5455
Toluene	1.0317	24.760	4.5187
Ethylbenzene	0.2113	5.072	0.9257
Xylenes	1.0367	24.882	4.5409
C8+ Heavies	0.2630	6.313	1.1522
Total Emissions	9.4057	225.737	41.1970
Total Hydrocarbon Emissions	9.4057	225.737	41.1970
Total VOC Emissions	8.5552	205.326	37.4720
Total HAP Emissions	4.0326	96.782	17.6627
Total BTEX Emissions	3.7742	90.580	16.5308

FLASH GAS EMISSIONS

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	52.0628	1249.507	228.0350
Ethane	35.6142	854.742	155.9904
Propane	30.5689	733.653	133.8916
Isobutane	4.5719	109.725	20.0248
n-Butane	16.8271	403.851	73.7028
Isopentane	3.7901	90.962	16.6005
n-Pentane	6.0900	146.160	26.6742
Cyclopentane	0.1940	4.656	0.8496
n-Hexane	1.7298	41.514	7.5763
Cyclohexane	0.6026	14.462	2.6393
Other Hexanes	2.0998	50.395	9.1971
Heptanes	1.1462	27.508	5.0202
Methylcyclohexane	0.2288	5.490	1.0020
2,2,4-Trimethylpentane	0.0510	1.223	0.2232
Benzene	0.4041	9.698	1.7699
Toluene	0.1908	4.579	0.8357
Ethylbenzene	0.0238	0.571	0.1042
Xylenes	0.0814	1.954	0.3567
C8+ Heavies	0.1375	3.300	0.6023
Total Emissions	156.4145	3753.949	685.0957
Total Hydrocarbon Emissions	156.4145	3753.949	685.0957
Total VOC Emissions	68.7375	1649.701	301.0704
Total HAP Emissions	2.4808	59.539	10.8659
Total BTEX Emissions	0.7001	16.802	3.0664

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature:	100.00	deg. F
Condenser Pressure:	14.70	psia
Condenser Duty:	1.95e-002	MM BTU/hr
Hydrocarbon Recovery:	0.36	bbls/day
Produced Water:	3.91	bbls/day
Ambient Temperature:	100.00	deg. F
Excess Oxygen:	5.00	%
Combustion Efficiency:	95.00	%
Supplemental Fuel Requirement:	1.95e-002	MM BTU/hr

Component	Emitted	Destroyed
Methane	4.99%	95.01%
Ethane	4.96%	95.04%
Propane	4.81%	95.19%
Isobutane	4.61%	95.39%
n-Butane	4.44%	95.56%
Isopentane	3.79%	96.21%
n-Pentane	3.52%	96.48%
Cyclopentane	3.13%	96.87%
n-Hexane	2.37%	97.63%
Cyclohexane	1.94%	98.06%
Other Hexanes	2.88%	97.12%
Heptanes	1.10%	98.90%
Methylcyclohexane	1.15%	98.85%
2,2,4-Trimethylpentane	1.21%	98.79%
Benzene	1.72%	98.28%
Toluene	0.71%	99.29%
Ethylbenzene	0.27%	99.73%
Xylenes	0.20%	99.80%
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:	3.56	lbs. H2O/MMSCF
Temperature:	100.0	deg. F
Pressure:	1100.0	psig
Dry Gas Flow Rate:	27.0000	MMSCF/day
Glycol Losses with Dry Gas:	4.4362	lb/hr
Wet Gas Water Content:	Saturated	
Calculated Wet Gas Water Content:	54.73	lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	3.65	gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	6.49%	93.51%
Carbon Dioxide	99.80%	0.20%
Nitrogen	99.98%	0.02%
Methane	99.98%	0.02%
Ethane	99.96%	0.04%

Propane	99.95%	0.05%
Isobutane	99.95%	0.05%
n-Butane	99.94%	0.06%
Isopentane	99.95%	0.05%
n-Pentane	99.94%	0.06%
Cyclopentane	99.73%	0.27%
n-Hexane	99.93%	0.07%
Cyclohexane	99.66%	0.34%
Other Hexanes	99.94%	0.06%
Heptanes	99.90%	0.10%
Methylcyclohexane	99.70%	0.30%
2,2,4-Trimethylpentane	99.96%	0.04%
Benzene	96.61%	3.39%
Toluene	96.45%	3.55%
Ethylbenzene	96.44%	3.56%
Xylenes	95.10%	4.90%
C8+ Heavies	99.91%	0.09%

FLASH TANK

Flash Control: Recycle/recompression
Flash Temperature: 150.0 deg. F
Flash Pressure: 55.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.29%	0.71%
Carbon Dioxide	4.96%	95.04%
Nitrogen	0.49%	99.51%
Methane	0.51%	99.49%
Ethane	1.61%	98.39%
Propane	3.38%	96.62%
Isobutane	4.75%	95.25%
n-Butane	6.00%	94.00%
Isopentane	6.62%	93.38%
n-Pentane	7.99%	92.01%
Cyclopentane	24.78%	75.22%
n-Hexane	12.80%	87.20%
Cyclohexane	36.83%	63.17%
Other Hexanes	10.27%	89.73%
Heptanes	21.92%	78.08%
Methylcyclohexane	41.98%	58.02%
2,2,4-Trimethylpentane	12.86%	87.14%
Benzene	79.73%	20.27%
Toluene	85.57%	14.43%
Ethylbenzene	90.89%	9.11%
Xylenes	93.63%	6.37%
C8+ Heavies	67.19%	32.81%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead

Water	34.09%	65.91%
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	1.68%	98.32%
n-Pentane	1.63%	98.37%
Cyclopentane	1.22%	98.78%
n-Hexane	1.15%	98.85%
Cyclohexane	5.83%	94.17%
Other Hexanes	2.47%	97.53%
Heptanes	0.84%	99.16%
Methylcyclohexane	6.09%	93.91%
2,2,4-Trimethylpentane	2.22%	97.78%
Benzene	5.98%	94.02%
Toluene	8.84%	91.16%
Ethylbenzene	10.98%	89.02%
Xylenes	13.43%	86.57%
C8+ Heavies	6.59%	93.41%

STREAM REPORTS:

WET GAS STREAM

Temperature: 100.00 deg. F
Pressure: 1114.70 psia
Flow Rate: 1.13e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.15e-001	6.17e+001
Carbon Dioxide	9.38e-001	1.23e+003
Nitrogen	3.03e+000	2.52e+003
Methane	5.71e+001	2.72e+004
Ethane	1.90e+001	1.69e+004
Propane	1.10e+001	1.44e+004
Isobutane	1.24e+000	2.14e+003
n-Butane	4.38e+000	7.56e+003
Isopentane	8.43e-001	1.81e+003
n-Pentane	1.31e+000	2.80e+003
Cyclopentane	2.80e-002	5.82e+001
n-Hexane	3.14e-001	8.03e+002
Cyclohexane	7.19e-002	1.80e+002
Other Hexanes	3.91e-001	9.99e+002
Heptanes	1.79e-001	5.32e+002
Methylcyclohexane	2.80e-002	8.15e+001
2,2,4-Trimethylpentane	7.99e-003	2.71e+001
Benzene	2.30e-002	5.33e+001
Toluene	1.20e-002	3.28e+001
Ethylbenzene	2.00e-003	6.30e+000
Xylenes	6.99e-003	2.20e+001
C8+ Heavies	3.00e-002	1.52e+002

Total Components	100.00	7.96e+004

DRY GAS STREAM

Temperature: 100.00 deg. F
Pressure: 1114.70 psia
Flow Rate: 1.13e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.50e-003	4.00e+000
Carbon Dioxide	9.37e-001	1.22e+003
Nitrogen	3.04e+000	2.52e+003
Methane	5.72e+001	2.72e+004
Ethane	1.90e+001	1.69e+004
Propane	1.10e+001	1.43e+004
Isobutane	1.24e+000	2.14e+003
n-Butane	4.39e+000	7.56e+003
Isopentane	8.44e-001	1.81e+003
n-Pentane	1.31e+000	2.80e+003
Cyclopentane	2.79e-002	5.81e+001
n-Hexane	3.14e-001	8.02e+002
Cyclohexane	7.18e-002	1.79e+002
Other Hexanes	3.91e-001	9.99e+002
Heptanes	1.79e-001	5.31e+002
Methylcyclohexane	2.79e-002	8.13e+001
2,2,4-Trimethylpentane	8.00e-003	2.71e+001
Benzene	2.22e-002	5.15e+001
Toluene	1.16e-002	3.16e+001
Ethylbenzene	1.93e-003	6.07e+000
Xylenes	6.66e-003	2.10e+001
C8+ Heavies	3.00e-002	1.51e+002
Total Components	100.00	7.95e+004

LEAN GLYCOL STREAM

Temperature: 100.00 deg. F
Flow Rate: 3.50e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	1.94e+003
Water	1.50e+000	2.96e+001
Carbon Dioxide	1.24e-011	2.45e-010
Nitrogen	3.05e-012	6.00e-011
Methane	8.23e-018	1.62e-016
Ethane	1.58e-007	3.11e-006
Propane	1.36e-008	2.67e-007
Isobutane	1.61e-009	3.18e-008
n-Butane	5.91e-009	1.16e-007
Isopentane	2.29e-004	4.52e-003
n-Pentane	4.38e-004	8.63e-003
Cyclopentane	3.96e-005	7.81e-004
n-Hexane	1.48e-004	2.91e-003
Cyclohexane	1.04e-003	2.05e-002
Other Hexanes	3.02e-004	5.95e-003

Heptanes	1.37e-004	2.69e-003
Methylcyclohexane	5.12e-004	1.01e-002
2,2,4-Trimethylpentane	8.48e-006	1.67e-004
Benzene	4.83e-003	9.51e-002
Toluene	5.08e-003	1.00e-001
Ethylbenzene	1.32e-003	2.61e-002
Xylenes	8.16e-003	1.61e-001
C8+ Heavies	9.41e-004	1.85e-002
Total Components	100.00	1.97e+003

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 100.00 deg. F
Pressure: 1114.70 psia
Flow Rate: 4.00e+000 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	8.81e+001	1.94e+003
Water	3.96e+000	8.73e+001
Carbon Dioxide	2.08e-001	4.59e+000
Nitrogen	2.27e-001	5.00e+000
Methane	2.38e+000	5.23e+001
Ethane	1.64e+000	3.62e+001
Propane	1.44e+000	3.16e+001
Isobutane	2.18e-001	4.80e+000
n-Butane	8.13e-001	1.79e+001
Isopentane	1.84e-001	4.06e+000
n-Pentane	3.01e-001	6.62e+000
Cyclopentane	1.17e-002	2.58e-001
n-Hexane	9.01e-002	1.98e+000
Cyclohexane	4.33e-002	9.54e-001
Other Hexanes	1.06e-001	2.34e+000
Heptanes	6.66e-002	1.47e+000
Methylcyclohexane	1.79e-002	3.94e-001
2,2,4-Trimethylpentane	2.66e-003	5.85e-002
Benzene	9.05e-002	1.99e+000
Toluene	6.00e-002	1.32e+000
Ethylbenzene	1.19e-002	2.61e-001
Xylenes	5.81e-002	1.28e+000
C8+ Heavies	1.90e-002	4.19e-001
Total Components	100.00	2.20e+003

FLASH TANK OFF GAS STREAM

Temperature: 150.00 deg. F
Pressure: 69.70 psia
Flow Rate: 2.28e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	5.72e-001	6.20e-001
Carbon Dioxide	1.65e+000	4.36e+000
Nitrogen	2.95e+000	4.98e+000
Methane	5.39e+001	5.21e+001

Ethane	1.97e+001	3.56e+001
Propane	1.15e+001	3.06e+001
Isobutane	1.31e+000	4.57e+000
n-Butane	4.81e+000	1.68e+001
Isopentane	8.73e-001	3.79e+000
n-Pentane	1.40e+000	6.09e+000
Cyclopentane	4.60e-002	1.94e-001
n-Hexane	3.34e-001	1.73e+000
Cyclohexane	1.19e-001	6.03e-001
Other Hexanes	4.05e-001	2.10e+000
Heptanes	1.90e-001	1.15e+000
Methylcyclohexane	3.87e-002	2.29e-001
2,2,4-Trimethylpentane	7.41e-003	5.10e-002
Benzene	8.60e-002	4.04e-001
Toluene	3.44e-002	1.91e-001
Ethylbenzene	3.72e-003	2.38e-002
Xylenes	1.27e-002	8.14e-002
C8+ Heavies	1.34e-002	1.38e-001
Total Components	100.00	1.66e+002

FLASH TANK GLYCOL STREAM

Temperature: 150.00 deg. F
Flow Rate: 3.63e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.52e+001	1.94e+003
Water	4.26e+000	8.67e+001
Carbon Dioxide	1.12e-002	2.27e-001
Nitrogen	1.20e-003	2.45e-002
Methane	1.31e-002	2.66e-001
Ethane	2.87e-002	5.84e-001
Propane	5.25e-002	1.07e+000
Isobutane	1.12e-002	2.28e-001
n-Butane	5.28e-002	1.07e+000
Isopentane	1.32e-002	2.69e-001
n-Pentane	2.60e-002	5.29e-001
Cyclopentane	3.14e-003	6.39e-002
n-Hexane	1.25e-002	2.54e-001
Cyclohexane	1.73e-002	3.51e-001
Other Hexanes	1.18e-002	2.40e-001
Heptanes	1.58e-002	3.22e-001
Methylcyclohexane	8.13e-003	1.66e-001
2,2,4-Trimethylpentane	3.69e-004	7.52e-003
Benzene	7.81e-002	1.59e+000
Toluene	5.56e-002	1.13e+000
Ethylbenzene	1.17e-002	2.37e-001
Xylenes	5.88e-002	1.20e+000
C8+ Heavies	1.38e-002	2.82e-001
Total Components	100.00	2.04e+003

FLASH GAS EMISSIONS

Control Method: Recycle/recompression

Control Efficiency: 100.00

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.26e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.52e+001	5.71e+001
Carbon Dioxide	1.55e-001	2.27e-001
Nitrogen	2.62e-002	2.45e-002
Methane	4.98e-001	2.66e-001
Ethane	5.83e-001	5.84e-001
Propane	7.28e-001	1.07e+000
Isobutane	1.18e-001	2.28e-001
n-Butane	5.55e-001	1.07e+000
Isopentane	1.10e-001	2.64e-001
n-Pentane	2.16e-001	5.20e-001
Cyclopentane	2.70e-002	6.31e-002
n-Hexane	8.75e-002	2.51e-001
Cyclohexane	1.18e-001	3.31e-001
Other Hexanes	8.16e-002	2.34e-001
Heptanes	9.56e-002	3.19e-001
Methylcyclohexane	4.75e-002	1.55e-001
2,2,4-Trimethylpentane	1.93e-003	7.35e-003
Benzene	5.74e-001	1.49e+000
Toluene	3.36e-001	1.03e+000
Ethylbenzene	5.98e-002	2.11e-001
Xylenes	2.93e-001	1.04e+000
C8+ Heavies	4.64e-002	2.63e-001
Total Components	100.00	6.68e+001

CONDENSER PRODUCED WATER STREAM

Temperature: 100.00 deg. F
Flow Rate: 1.14e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	9.99e+001	5.70e+001	999215.
Carbon Dioxide	4.84e-003	2.76e-003	48.
Nitrogen	1.20e-005	6.86e-006	0.
Methane	2.65e-004	1.51e-004	3.
Ethane	6.93e-004	3.96e-004	7.
Propane	1.07e-003	6.10e-004	11.
Isobutane	1.22e-004	6.95e-005	1.
n-Butane	7.52e-004	4.29e-004	8.
Isopentane	1.14e-004	6.52e-005	1.
n-Pentane	2.28e-004	1.30e-004	2.
Cyclopentane	1.86e-004	1.06e-004	2.
n-Hexane	6.40e-005	3.65e-005	1.
Cyclohexane	4.17e-004	2.38e-004	4.

Other Hexanes	5.75e-005	3.28e-005	1.
Heptanes	2.14e-005	1.22e-005	0.
Methylcyclohexane	5.63e-005	3.21e-005	1.
2,2,4-Trimethylpentane	3.58e-007	2.04e-007	0.
Benzene	5.22e-002	2.98e-002	522.
Toluene	1.26e-002	7.21e-003	126.
Ethylbenzene	7.63e-004	4.35e-004	8.
Xylenes	4.05e-003	2.31e-003	41.
C8+ Heavies	3.84e-008	2.19e-008	0.
Total Components	100.00	5.70e+001	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 100.00 deg. F
Flow Rate: 1.06e-002 gpm

Component	Conc. (wt%)	Loading (lb/hr)
Water	4.20e-002	1.90e-003
Carbon Dioxide	2.03e-002	9.19e-004
Nitrogen	1.04e-003	4.70e-005
Methane	8.05e-003	3.64e-004
Ethane	9.79e-002	4.42e-003
Propane	9.05e-001	4.09e-002
Isobutane	3.96e-001	1.79e-002
n-Butane	2.68e+000	1.21e-001
Isopentane	1.41e+000	6.40e-002
n-Pentane	3.40e+000	1.54e-001
Cyclopentane	5.19e-001	2.35e-002
n-Hexane	2.92e+000	1.32e-001
Cyclohexane	4.47e+000	2.02e-001
Other Hexanes	2.20e+000	9.93e-002
Heptanes	5.50e+000	2.49e-001
Methylcyclohexane	2.65e+000	1.20e-001
2,2,4-Trimethylpentane	1.23e-001	5.57e-003
Benzene	2.11e+001	9.52e-001
Toluene	1.94e+001	8.78e-001
Ethylbenzene	4.41e+000	2.00e-001
Xylenes	2.19e+001	9.92e-001
C8+ Heavies	5.81e+000	2.63e-001
Total Components	100.00	4.52e+000

CONDENSER VENT STREAM

Temperature: 100.00 deg. F
Pressure: 14.70 psia
Flow Rate: 4.37e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	6.51e+000	1.35e-001
Carbon Dioxide	4.41e+000	2.24e-001
Nitrogen	7.56e-001	2.44e-002
Methane	1.44e+001	2.66e-001
Ethane	1.67e+001	5.79e-001

Propane	2.02e+001	1.03e+000
Isobutane	3.14e+000	2.10e-001
n-Butane	1.42e+001	9.54e-001
Isopentane	2.41e+000	2.00e-001
n-Pentane	4.41e+000	3.66e-001
Cyclopentane	4.89e-001	3.95e-002
n-Hexane	1.20e+000	1.19e-001
Cyclohexane	1.32e+000	1.29e-001
Other Hexanes	1.36e+000	1.35e-001
Heptanes	6.07e-001	7.02e-002
Methylcyclohexane	3.16e-001	3.57e-002
2,2,4-Trimethylpentane	1.35e-002	1.78e-003
Benzene	5.70e+000	5.13e-001
Toluene	1.37e+000	1.46e-001
Ethylbenzene	9.25e-002	1.13e-002
Xylenes	3.46e-001	4.24e-002
C8+ Heavies	1.15e-003	2.26e-004
Total Components	100.00	5.23e+000

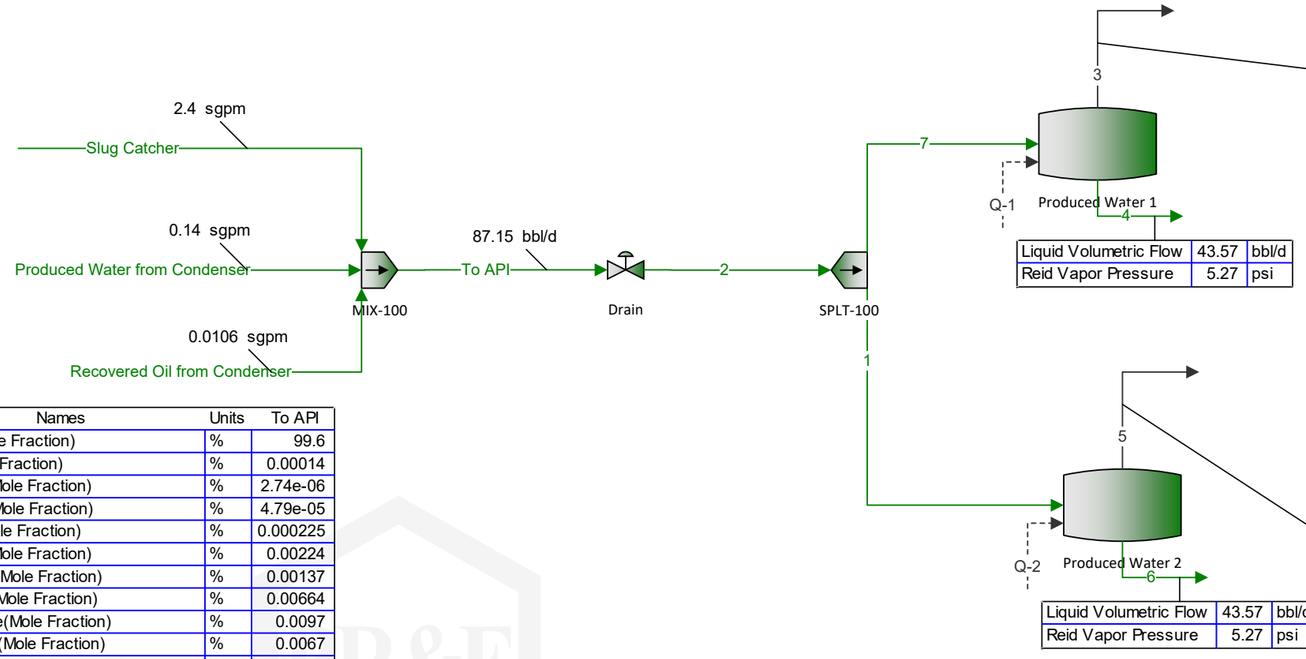
COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.93e+000 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	1.63e+001	1.33e-002
Ethane	1.89e+001	2.90e-002
Propane	2.29e+001	5.14e-002
Isobutane	3.55e+000	1.05e-002
n-Butane	1.61e+001	4.77e-002
Isopentane	2.72e+000	1.00e-002
n-Pentane	4.99e+000	1.83e-002
Cyclopentane	5.54e-001	1.98e-003
n-Hexane	1.36e+000	5.96e-003
Cyclohexane	1.50e+000	6.43e-003
Other Hexanes	1.54e+000	6.75e-003
Heptanes	6.88e-001	3.51e-003
Methylcyclohexane	3.58e-001	1.79e-003
2,2,4-Trimethylpentane	1.53e-002	8.91e-005
Benzene	6.45e+000	2.56e-002
Toluene	1.56e+000	7.30e-003
Ethylbenzene	1.05e-001	5.66e-004
Xylenes	3.92e-001	2.12e-003
C8+ Heavies	1.31e-003	1.13e-005
Total Components	100.00	2.42e-001

APPENDIX D: ProMax Report

Edgewater Compressor Station
Produced Water Tank Analysis



Liquid Volumetric Flow	43.57	bbl/d
Reid Vapor Pressure	5.27	psi

Liquid Volumetric Flow	43.57	bbl/d
Reid Vapor Pressure	5.27	psi

Names	Units	To API
Water(Mole Fraction)	%	99.6
CO2(Mole Fraction)	%	0.00014
Nitrogen(Mole Fraction)	%	2.74e-06
Methane(Mole Fraction)	%	4.79e-05
Ethane(Mole Fraction)	%	0.000225
Propane(Mole Fraction)	%	0.00224
Isobutane(Mole Fraction)	%	0.00137
n-Butane(Mole Fraction)	%	0.00664
Isopentane(Mole Fraction)	%	0.0097
n-Pentane(Mole Fraction)	%	0.0067
Cyclopentane(Mole Fraction)	%	0.000461
Hexane(Mole Fraction)	%	0.00557
Cyclohexane(Mole Fraction)	%	0.0033
Heptane(Mole Fraction)	%	0.0128
Octane(Mole Fraction)	%	0.0248
2,2,4-Trimethylpentane(Mole Fraction)	%	0.00101
Benzene(Mole Fraction)	%	0.0231
Toluene(Mole Fraction)	%	0.032
Ethylbenzene(Mole Fraction)	%	0.00189
m-Xylene(Mole Fraction)	%	0.00969
p-Xylene(Mole Fraction)	%	0.0238
o-Xylene(Mole Fraction)	%	0.0135
TEG(Mole Fraction)	%	0.153

Water(Mole Fraction)	%
Hydrogen Sulfide(Mole Fraction)	%
CO2(Mole Fraction)	%
Nitrogen(Mole Fraction)	%
Methane(Mole Fraction)	%
Ethane(Mole Fraction)	%
Propane(Mole Fraction)	%
Isobutane(Mole Fraction)	%
n-Butane(Mole Fraction)	%
Isopentane(Mole Fraction)	%
n-Pentane(Mole Fraction)	%
Cyclopentane(Mole Fraction)	%
Hexane(Mole Fraction)	%
Cyclohexane(Mole Fraction)	%
Heptane(Mole Fraction)	%
Octane(Mole Fraction)	%
2,2,4-Trimethylpentane(Mole Fraction)	%
Benzene(Mole Fraction)	%
Toluene(Mole Fraction)	%
Ethylbenzene(Mole Fraction)	%
m-Xylene(Mole Fraction)	%
p-Xylene(Mole Fraction)	%
o-Xylene(Mole Fraction)	%
TEG(Mole Fraction)	%

Water(Mole Fraction)	%
Hydrogen Sulfide(Mole Fraction)	%
CO2(Mole Fraction)	%
Nitrogen(Mole Fraction)	%
Methane(Mole Fraction)	%
Ethane(Mole Fraction)	%
Propane(Mole Fraction)	%
Isobutane(Mole Fraction)	%
n-Butane(Mole Fraction)	%
Isopentane(Mole Fraction)	%
n-Pentane(Mole Fraction)	%
Cyclopentane(Mole Fraction)	%
Hexane(Mole Fraction)	%
Cyclohexane(Mole Fraction)	%
Heptane(Mole Fraction)	%
Octane(Mole Fraction)	%
2,2,4-Trimethylpentane(Mole Fraction)	%
Benzene(Mole Fraction)	%
Toluene(Mole Fraction)	%
Ethylbenzene(Mole Fraction)	%
m-Xylene(Mole Fraction)	%
p-Xylene(Mole Fraction)	%
o-Xylene(Mole Fraction)	%
TEG(Mole Fraction)	%

Edgewater Produced Water Tank

Annual tank loss calculations for "To API".
Total working and breathing losses from the Vertical Cylinder are 2.615 ton/yr.
Flashing losses are 0 ton/yr.
* Only Non-Exempt VOCs are reported.
Vapor adjusted to ensure mass balance

Edgewater Produced Water Tank

Process Stream	To API[Flowsheet1]	
Tank Geometry	Vertical Cylinder	
Shell Length	12	ft
Shell Diameter	20	ft
Number of Storage Tanks Employed	2	
Location	Williston, North Dakota	
Time Frame	Year	
Report Components	Non-exempt VOC	
Set Bulk Temperature to Stream Temperature?	FALSE	
Use AP42 Raoult's Vapor Pressure?	FALSE	
Maximum Fraction Fill of Tank	90	%
Average Fraction Fill of Tank	50	%
Material Category	Light Organics	
Tank Color	Tan	
Shell Paint Condition	Good	
Operating Pressure	0.25	psig
Breather Vent Pressure	0.25	psig
Breather Vacuum Pressure	-0.025	psig
Roof Type	Cone	
Slope of Coned Roof	0.0625	
Roof Color	Tan	
Roof Paint Condition	Good	
Flashing Temperature	54.57	°F
Calculate Loading Losses?	FALSE	
Output Flashing Losses?	TRUE	
Output Working/Breathing Losses?	TRUE	

Edgewater Produced Water Tank

Atmospheric Pressure	13.82	psia
True Vapor Pressure at Average Temperature	2.67	psia
Average Liquid Surface Temperature	46.45	°F
Maximum Liquid Surface Temperature	54.57	°F
Bulk Liquid Temperature	43.01	°F
Annual Tank Turnover Rate	27.58	
Flashing Losses	0.00	ton/yr
Total W/B Losses	2.62	ton/yr
Working Losses per Tank	0.89	ton/yr
Standing Losses per Tank	0.42	ton/yr
Withdrawal Loss per Tank	0.00	ton/yr

Edgewater Produced Water Tank

ProMax AP-42 Emissions Report
Annual Emissions
Vertical Cylinder

Components	Working Losses (ton/yr)	Breathing Losses (ton/yr)	Total Losses (ton/yr)
Mixture	1.772	0.8438	2.615
Propane	0.2113	0.1006	0.3119
Isobutane	0.17	0.08098	0.251
n-Butane	0.5465	0.2603	0.8067
Methanol	1.23E-05	5.88E-06	1.82E-05
Isopentane	0.3228	0.1537	0.4765
n-Pentane	0.1657	0.07892	0.2446
Cyclopentane	0.005923	0.002821	0.008745
Cyclohexane	0.01536	0.007316	0.02268
Heptane	0.03163	0.01507	0.0467
Methylcyclohexane	0.003985	0.001898	0.005882
Octane	0.01785	0.008503	0.02636
Nonane	0.001335	0.0006356	0.00197
Decane	0.005615	0.002675	0.00829
2-Methylpentane	0.03193	0.01521	0.04714
3-Methylpentane	0.009264	0.004412	0.01368
Hexane	0.04086	0.01946	0.06031
2,2,4-Trimethylpentane	0.003151	0.001501	0.004652
Benzene	0.1158	0.05516	0.171
Toluene	0.05135	0.02446	0.0758
Ethylbenzene	0.0008968	0.0004271	0.001324
m-Xylene	0.004235	0.002017	0.006253
p-Xylene	0.01092	0.005203	0.01613
o-Xylene	0.005224	0.002488	0.007712
TEG	6.13E-10	2.92E-10	9.05E-10

Edgewater Produced Water Tank

Vapor adjusted to ensure mass balance

APPENDIX E: Representative Gas/Liquid Analysis

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EXTENDED HYDROCARBON GAS (GLYCALC) STUDY

CERTIFICATE OF ANALYSIS

Company ..... **KINDER MORGAN, INC.**
Lab Number CR-22987
Date Sampled 10-19-2022
Time Sampled ..... 2:40 PM
Method of Analysis ..... Dual TCD-FID Chromatography

Study Number CR-6
Date Tested 10-28-2022
Time Tested ..... 12:05 PM
Ambient Temp at Sampling ..... 67 F

Sample Identification ..... **GAS TAKEN BEFORE DEHYDRATOR**
EDGEWATER COMPRESSOR STATION

Sample Location ..... ALEXANDER, NORTH DAKOTA.
Type Sample ..... Spot
Effective Date ..... N/A
Sample Pressure ..... 1,200 PSIG
Cylinder ID ..... AMR 410
Instrument Used ..... Shimadzu GC-2014
Sample Method ..... Trap & Purge
Test Method GPA-2286

County ..... N/A
Composite From ..... N/A
Sample Temperature ..... 105 F
Cylinder Heated To ..... 130 F
Calibration Date 10-28-2022
Un-Normalized Total ..... 98.017 %
Sampled By ..... KMI - K. Knutson

Components	Mole %	Weight %	Liq. Vol. %
Carbon Dioxide	0.939	1.542	0.752
Hydrogen Sulfide	0.000	0.000	0.000
Nitrogen	3.035	3.173	1.566
Methane	57.167	34.226	45.467
Ethane	19.005	21.327	23.845
Propane	10.974	18.059	14.184
iso-Butane	1.242	2.694	1.907
n-Butane	4.387	9.516	6.489
iso-Pentane	0.844	2.273	1.448
n-Pentane	1.309	3.525	2.226
Cyclopentane	0.028	0.073	0.039
n-Hexane	0.314	1.010	0.606
Cyclohexane	0.072	0.226	0.115
Other Hexanes	0.391	1.257	0.749
Heptanes	0.179	0.669	0.387
Methylcyclohexane	0.028	0.103	0.053
2,2,4-Trimethylpentane	0.008	0.034	0.020
Benzene	0.023	0.067	0.030
Toluene	0.012	0.041	0.019
Ethylbenzene	0.002	0.008	0.004
Xylenes	0.007	0.028	0.013
Octanes	0.029	0.124	0.070
Nonanes	0.002	0.010	0.005
Decanes +	0.003	0.016	0.009
Totals	**100.000**	**100.000**	**100.000**

ADDITIONAL BETX DATA

Components	Mole %	Weight %	Liq. Vol. %
Cyclopentane	0.028	0.073	0.039
Cyclohexane	0.072	0.226	0.115
2-Methylpentane	0.280	0.899	0.535
3-Methylpentane	0.111	0.358	0.213
n-Hexane	0.314	1.010	0.606
Methylcyclohexane	0.028	0.103	0.053
2,2,4-Trimethylpentane	0.008	0.034	0.020
Benzene	0.023	0.067	0.030
Toluene	0.012	0.041	0.019
Ethylbenzene	0.002	0.008	0.004
m-Xylene	0.001	0.004	0.002
p-Xylene	0.004	0.017	0.008
o-Xylene	0.002	0.007	0.003
Hexanes, Total	0.805	2.567	1.508
Heptanes, Total	0.238	0.873	0.490
Octanes, Total	0.050	0.201	0.105
Nonanes, Total	0.002	0.010	0.005
Decanes+, Total	0.003	0.016	0.009

SPECIFIC GRAVITY AT 60/60 F, calculated	0.92517
TOTAL GPM (ETHANE INCLUSIVE)	11.101
CALCULATED BTU / REAL CF AT 14.73 PSIA, dry basis	1525.723
CALCULATED BTU / REAL CF AT 14.73 PSIA, wet basis	1499.431
AVERAGE MOLECULAR WEIGHT	26.795
MOLAR MASS RATIO	0.92517
RELATIVE DENSITY (G x Z (Air) / Z), calculated	0.93067
IDEAL GROSS HEATING VALUE, BTU / IDEAL CF AT 14.696 PSIA, calculated	1513.223
COMPRESSIBILITY FACTOR (Z)	0.99409

ETHANE GPM	5.0696
PROPANE GPM	3.0156
iso-BUTANE GPM	0.4054
n-BUTANE GPM	1.3795
iso-PENTANE GPM	0.3079
n-PENTANE GPM	0.4733
GASOLINE RANGE (HEXANES+) GPM	0.4501

NOTATION: ALL CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-16, THE TABLES OF PHYSICAL CONSTANTS FOR HYDROCARBONS AND OTHER COMPOUNDS OF INTEREST TO THE NATURAL GAS INDUSTRY.

James A. Kane, President
American Mobile Research, Inc.

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EXTENDED WATER GLYCALC STUDY

CERTIFICATE OF ANALYSIS

Company ..... **KINDER MORGAN, INC.**

Lab Number CR-20730
Date Sampled 8-24-2020

Study Number CR-3
Date Tested 9-3-2020

Sample Identification ..... **PRODUCED WATER**
SACRAMENTO STATION
Sample Location ..... NORTH DAKOTA
Sample Pressure ..... 20 PSIG
Type Sample ..... SPOT
Test Method ..... GPA 2186M

Sample Temperature ..... 50 F
County ..... N/A
Cylinder ID ..... KMI 2573

Components	Mole %	Weight %	Liq. Vol. %
Water	99.626	97.295	96.998
Hydrogen Sulfide	0.000	0.000	0.000
Carbon Dioxide	0.000	0.000	0.000
Nitrogen	0.000	0.000	0.000
Methane	0.000	0.000	0.000
Ethane	0.000	0.000	0.000
Propane	0.001	0.002	0.005
iso-Butane	0.001	0.003	0.006
n-Butane	0.004	0.013	0.022
Methanol	0.002	0.003	0.004
iso-Pentane	0.009	0.035	0.056
n-Pentane	0.004	0.016	0.025
Hexanes	0.004	0.019	0.028
Heptanes	0.010	0.054	0.079
Octanes	0.023	0.142	0.201
Nonanes	0.006	0.042	0.058
Decanes+	0.083	0.709	0.949
Benzene	0.006	0.025	0.029
Toluene	0.020	0.100	0.114
Ethylbenzene	0.002	0.012	0.013
Xylenes	0.034	0.196	0.225
n-Hexane	0.002	0.009	0.014
2,2,4-Trimethylpentane	0.001	0.006	0.009
Glycol	0.162	1.319	1.166
Totals	**100.000**	**100.000**	**100.000**

ADDITIONAL BETX DATA

Components	Mole %	Weight %	Liq. Vol. %
2-Methylpentane	0.003	0.012	0.018
3-Methylpentane	0.001	0.006	0.010
n-Hexane	0.002	0.009	0.014
2,2,4-Trimethylpentane	0.001	0.006	0.009
Benzene	0.006	0.025	0.029
Toluene	0.020	0.100	0.114
Ethylbenzene	0.002	0.012	0.013
m-Xylene	0.005	0.029	0.034
p-Xylene	0.020	0.117	0.135
o-Xylene	0.009	0.049	0.056

API GRAVITY AT 60/60 F, calculated	**10.43**
SPECIFIC GRAVITY AT 60/60 F, calculated	**0.99695**
RELATIVE SPECIFIC GRAVITY OF DECANES+ (C10+) FRACTION, calculated	**0.74442**
AVERAGE MOLECULAR WEIGHT	**18.447**
AVERAGE MOLECULAR WEIGHT OF DECANES+ (C10+) FRACTION, calculated	**157.573**
TRUE VAPOR PRESSURE AT 100 F, PSIA, calculated	**0.955**
AVERAGE BOILING POINT, F, calculated	**214.777**
CUBIC FEET OF GAS / GALLON OF LIQUID, as Ideal Gas, calculated	**170.724**
BTU / GALLON OF LIQUID AT 14.73 PSIA, calculated	**10,899.34**
LBS / GALLON OF LIQUID, calculated	**8.312**

NOTATION: ALL CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-16, THE TABLES OF PHYSICAL CONSTANTS FOR HYDROCARBONS AND OTHER COMPOUNDS OF INTEREST TO THE NATURAL GAS INDUSTRY.

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CERTIFICATE OF ANALYSIS

OXYGENATES IN HYDROCARBON GASES

Company ….. KINDER MORGAN, INC.

Lab Number ….. CR-20730
Date Sampled ….. 8-24-2020
Sample Identification ….. **SACRAMENTO STATION PRODUCED WATER**

Study Number ….. CR-3B
Date Tested ….. 9-9-2020

Sample Location ….. SACRAMENTO STATION, WATFORD CITY, NORTH DAKOTA.
Sample Pressure ….. 20 PSIG
Sample Type….. SPOT
Test Method ….. ASTM D-7423

Sample Temperature ….. 50 F
County ….. N/A
Sample Container ….. KMI 1967

Component	Concentration, ppm by Volume
Dimethyl Ether (DME)	< 1.0 PPMV
Acetone	8.98 PPMV
sec-Butyl Methyl Ether	< 1.0 PPMV
Methyl tert-Butyl Ether (MTBE)	< 1.0 PPMV
Methyl Ethyl Ketone (MEK)	< 1.0 PPMV
Methyl Alcohol (MeOH)	31.84 PPMV
Ethyl tert-Butyl Ether (EtBE)	< 1.0 PPMV
Ethyl Alcohol (EtOH)	< 1.0 PPMV
tert-Amyl Methyl Ether (TAME)	< 1.0 PPMV
iso-Propanol (IPA)	23.61 PPMV
tert-Butyl Alcohol (tBA)	< 1.0 PPMV
n-Propanol (nPA)	5.50 PPMV
sec-Butyl Alcohol	< 1.0 PPMV
2-Methyl-1-Propanol	< 1.0 PPMV
Butyl Alcohol	< 1.0 PPMV
Total Glycols (EG, DEG, TEG)…	13,177.30 PPMV
Total Oxygenates	13,247.23 PPMV

Analysis performed according to methodology outlined in ASTM D-7423, Determination of Oxygenates in C2, C3, C4, and C5 Hydrocarbon Matrices.

James A. Kane, President
American Mobile Research, Inc.

APPENDIX F: Engine Specifications

G3516J

GAS ENGINE SITE SPECIFIC TECHNICAL DATA
RFQ PRP-114932 Edgewater Compresso

CATERPILLAR®

GAS COMPRESSION APPLICATION	
ENGINE SPEED (rpm):	1400
COMPRESSION RATIO:	8
AFTERCOOLER TYPE:	SCAC
AFTERCOOLER - STAGE 2 INLET (°F):	130
AFTERCOOLER - STAGE 1 INLET (°F):	201
JACKET WATER OUTLET (°F):	210
ASPIRATION:	TA
COOLING SYSTEM:	JW+OC+1AC, 2AC
CONTROL SYSTEM:	ADEM3
EXHAUST MANIFOLD:	ASWC
COMBUSTION:	LOW EMISSION
NOx EMISSION LEVEL (g/bhp-hr NOx):	0.5
SET POINT TIMING:	28

RATING STRATEGY:	STANDARD
RATING LEVEL:	CONTINUOUS
FUEL SYSTEM:	CAT WIDE RANGE WITH AIR FUEL RATIO CONTROL
SITE CONDITIONS:	
FUEL:	Gas Analysis
FUEL PRESSURE RANGE(psig): (See note 1)	7.0-40.0
FUEL METHANE NUMBER:	59.0
FUEL LHV (Btu/scf):	1145
ALTITUDE(ft):	2500
INLET AIR TEMPERATURE(°F):	110
STANDARD RATED POWER:	1380 bhp@1400rpm

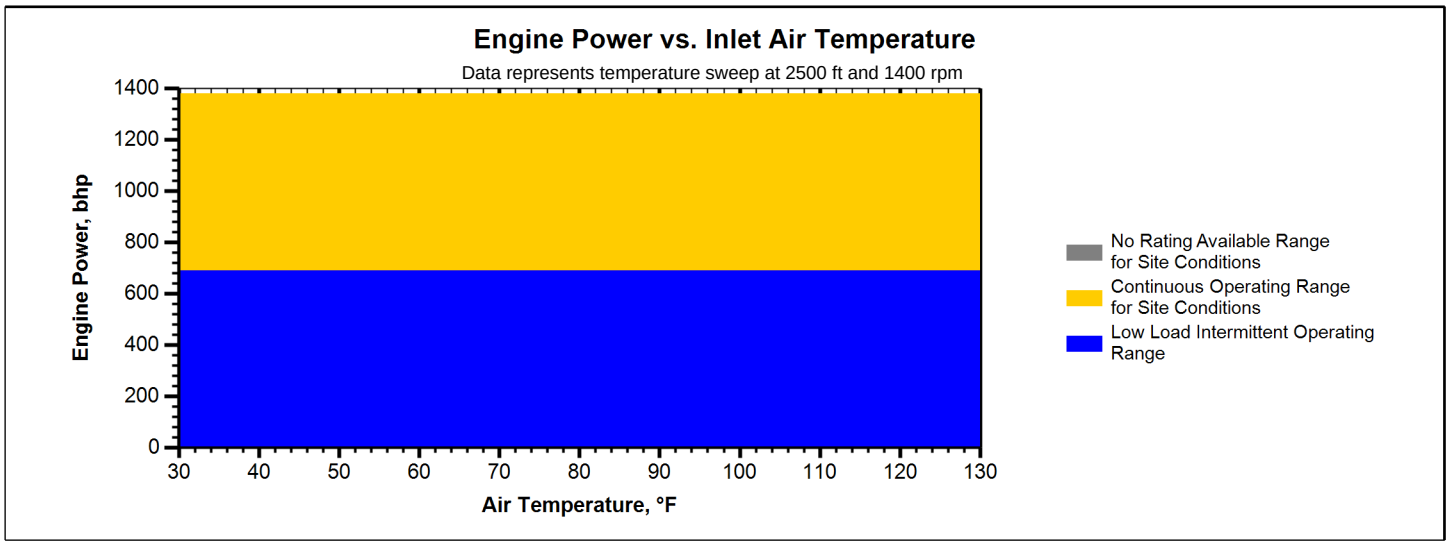
				MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE		
RATING		**NOTES**	**LOAD**	**100%**	**100%**	**75%**	**50%**
ENGINE POWER	(WITHOUT FAN)	(2)	bhp	1380	1380	1035	690
INLET AIR TEMPERATURE			°F	110	110	110	110
ENGINE DATA							
FUEL CONSUMPTION (LHV)		(3)	Btu/bhp-hr	7361	7361	7727	8305
FUEL CONSUMPTION (HHV)		(3)	Btu/bhp-hr	8103	8103	8506	9142
AIR FLOW (@inlet air temp, 14.7 psia)	(WET)	(4)(5)	ft3/min	3325	3325	2541	1745
AIR FLOW	(WET)	(4)(5)	lb/hr	13890	13890	10614	7289
FUEL FLOW (60°F, 14.7 psia)			scfm	148	148	116	83
INLET MANIFOLD PRESSURE		(6)	in Hg(abs)	88.6	88.6	70.5	48.5
EXHAUST TEMPERATURE - ENGINE OUTLET		(7)	°F	824	824	822	878
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(WET)	(5)(8)	ft3/min	8038	8038	6144	4415
EXHAUST GAS MASS FLOW	(WET)	(5)(8)	lb/hr	14407	14407	11021	7580
EMISSIONS DATA - ENGINE OUT							
NOx (as NO2)		(9)(10)	g/bhp-hr	0.50	0.50	0.50	0.50
CO		(9)(10)	g/bhp-hr	2.42	2.42	2.43	2.34
THC (mol. wt. of 15.84)		(9)(10)	g/bhp-hr	4.13	4.13	4.03	3.81
NMHC (mol. wt. of 15.84)		(9)(10)	g/bhp-hr	2.07	2.07	2.02	1.91
NMNEHC (VOCs) (mol. wt. of 15.84)		(9)(10)(11)	g/bhp-hr	0.85	0.85	0.83	0.78
HCHO (Formaldehyde)		(9)(10)	g/bhp-hr	0.40	0.40	0.38	0.37
CO2		(9)(10)	g/bhp-hr	505	505	530	570
EXHAUST OXYGEN		(9)(12)	% DRY	9.1	9.1	8.8	8.4
HEAT REJECTION							
HEAT REJ. TO JACKET WATER (JW)		(13)	Btu/min	36653	36653	31504	26258
HEAT REJ. TO ATMOSPHERE		(13)	Btu/min	5313	5313	4428	3543
HEAT REJ. TO LUBE OIL (OC)		(13)	Btu/min	4431	4431	3808	3174
HEAT REJ. TO A/C - STAGE 1 (1AC)		(13)(14)	Btu/min	11658	11658	8851	2397
HEAT REJ. TO A/C - STAGE 2 (2AC)		(13)(14)	Btu/min	5497	5497	4738	2903
COOLING SYSTEM SIZING CRITERIA							
TOTAL JACKET WATER CIRCUIT (JW+OC+1AC)		(14)(15)	Btu/min	57876			
TOTAL AFTERCOOLER CIRCUIT (2AC)		(14)(15)	Btu/min	5772			

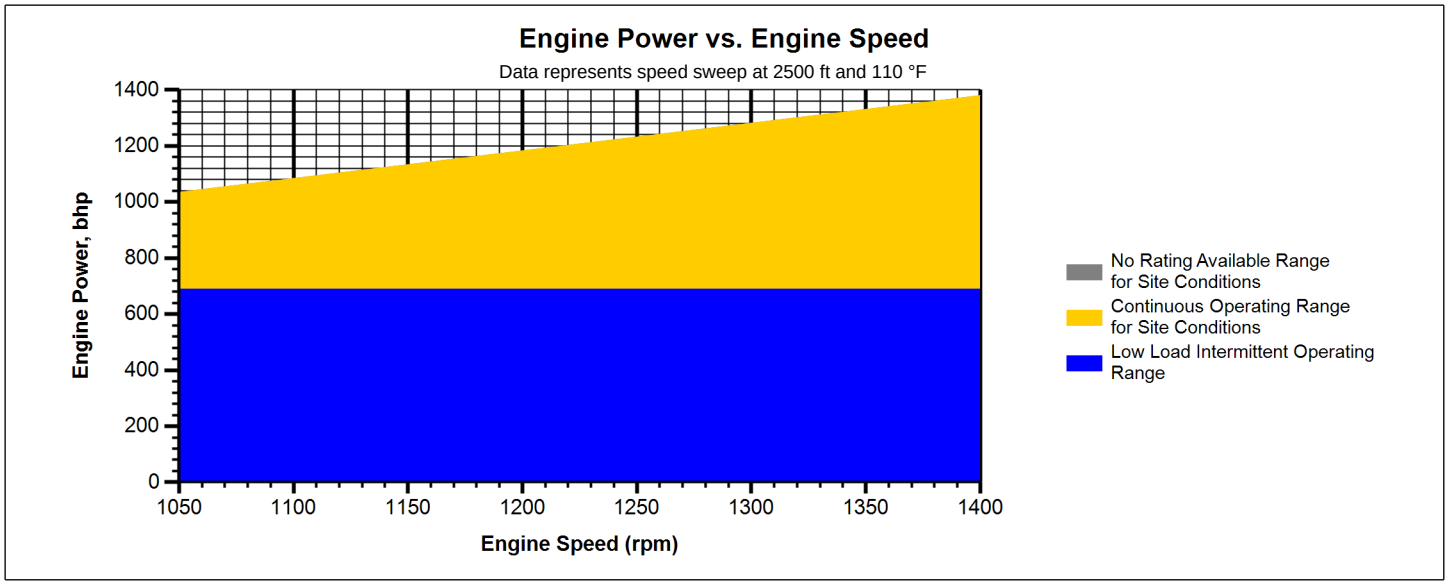
A cooling system safety factor of 0% has been added to the cooling system sizing criteria.

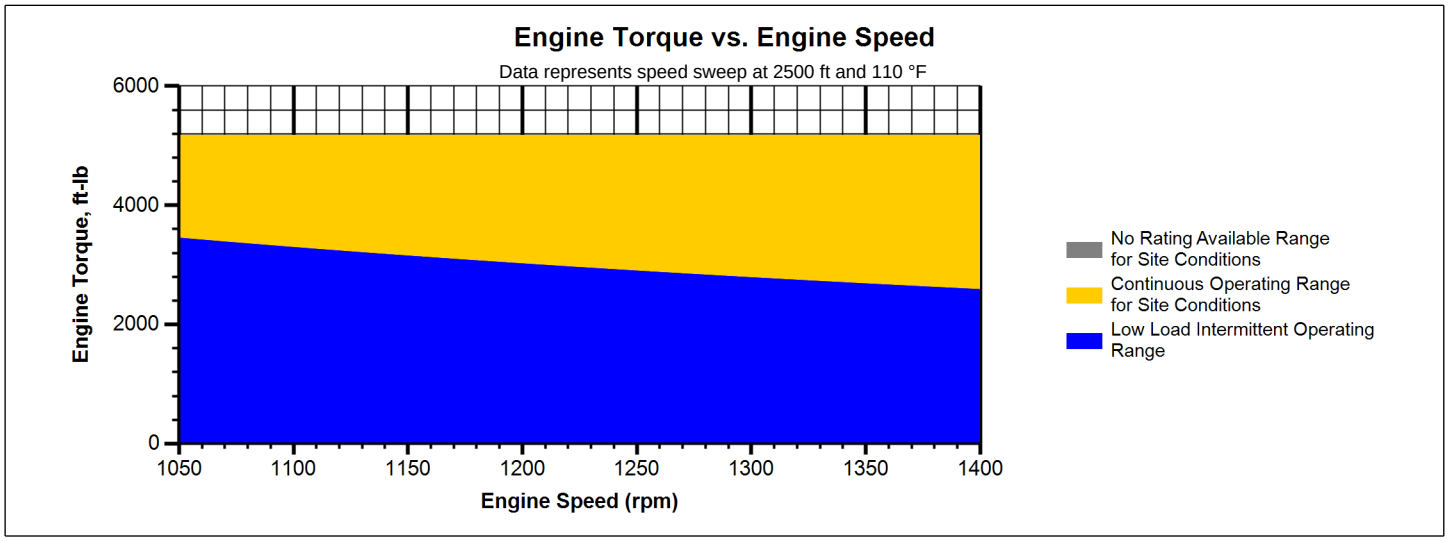
CONDITIONS AND DEFINITIONS

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. Refer to product O&M manual for details on additional lower load capability. No overload permitted at rating shown.

For notes information consult page three.







Note:
At site conditions of 2500 ft and 110°F inlet air temp., constant torque can be maintained down to 1050 rpm. The minimum speed for loading at these conditions is 1050 rpm.

NOTES:

1. Fuel pressure range specified is to the engine fuel pressure regulator. 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 ± 3.0% 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	67.0083	67.0083
Ethane	C2H6	19.7659	19.7659
Propane	C3H8	7.2090	7.2090
Isobutane	iso-C4H10	0.3616	0.3616
Norbutane	nor-C4H10	0.8755	0.8755
Isopentane	iso-C5H12	0.0587	0.0587
Norpentane	nor-C5H12	0.0727	0.0727
Hexane	C6H14	0.0527	0.0527
Heptane	C7H16	0.0000	0.0000
Nitrogen	N2	3.5493	3.5493
Carbon Dioxide	CO2	1.0463	1.0463
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 %)		100.0000	100.0000

Fuel Makeup:	Gas Analysis
Unit of Measure:	English

Calculated Fuel Properties

Caterpillar Methane Number:	59.0
Lower Heating Value (Btu/scf):	1145
Higher Heating Value (Btu/scf):	1261
WOBBE Index (Btu/scf):	1309
THC: Free Inert Ratio:	20.76
Total % Inerts (% N2, CO2, He):	4.60%
RPC (%) (To 905 Btu/scf Fuel):	100%
Compressibility Factor:	0.996
Stoich A/F Ratio (Vol/Vol):	11.85
Stoich A/F Ratio (Mass/Mass):	15.48
Specific Gravity (Relative to Air):	0.766
Fuel Specific Heat Ratio (K):	1.275

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.

ENERFLEX

Enerflex Contract Compression Unit Information Form

Date 12/12/2022

Enerflex Contract Compression Unit #	EF6347	Unit Description	GAS COMP: G3516J, JGT/4, 3Stg
Engine Make	Caterpillar	**Compressor Make**	Ariel
Engine Model	G3516ULB	**Compressor Model**	JGT/4
Engine Serial Number	N6W01218	**Compressor Serial Number**	F60648
Engine Manufactured Date	2/6/2019	**Compressor Manufacture Date**	6/28/2019
Engine Rated Horsepower	1380		
Engine Max RPM	1400	**Compressor Max RPM**	1400
Engine Combustion Type	4 Cycle Lean Burn		
Engine Displacement (in3)	4211 CID	**Engine Modified or**	
Fuel Delivery Method	Electronic Fuel Metering Valve	**Reconstructed**	N/A
Turbo or Naturally Aspirated	Turbo		

Air Environmental Regulations

Engine Federal Requirements: Subject to NSPS JJJJ Tier 2 emissions limits

NSPS JJJJ Emissions Limits g/bhp-hr:		**CO**	2	**NOx**	1	**VOC**	0.7
Uncontrolled Emission:	g/hp-hr	**CO**	2.42	**NOx**	0.5	**VOC**	0.85
		HCHO	**0.4**				

AFR Make	Cat	**Catalyst Housing Make**	EMIT
AFR Model	ADEM III Nox ULB	**Catalyst Housing Model**	ELH-3550-1616F-4CE0-241
		Catalyst Element Type	Oxidation
		Number of Catalyst Elements in Housing	3
		Other Engine Emissions Controls	N/A

Controlled Emissions		**CO**	1	**NOx**	**0.5**	**VOC**	0.7
		HCHO	0.2				

Notes

All emissions values are based on Engine, AFR controller & Catalyst Manufacturer specification assuming a "Pipeline Quality" fuel gas composition, 1200ft elevation and 100F max air inlet temp unless otherwise specified. Note that Emissions values are based on 100% engine load operation and some emissions values are nominal and are not representative of Not-to-Exceed values unless otherwise specified. It is recommended to apply a safety factor to all emissions values for air permitting to allow for operational flexibility and variations in fuel gas composition.

Catalytic Combustion Corporation
311 Riggs Street, Bloomer, WI 54724
Tel: (715) 568-2882 • Fax: (715) 568-2884
Email mthompson@catalyticcombustion.com

CATALYTIC COMBUSTION
EMISSION TECHNOLOGIES

To Enerflex
Attn Kevin Parsons
Via E-mail

Our Ref. 001-00-281048.01
Date: 13 December, 2022
Page: 1 of 1

Catalyst Performance

For : Caterpillar G3516J

Project/Location : EF6347

Engine Parameters

				Raw Exhaust	
Engine Manufacturer	Caterpillar				
Engine Model	G3516J		NOx	0.50	g/bhp-hr
Horsepower	1380	bhp	CO	2.42	g/bhp-hr
Speed	1400	rpm	NMHC	2.07	g/bhp-hr
Exhaust Flowrate	8038	acfm	NMNEHC (VOC)	0.85	g/bhp-hr
Exhaust Temperature	824	° F	HCHO	0.40	g/bhp-hr
Fuel	Natural Gas		Oxygen	9.10	%

Catalyst Description and Performance Expectations

Catalyst Model	REMB-2415F-D-15HF-HFX4	Overall Dimensions	23.88 x 14.88 x 3.7
Cell Pattern, Substrate	15HF	Catalyst Qty Required	3 per Unit
Formulation	HFX4	Pressure Drop	3.6 inches of H2O
Warranty Period [hrs]	24000		

	Performance		Expected Fresh Performance		Expected End of Life Performance	
NOx	0.50	g/bhp-hr	-	% Conversion	-	% Conversion
CO	1.00	g/bhp-hr	99	% Conversion	96	% Conversion
NMHC						
NMNEHC (VOC)	0.70	g/bhp-hr	30	% Conversion	19	% Conversion
HCHO	0.20	g/bhp-hr	95	% Conversion	85	% Conversion

This quote is subject to Catalytic Combustion's Terms and Conditions of Sale which can be reviewed at www.catalyticcombustion.com

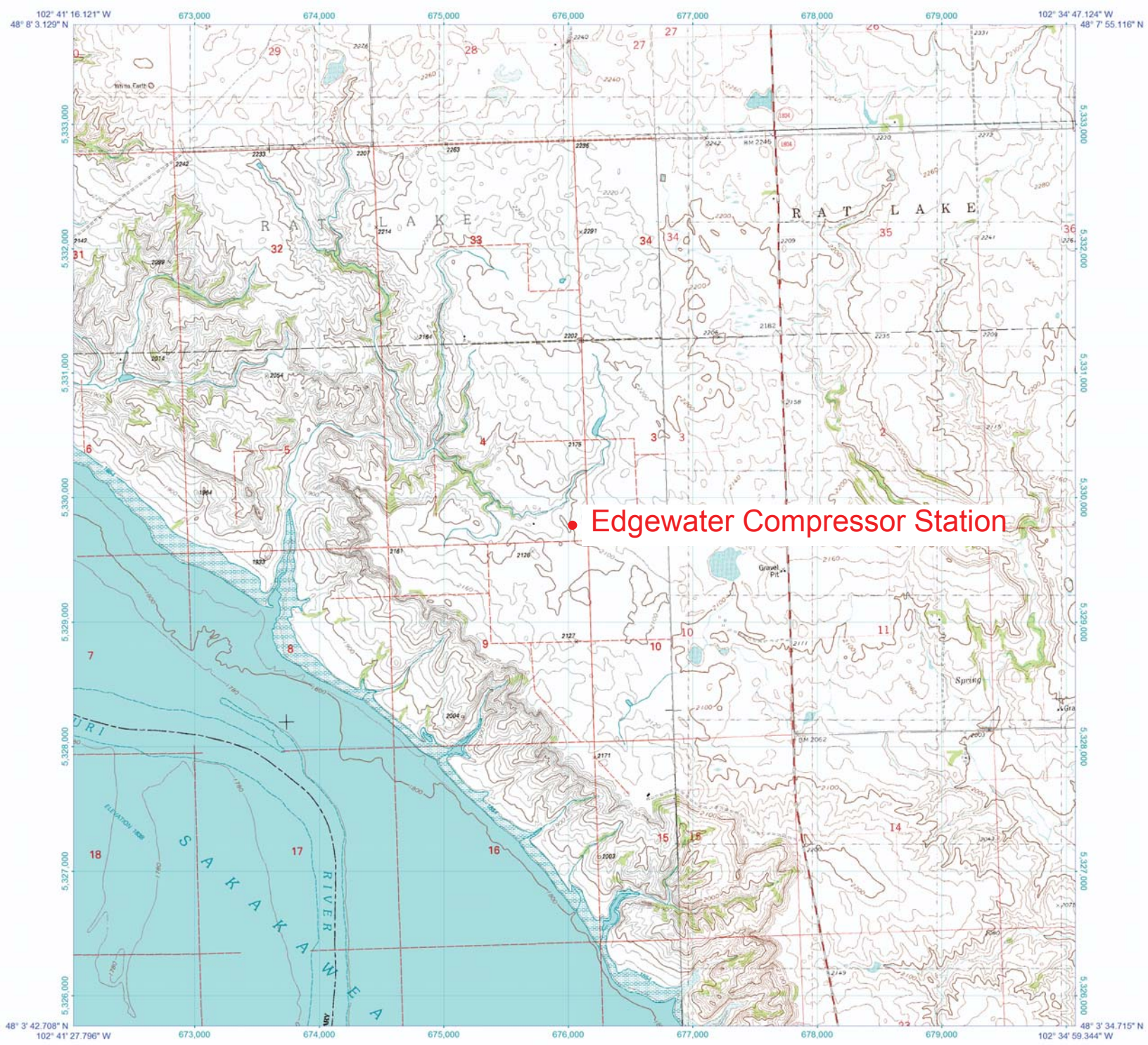
Please contact us if you have any questions or to let us know how we can be of further help.

Best regards,

Mindy Thompson

Mindy Thompson
Account Manager, Catalytic Combustion Corporation
Prepared By: JL

APPENDIX G: Facility Plot Plan



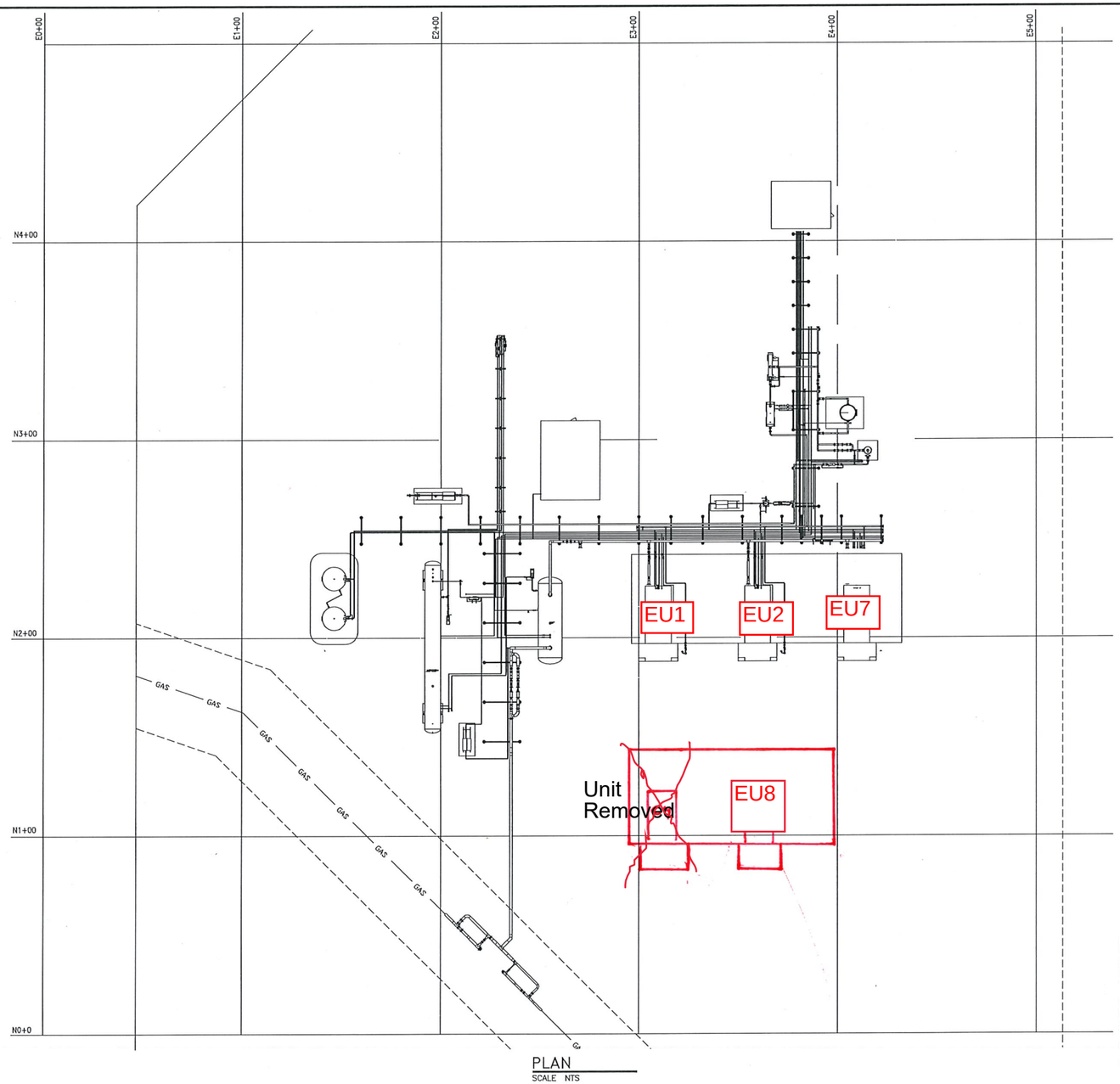
Map Projection: UTM: Zone 13N, Meters, NAD83
UTM Grid: UTM: Zone 13N, Meters, NAD83
Built with BigTopo9 www.igage.com (B9210)
Source Maps: Rat Lake SE, ND; Rat Lake SW, ND; Robinson Lake, ND; Rat Lake, ND

2016 Declination at Sheet Center
TN to MN 7.353° (7° 21' 11") (135 mils)
TN to UTM GN 1.781° (1° 45' 38") (31 mils)

0 ¼ ½ 1 2 Miles
1000 0 2000 4000 6000 8000 10,000 Feet
1,000 Meters 500 0 ½ 1 2 Kilometers

Big Topo 9 Map


Verizon
12:14 PM
3D
37°
AQI 35
Search for a place or address



PLAN
SCALE NTS

NOTES:
1. CONTRACTOR TO INSTALL 1" HIGH POINT VENTS AND LOW POINT DRAINS AS NEEDED.
2. IA PIPING TO BE ROUTED 18" FROM DEVICE.
3. CONTRACTOR TO CONNECT INSTRUMENT AIR/GAS AS REQUIRED.
4. CONTRACTOR TO FIELD ROUTE ALL LINES 1 ½" AND UNDER NOT SHOWN ON PIPING DRAWINGS BUT SHOWN ON P&IDs.
5. ADD PIPE SUPPORTS AS REQUIRED ON 1 ½" AND SMALLER PIPING.
6. CONTRACTOR TO VERIFY ALL EQUIPMENT CONNECTIONS PRIOR TO PIPE FABRICATION.
7. CONTRACTOR TO COAT AND WRAP ALL UNDERGROUND WELDS AND FITTINGS PER SPECIFICATIONS.
8. DECK GRATING NOT SHOWN FOR CLARITY.
9. ⟨1⟩ = INSULATION GASKET KIT
10. ⟨S⟩ = CONTRACTOR TO STOP PIPE FABRICATION UNTIL LOCATION OF EQUIPMENT CONNECTIONS /TIE POINTS ARE VERIFIED IN FIELD BY CONTRACTOR.

REFERENCED DRAWINGS

DRAWING NUMBER	TITLE
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DRAWING REVISIONS

NO.	DESCRIPTION	BY	CHK	APVD	DATE
0	ISSUED FOR CONSTRUCTION	BJL	WP		2/16/17

HILAND

HILAND PARTNERS
PIPING KEY PLAN
EDGEWATER COMPRESSOR STATION
—

JOB NO. 208882
DRAWING NO. 15039-P02-1000
REV. 0
PLOT SIZE: ANSI D
SCALE: AS SHOWN