1001 Louisiana Street, Suite 1000, Houston, TX 77002

Via Electronic Submittal

April 13, 2021

Mr. Russell Martin
North Dakota Department of Environmental Quality
Division of Air Quality
918 E. Divide Avenue, 2nd Floor
Bismarck, ND 58501-1947

Re: Permit Revision with Updated PTE Site-Wide Emissions
Hiland Partners Holdings LLC
Bethel Compressor Station
Permit Number PTO O14017
Williams County, North Dakota
Corrective Action for Item # 41 and # 42

Dear Mr. Martin:

On January 14, 2021, a letter was sent to NDDEQ regarding a corrective action plan for compressor blowdowns related to findings Item #41 and #42 in Hiland Partners Holdings LLC's (Hiland) December 18, 2020 self-audit disclosure. In its corrective action plan, Hiland proposed to install new piping to route compressor blowdown emissions to a new flare. Our team completed a detailed engineering design and a Purchase Order for a new flare was placed in early March 2021.

Hiland is submitting the attached permit revision which includes revised Potential to Emit (PTE) emission calculations. The emission calculations update calculation methodologies for various sources and include existing sources previously not represented in the permit. The attached permit revision proposes to 1) route compressor blowdown emissions to a new flare and 2) correct a Hot Oil Heater rating.

Hiland is planning installation of the Bethel Compressor Station (CS) flare project in coordination with the Watford Gas Plant annual plant turnaround which begins in early June 2021. Activities such as site work including grading, pouring foundation, piping, and equipment that is not an emissions unit may be performed prior to air permit issuance as allowed by NDDEQ regulations. The flare will be placed upon air permit issuance and therefore Hiland hopes to receive the permit by June 1, 2021 at the latest. If the permit can be obtained by that time, then the estimated completion of the project is several months ahead of the originally proposed schedule. By end of June 2021, we estimate completion of the flare installation project.

If you need additional information or have any questions, please contact me at (520) 349-0611 or by email at Anu_Pundari@KinderMorgan.com.

Sincerely,

Anu Pundari

Anu Pundari
Engineer – EHS Staff

PERMIT REVISION AND UPDATED POTENTIAL TO EMIT EMISSION CALCULATIONS TO AIR QUALITY PERMIT TO OPERATE NATURAL GAS COMPRESSOR STATION

Hiland Partners Holdings LLC
Bethel Compressor Station
Permit to Operate PTO O14017
Williams County, North Dakota

April 2021

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APPENDICES

1.0 INTRODUCTION

1.1 Introduction

Hiland Partners Holdings LLC (Hiland) owns and operates the Bethel Compressor Station located in Williams County, ND. The Bethel Compressor Station is authorized under Permit to Operate PTO O14017. Hiland is submitting this permit revision and updated Potential to Emit (PTE) site-wide emissions at Bethel Compressor Station based on an internal audit initiated June 22, 2020 and disclosed December 18, 2020. Hiland requests that the permit be updated to include the emission sources represented and establish federal enforceability.

1.2 Proposed Construction

The project will include construction of the following emission sources:

1) a new flare

The following updates are being requested:

1. Update Phoenix Hot Oil Heater rating to 14.7 X 10^6 Btu/hr and fired on natural gas (Dc).
2. Update EU6 with a new flare
3. Increased the fuel heating value for combustion sources to reflect current fuel conditions.
4. Updated Produced Water Tanks (EU7) emissions using ProMax process simulation and updated throughputs.
5. Updated with calculation methodologies for :
    a. Produced Water Truck Loading
    b. NGL Truck Loading
    c. Fugitives
6. Addition of existing sources previously not represented in the permit.
    a. Pigging
    b. Methanol Storage Tanks

Detailed information for the emission sources can be found in Section 2.0.

2.0 EMISSION SOURCES

2.1 Criteria Pollutant Emission Inventory

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

Emissions from the existing equipment was recalculated. Fuel heating value was assumed to be 1500 Btu/scf for all emission sources.

2.2 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 the pressurized Natural Gas Liquids (NGL) tanks. The water fraction routes to the atmospheric produced water storage tanks. As part of the 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 Bethel Compressor Station.

Using ProMax estimation software, working, breathing, and flashing losses were calculated for a tank with 10,000 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. Although historical throughput has been less than 10,000 bbls/year, a 20 % safety factor was applied to the total emissions. With a 20 % safety factor, Total Losses was calculated at 5.02 TPY VOCs for the Bethel CS tank.

The ProMax simulation reports are found in Appendix B and the analyses are found in Appendix C. The analytical results show that Produced Water tanks contain primarily water (>99 % water).

2.3 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.

2.4 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 Topeka Compressor Station specific gas analysis to calculate VOC emissions. To be conservative, Topeka Compressor Station gas analysis was chosen to represent Bethel CS.

2.5 Flare Emissions

The new flare will receive gas from the flash tank, first stage scrubber, and compressor blowdowns. The flare destruction efficiency is assumed to be 98 % based on flare vendor information. Purge gas to prevent backflow into the flare header and pilot gas will also be routed to the new flare. To be conservative, Topeka Compressor Station gas analysis was chosen to represent Bethel CS.

2.6 NGL Truck Loading Emissions

NGL truck loading emissions are conservatively estimated at 70,000 gallons/day. The daily volume was based on reviewing historical volumes and adding a 30 % safety factor. 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.

2.7 Fugitives Emissions

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 flare at the station.

2.8 HAP Emission Inventory

Potential HAP emissions will not exceed the major source thresholds of 10 tpy of any individual HAP or 25 tpy of any combination of HAPs.

3.0 EMISSIONS REGULATORY ANALYSIS

3.1 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.

The emissions at Bethel 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.

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

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

There are no new applicable regulations as a result of the new flare and corrected heatrate of Phoenix Hot Oil heater. An analysis was conducted for only proposed revisions at the station.

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

This facility will operate four natural gas-fired stationary combustion engines, one natural gas fired hot oil heater, and one flare. Hiland 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 and 33-15-03 does apply.

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

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 Phoenix Hot Oil heater a maximum design heat input capacities of 14.7 MMBtu/hr; therefore, the heater is subject to Subpart Dc.

This regulation does not impose any emission limitations on affected equipment fired with natural gas. Per 60.48(g)(2) the owner or operator of affected equipment fired with natural gas has an alternative to show compliance by recording and maintaining records of the amount of fuel combusted during each calendar month.

NSPS Subpart OOOOa

Owners and operators are subject to Subpart OOOOa if they commence construction, modification or reconstruction after September 15, 2018, on one or more affected facilities.

An affected facility could include the following:

- Centrifugal compressors;
- Reciprocating compressors;
- Storage vessels;
- Pneumatic controllers;
- Sweeting units; and,
- Equipment leaks at an onshore natural gas processing plant.
-

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

Since the produced water storage tank will not have VOC emissions greater than six tons per year, the tank is not subject to the requirements in Subpart OOOOa.

The facility will include reciprocating compressors. There are no changes to the existing reciprocating compressor units.

The facility will utilize only air driven pneumatic controllers.

Bethel Compressor Station will not have a sweetening unit or a sweetening unit followed by a sulfur recovery unit and is not considered an onshore natural gas processing plant.

Since there are no changes to the facility that meet NSPS OOOOa criteria, this subpart does not apply.

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

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

Since Bethel 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 (see Section 4.0 of this application), the facility will not be subject to the Title V operating permit program described in NDAC 33-15-14-06.

Per the Criteria Pollutant Modeling Requirements for a Permit to Construct modeling policy memo dated October 6, 2014, 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} or 25 tons per year of $PM_{2.5}$.
- 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} or 10 tons per year of $PM_{2.5}$.

The emissions from previously permitted and new sources 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.

Air Pollutants for Source Categories (NDAC 33-15-22)

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

This subpart applies to equipment located at major HAP sources. The Bethel Compressor Station is an area HAP source and will remain an area HAP source following project completion. Therefore, this subpart does not apply.

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

This subpart applies to existing, new or reconstructed boilers located at area HAP sources. The Bethel Compressor Station is an area HAP source and remain an area HAP source post-project but the existing heater does not meet the definition of a boiler. Therefore, this subpart does not apply.

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

The compressor engines at Bethel 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%.*

   All of the compressor engines are controlled by non-selective catalytic reduction catalysts that reduce non-methane hydrocarbons emissions by at least 50%.

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 are 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.*

   There are no glycol dehydration units at the facility.

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 0.66 miles (3500 feet) to the northwest 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 0.66 miles (3500 feet) to the northwest from a residence. The 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.

Since the facility meets all of the conditions in the memorandum, dispersion modeling for air toxics is not required for this application.

4.0 PROPOSED REVISIONS TO EXISTING PERMIT AND NDDEQ FORMS AND EMISSION CALCULATIONS

Proposed Revisions to Existing Permit and NDDEQ Forms and are included in Site specific Potential to Emit (PTE) emission calculations are included in this section.

PROPOSED REVISIONS TO EXISTING PERMIT

1. **Updated Site Potential to Emit**
2. **Installation of a new Flare (EU6)**
3. **Corrected Hot Oil Heater rating (EU5)**
4. **Update permit to include the following:**
    a. **EU8 (Produced Water Truck Loading)**
    b. **EU9 (NGL Truck Loading)**
    c. **Blowdowns and maintenance venting – BD – Flare listed under Air Pollution Control Equipment**

NDDEQ 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 520-349-0611	E-mail Address anu_pundari@kindermorgan.com
Contact Person for Air Pollution Matters Anu Pundari		
Title Sr. Engineer	Telephone Number 520-349-0611	E-mail Address anu_pundari@kindermorgan.com
Mailing Address (Street & No.) 1001 Louisiana Street, Suite 1000		
City Houston	State TX	ZIP Code 77002
Facility Name Bethel Compressor Station		
Facility Address (Street & No.) 5549 144th Avenue NW		
City Williston	State ND	ZIP Code 58801

County Williams	Latitude (Nearest Second) 48.220279	Longitude (Nearest Second) -103.799804

Legal Description of Facility Site

Quarter SE/4	Quarter NE/4	Section 28	Township 155N	Range 102W

Land Area at Facility Site 10 Acres (or) Sq. Ft.	MSL Elevation at Facility 2300

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	211111	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 Site activities early May with flare onsite upon permit issuance	Planned End Construction Date July 2021

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
C1	Engine	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑
C2	Engine	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑
C3	Engine	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑
C4	Engine	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑
EU5	Hot Oil Heater	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑
EU6	Flare	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
EU7	Produced Water Tank	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑
NA	Produced Water Truck Loading	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑
NA	NGL Truck loading	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑

Add additional pages if necessary

SECTION D2 – APPLICABLE REGULATIONS

Source ID No.	Applicable Regulations (NSPS/MACT/NESHAP/etc.)
Facility-wide	
C1, C2, C3, C4	NSPS JJJJ - Compressor Engines
C1, C2, C3, C4	MACT ZZZZ Compressor Engines

SECTION E – TOTAL POTENTIAL EMISSIONS

Pollutant	Amount (Tons Per Year)
NO_x	62.49
CO	71.16
PM	4.21

Pollutant	Amount (Tons Per Year)
PM_{10} (filterable and condensable)	4.21
$PM_{2.5}$ (filterable and condensable)	4.21
SO_2	0.16
VOC	61.87
GHG (as CO_2e)	30974
Largest Single HAP	0.53 (Formaldehyde)
Total HAPS	1.88

*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.	Emissions Calculations	4.	
2.	Flare Specifications	5.	
3.	Gas Analysis	6.	

I, the undersigned applicant, am fully aware that statements made in this application and the attached exhibits and statements constitute the application for Permit(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	4/12/21

PERMIT APPLICATION FOR FUEL BURNING EQUIPMENT FOR INDIRECT HEATING

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 8518 (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	Bethel Compressor Station

SECTION B – EQUIPMENT

Source ID No. (From form SFN 8516)	Name of Manufacturer
EU5	Phoenix
Rated Capacity/Maximum Input	**Model Number**
14.7 MMBTU/hr	PX-100

Purpose
Space Heat _____ %
Process Heat 100 %
Power Generation _____ %
Other (Specify % if Multi-Purpose) _____ %

SECTION C – TYPE OF COMBUSTION UNIT AND FUEL FEEDING METHOD

Coal (If other solid fuel, specify here)

- ☐ Pulverized
- ☐ General
- ☐ Dry Bottom
- ☐ Wet Bottom with Fly Ash Reinjection
- ☐ Wet Bottom without Fly Ash Reinjection
- ☐ Other – Specify:
- ☐ Spreader Stoker with Fly Ash Reinjection
- ☐ Spreader Stoker without Fly Ash Reinjection
- ☐ Fluidized Bed
- ☐ Cyclone
- ☐ Hand-Fired

Fuel Oil

- ☐ Horizontally Fired
- ☐ Tangentially Fired
- ☐ Other – Specify:

Gas

- ☐ Horizontally Fired
- ☒ Tangentially Fired
- ☐ Other – Specify:

SECTION D – NORMAL SCHEDULE OF OPERATION

Hours Per Day	Days Per Week	Weeks Per Year	Hours Per Year Total	Peak Season (Specify Months)
24	7	52	8760	

SECTION E – FUEL USE EXPECTED IN A CALENDAR YEAR

Year 2021

Primary Fuels		Standby Fuels	
Type: Natural Gas		Type:	
Quantity Per Year: 85.85	Units of Measure: MMSCF/YR	Quantity Per Year:	Units of Measure:

Percent Ash (Solid Fuels Only)					
Minimum	Maximum	Average	Minimum	Maximum	Average

Percent Sulfur					
Minimum	Maximum	Average	Minimum	Maximum	Average

Btu Per Unit of Measure (e.g. lb, gal, etc. - Specify)					
Minimum	Maximum	Average	Minimum	Maximum	Average

Describe Fuel Transport and Storage Methods:

Natural gas processed at the compressor station.

SECTION F – COMBUSTION AIR

☒ Natural Draft ☐ Induced ☐ Forced ☐ Other – Specify:

SECTION G – STACK DATA

Inside Diameter (ft) Unknown	Height Above Grade (ft) Unknown
Gas Temperature at Exit (Avg. °F) Unknown	Gas Velocity at Exit (Avg. ft/sec) Unknown
Are Emission Control Devices in Place? If YES – Complete SFN 8532 ☐ Yes ☒ No	
Stack Exit Gas Flow Rate	
Average (ACFM) Unknown	Average (DSCFM) Unknown
Maximum (ACFM) Unknown	Maximum (DSCFM) Unknown
Are sampling ports available? ☒ No ☐ Yes – Describe:	

SECTION H – NEARBY BUILDINGS

Attach drawings which show the plan and elevation views of any nearby buildings including the building that houses the fuel-fired equipment.

SECTION I – AIR CONTAMINANTS EMITTED

Pollutant	Maximum Pounds Per Hour	Amount (Tons Per Year)	Basis of Estimate*
NO_x	1.44	6.31	AP-42 Table 1.4-1 (07/98)
CO	1.21	5.30	AP-42 Table 1.4-1 (07/98)
PM	0.110	0.48	AP-42 Table 1.4-2 (07/98)
PM_{10} (filterable and condensable)	0.027	0.12	AP-42 Table 1.4-2 (07/98)
$PM_{2.5}$ (filterable and condensable)	0.027	0.12	AP-42 Table 1.4-2 (07/98)
SO_2	0.009	0.04	AP-42 Table 1.4-2 (07/98)

Pollutant	Maximum Pounds Per Hour	Amount (Tons Per Year)	Basis of Estimate*
VOC	0.079	0.35	AP-42 Table 1.4-2 (07/98)
GHG (as CO_2e)	1183	5181	AP-42 Table 1.4-2 (07/98)
Largest Single HAP	0.02	0.08	AP-42 Table 1.4-2 (07/98)
Total HAPS	0.018	0.081	AP-42 Table 1.4-2 (07/98)

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

PERMIT APPLICATION FOR FLARES

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 59652 (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	Bethel Compressor Station

SECTION B - FLARE INFORMATION

Use: ☐ Emergency ☐ Process ■ Both	Subject to NSPS (40 CFR 60.18) ○ Yes ◉ No	
Emission Point ID EU6	Height Above Ground Level (ft.) 50 feet	Diameter at Top (ft.) 2 feet
Flame Monitor: ■ Thermocouple ☐ Infrared ☐ Ultraviolet ☐ Acoustic ☐ Other:		
Ignition: ☐ Automatic ■ Continuous Burning Pilot ☐ Other:		
Average Btu/1000 scf 1500	Percent H_2S negligible	Maximum Hourly Flow Rate to Flare 291,667
List source ID numbers controlled by this unit, if any: EU1 to EU4 compressor blowdowns, First Stage Scrubber venting, Flash Tank venting		

SECTION C – AIR CONTAMINANTS EMITTED

Pollutant	Amount (Tons Per Year)	Basis of Estimate*
NO_x	2.86	AP-42 Factors
CO	12.54	AP-42 Factors
PM	0.21	AP-42 Factors
PM_{10} (filterable and condensable)	0.21	Assume PM total is same as PM10.
$PM_{2.5}$ (filterable and condensable)	0.21	Assume PM Total is same as PM2.5
SO_2	0.001	AP-42 Factors
VOC	12.89	Flare vendor
GHG (as CO_2e)	4696	40 CFR 98 Subpart C
Largest Single HAP	0.14	AP-42 Factors
Total HAPS	0.17	AP-42 Factors

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

Will flaring of gas comply with applicable Ambient Air Quality Standards? ■ Yes ☐ No

IS THIS UNIT IN COMPLIANCE WITH ALL APPLICABLE AIR POLLUTION CONTROL 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 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 Holdings LLC		
Applicant's Name Anu Pundari		
Title Sr. Engineer	Telephone Number 520-349-0611	E-mail Address anu_pundari@kindermorgan.com
Mailing Address (Street & No.) 1001 Louisiana Street, Suite 1000		
City Houston	State TX	ZIP Code 77002

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) Lat 48.220279 and Long -103.799804		
City Williston	State ND	ZIP Code 58801
County Williams	Number of Employees at Location 0	
Land Area at Plant Site 10 Acres (or) _____ Sq. Ft.	MSL Elevation at Plant 2300	

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	Distance (ft)	Direction
Nearest Property Line	Distance (ft)	Direction

SECTION C – EMISSION STREAM DATA

Source ID No. From SFN 8516 EU5	Mean Particle Diameter (um) Unknown
Flow Rate (scfm) Unknown	Drift Velocity (ft/sec) Unknown
Stream Temperature (°F) Unknown	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 Hexane	Chemical Abstract Services (CAS) Number 110-54-3
Proposed Emission Rate (lb/hr) 0.02	Emission Source (describe) Heater
Source Classification (process point, process fugitive, area fugitive) Process Point	Pollutant Class and Form (organic/inorganic - particulate/vapor) Organic
Concentration in Emission Stream (ppmv) Unknown	Vapor Pressure (in. Hg @ °F) 760 mmHg
Solubility 9.5 mg/L	Molecular Weight (lb/lb-mole) 86.18
Absorptive Properties	

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 4/12/21

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

EMISSIONS CALCULATIONS

Bethel Compressor Station
Site Emissions Summary

Emissions Summary

Emission Unit #	Emission Unit Description	PM-10 (tpy)	NOx (tpy)	CO (tpy)	SOx (tpy)	VOC (tpy)	HAPS (tpy)	Formaldehyde (tpy)	CO2e (tpy)	GHG (tpy)
C1	Waukesha L5794 GSI - 1,380 bhp w/NSCR	0.88	13.33	13.33	0.03	9.46	0.40	0.13	5274	5004
C2	Waukesha L5794 GSI - 1,380 bhp w/NSCR	0.88	13.33	13.33	0.03	9.46	0.40	0.13	5274	5004
C3	Waukesha L5794 GSI - 1,380 bhp w/NSCR	0.88	13.33	13.33	0.03	9.46	0.40	0.13	5274	5004
C4	Waukesha L5794 GSI - 1,380 bhp w/NSCR	0.88	13.33	13.33	0.03	9.46	0.40	0.13	5274	5004
EU5	Phoenix Hot Oil Heater Rated at 14.7 MMBtu/hr (Dc)	0.48	6.31	5.30	0.04	0.35	0.08	--	5181	5151
EU6	Flare	0.21	2.86	12.54	0.001	12.89	0.17	--	4696	4692
EU7	Produced Water Tank - 400 bbl - 10,000 bbl/year	--	--	--	--	5.02	--	--	--	--
NA	Produced Water Truck Loading	--	--	--	--	0.15	--	--	--	--
NA	NGL Truck Loading	--	--	--	--	1.43	--	--	--	--
NA	Pigging	--	--	--	--	1.13	--	--	--	--
NA	Fugitives	--	--	--	--	3.03	0.03	--	--	--
NA	Three Methanol Chemical Storage Tanks	--	--	--	--	0.03	--	--	--	--
Total Sitewide Emissions		**4.21**	**62.49**	**71.16**	**0.16**	**61.87**	**1.88**	**0.52**	**30974**	**29858**
Emissions <100 tpy ?		**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**		

Notes:
1. Pigging emissions are conservatively assumed to be 1.13 tpy of VOC.
2. Methanol storage tank emissions are conservatively assumed to be 0.01 tpy of VOC for each tank.
3. Minor sources are considered Produced Water Tank, Produced Water Truck Loading, Pigging, and NGL Truck Loading.
4. Compressor Blowdowns to Flare.

Bethel Compressor Station
Engine Emissions

Equipment Data:

Emission Unit:	**C1, C2, C3, C4**
Emission Unit Name:	Waukesha L5794GSI
Engine Type:	4SRB

Fuel Usage =	60.525	MMscf/yr	(Calculated value based on max fuel combustion rate.)
Horsepower =	1,380	bhp	
Speed =	1,200	rpm	
Hours of Operation =	8,760	hr/yr	
Max. Fuel Combustion Rate (HHV) =	7,510	Btu/bhp-hr	(Based on Manufacturer Specs)
Fuel Heating Value (HHV) =	1,500	MMBtu/MMscf	estimated
Max. Heat Rate (HHV) =	10.36	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)	0.20	0.88
NOx	1.0	g/BHP-hr	40 CFR 60 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 Table 3.2-3 (07/00)	0.01	0.03
VOC	0.70	g/BHP-hr	40 CFR 60 Subpart JJJJ	2.16	9.46
Total HAPs			Engine Vendor/AP-42 Table 3.2-3	0.09	0.40
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	--	--	--	1,204	5,274
GHG	--	--	--	1,142	5,004
CO_2	110	lb/MMBtu	AP-42 Table 3.2-3 (07/00)	1,140	4,993
CH_4	0.23	lb/MMBtu	AP-42 Table 3.2-3 (07/00)	2.38	10.44
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 40 CFR 60 Subpart JJJJ standards. Formaldehyde emissions are based on manufacturer data. 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 (10.36 MMBtu/hr) x (8,760 hr/yr) / (2,000 lb/ton) = 0.88 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) = ((4993.28 ton/yr x 1) + (10.44 ton/yr x 25) + (0.07 ton/yr x 298)) = 5274.13 ton/yr

GHG Emissions (ton/yr) = (CO_2 emissions) + (CH_4 emissions) + (N_2O emissions)
GHG Emissions (ton/yr) = (4993.28 ton/yr) + (10.44 ton/yr) + (0.07 ton/yr) = 5003.79 ton/yr

Bethel Compressor Station
Site Emissions Summary

HAP Emissions per engine

HAP Emissions from Rich-Burn Compressor Engines

Engines	Horsepower (hp)	Hours per Year	Heat Input (MMBtu/yr)	Fuel Input (MMscf/yr)
C1, C2, C3, C4	1,380	8,760	90,787	60.52

HAP	Emission Factor (lb/MMBtu)	Emission Factor (g/bhp-hr)	Control Efficiency (%)	Emissions (tpy) (Controlled)	Notes
1,1,2,2-Tetrachloroethane	2.53E-05	--	50%	5.74E-04	1,4
1,1,2-Trichloroethane	1.53E-05	--	50%	3.47E-04	1,4
1,1-Dichloroethane	1.13E-05		50%	2.56E-04	1,4
1,2-Dichloroethane	1.13E-05		50%	2.56E-04	1,4
1,2-Dichloropropane	1.30E-05		50%	2.95E-04	1,4
1,3-Butadiene	6.63E-04	--	50%	1.50E-02	1,4
1,3-Dichloropropene	1.27E-05	--	50%	2.88E-04	1,4
Acetaldehyde	2.79E-03	--	50%	6.33E-02	1,4
Acrolein	2.63E-03	--	50%	5.97E-02	1,4
Benzene	1.58E-03	--	50%	3.59E-02	1,4
Carbon Tetrachloride	1.77E-05	--	50%	4.02E-04	1,4
Chlorobenzene	1.29E-05	--	50%	2.93E-04	1,4
Chloroform	1.37E-05	--	50%	3.11E-04	1,4
Ethylbenzene	2.48E-05	--	50%	5.63E-04	1,4
Ethylene Dibromide	2.13E-05	--	50%	4.83E-04	1,4
Formaldehyde	--	1.00E-02	NA	0.13	2
Methanol	3.06E-03	--	50%	6.95E-02	1,4
Methylene Chloride	4.12E-05	--	50%	9.35E-04	1,4
Naphthalene	9.71E-05	--	50%	2.20E-03	1,4
PAH	1.41E-04	--	50%	3.20E-03	1,4
Styrene	1.19E-05	--	50%	2.70E-04	1,4
Toluene	5.58E-04	--	50%	1.27E-02	1,4
Vinyl Chloride	7.18E-06	--	50%	1.63E-04	1,4
Xylene	1.95E-04	--	50%	4.43E-03	1,4
HAP	**Emission Factor (lb/MMscf)**		**Control Efficiency (%)**	**Emissions (tpy) (Uncontrolled)**	**Notes**
Arsenic	2.04E-04	--	0%	6.17E-06	3
Beryllium	1.20E-05	--	0%	3.63E-07	3
Cadmium	1.10E-03	--	0%	3.33E-05	3
Chromium	1.40E-03	--	0%	4.24E-05	3
Cobalt	8.40E-05	--	0%	2.54E-06	3
Manganese	3.80E-04	--	0%	1.15E-05	3
Mercury	2.60E-04	--	0%	7.87E-06	3
Nickel	2.10E-03	--	0%	6.36E-05	3
Selenium	2.40E-05	--	0%	7.26E-07	3
Total HAP Emissions				**0.40**	

1. Emission factor from AP-42 Table 3.2-3, Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines (July 2000)
2. Vendor Information.
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

Bethel Compressor Station
Site Emissions Summary

Emission Unit EU5
Hot Oil Heater - 14.7 MMBtu/hr

Fuel Usage =	85.85	MMscf/yr	Calculated value based on max fuel combustion rate.
Hours of Operation =	8,760	hr/yr	
Max. Fuel Combustion Rate =	14.70	MMBtu/hr	
Fuel Heating Value =	1,500	MMBtu/MMscf	

CO_2 GWP	1	(100 year)
CH_4 GWP	25	(100 year)
N_2O GWP	298	(100 year)

Pollutant	Emission Factor	Units	Emission Factor Reference	Hourly Emissions (lb/hr)	Annual Emissions (tons/yr)
PM Total Filterable	1.9	lb/MMscf	AP-42 Table 1.4-2 (07/98)	0.027	0.12
PM Filterable	1.9	lb/MMscf	AP-42 Table 1.4-2 (07/98)	0.027	0.12
PM Condensable	5.7	lb/MMscf	AP-42 Table 1.4-2 (07/98)	0.082	0.36
PM (Total Filterable + Condensable)	7.6	lb/MMscf	AP-42 Table 1.4-2 (07/98)	0.110	0.48
SOx	0.6	lb/MMscf	AP-42 Table 1.4-2 (07/98)	0.009	0.04
NOx	100	lb/MMscf	AP-42 Table 1.4-1 (07/98)	1.44	6.31
CO	84	lb/MMscf	AP-42 Table 1.4-1 (07/98)	1.21	5.30
VOC	5.5	lb/MMscf	AP-42 Table 1.4-2 (07/98)	0.079	0.35
GHG					
CO_2	120,000	lb/MMscf	AP-42 Table 1.4-2 (07/98)	1,176.00	5,150.88
CH_4	2.3	lb/MMscf	AP-42 Table 1.4-2 (07/98)	0.02	0.10
N_2O	2.2	lb/MMscf	AP-42 Table 1.4-2 (07/98)	0.02	0.09
Total GHG	120,004.5	lb/MMscf	AP-42 Table 1.4-2 (07/98)	1,176.04	5,151.07
CO_2e				1,182.99	5,181.49

Sample Calculation:

Fuel Usage (MMscf/yr) = (Max Fuel Combustion Rate, MMBtu/hr) / (Fuel heating Value, MMBtu/MMscf)
Fuel Usage (MMscf/yr) = (14.7 MMBtu/hr) / (1500 MMBtu/MMscf) x (8760 hr/yr) = 85.848 MMscf/yr

PM Total 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 Total Emissions (lb/hr) = (1.9 lb/MMscf) x (1500 MMBtu/MMscf) / (1,020 MMBtu/MMscf) x (85.85 MMscf/yr) / (8760 hr/yr) = 0.027 lb/hr

PM Total Emissions (ton/yr) = (Emissions, lb/hr) x (Hours of Operation, hr/yr) / (2,000 lb/ton)
PM Total Emissions (ton/yr) = (0.027 lb/hr) x (8760 hr/yr) / (2000 lb/ton) = 0.12 ton/yr

Hiland Partners Holdings LLC
Bethel Compressor Station

Emission Unit 5 - Hot Oil Heater - 14.7 MMBtu/hr

Maximum Fuel usage	85.85	MMscf/yr
Operating Hours	8,760	hr/yr
Unit Conversion	2,000	lb/ton

HAP	Emission Factor	Potential Hourly Emissions	Potential Annual Emisisons
	(lb/mmscf)	(lb/hr)	(tpy)
2-Methylnaphthalene	2.40E-05	2.35E-07	1.03E-06
3-Methylcholanthrene	1.80E-06	1.76E-08	7.73E-08
7,12-Dimethylbenz(a)anthracene	1.60E-05	1.57E-07	6.87E-07
Acenaphthene	1.80E-06	1.76E-08	7.73E-08
Acenaphthylene	1.80E-06	1.76E-08	7.73E-08
Anthracene	2.40E-06	2.35E-08	1.03E-07
Benz(a)anthracene	1.80E-06	1.76E-08	7.73E-08
Benzene	2.10E-03	2.06E-05	9.01E-05
Benzo(a)pyrene	1.20E-06	1.18E-08	5.15E-08
Benzo(b)fluoranthene	1.80E-06	1.76E-08	7.73E-08
Benzo(g,h,i)perylene	1.20E-06	1.18E-08	5.15E-08
Benzo(k)fluoranthene	1.80E-06	1.76E-08	7.73E-08
Chrysene	1.80E-06	1.76E-08	7.73E-08
Dibenz(a,h)anthracene	1.20E-06	1.18E-08	5.15E-08
Dichlorobenzene	1.20E-03	1.18E-05	5.15E-05
Fluoranthene	3.00E-06	2.94E-08	1.29E-07
Fluorene	2.80E-06	2.74E-08	1.20E-07
Formaldehyde	7.50E-02	7.35E-04	3.22E-03
Indeno(1,2,3-c,d)pyrene	1.80E-06	1.76E-08	7.73E-08
n-Hexane	1.80E+00	0.02	0.08
Naphthalene	6.10E-04	5.98E-06	2.62E-05
Phenanthrene	1.70E-05	1.67E-07	7.30E-07
Pyrene	5.00E-06	4.90E-08	2.15E-07
Toluene	3.40E-03	3.33E-05	1.46E-04
Total HAP Emissions		**0.0184**	**0.0808**

Sample Calculations

Potential Hourly Emissions (lb/hr) = Emission Factor (lb/mmscf) x Maximum Fuel Usage (MMscf/yr) *1/8760 hours
Potential Annual Emissions (tpy) = Potential Hourly Emissions (lb/hr) x 8,760 hr/hr x 1 lb/2000 ton

Bethel Compressor Station
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	68	0.67	2.95
	Light Liquid	0.0055	21	0.12	0.51
Pumps	Gas Vapor	0.00529	0	0.00	0.00
	Light Liquid	0.02866	0	0.00	0.00
Flanges [2]	Gas/Vapor	0.00086	951	0.82	3.58
	Light Liquid	0.000243	48	0.01	0.05
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				1.70	7.43
Gas/Vapor Emissions				1.57	6.88
Light Liquid Emissions				0.13	0.56

Component	Gas (wt%)	Gas/Vapor Emissions		Total Emissions [4]	
		(lb/hr)	(tpy)	(lb/hr)	(tpy)
CO_2	1.488	0.023	0.102	0.023	0.102
Nitrogen	2.035	0.032	0.140	0.032	0.140
H_2S	0.000	0.00E+00	0.00E+00	0.000	0.000
Methane	39.110	0.614	2.689	0.614	2.689
Ethane	21.370	0.336	1.470	0.336	1.470
Propane	16.456	0.258	1.132	0.258	1.132
i-Butane	3.006	0.047	0.207	0.047	0.207
n-Butane	9.297	0.146	0.639	0.146	0.639
i-Pentane	2.337	0.037	0.161	0.037	0.161
n-Pentane	3.263	0.051	0.224	0.051	0.224
Benzene	0.046	0.001	0.003	0.001	0.003
n-Hexane	0.373	0.006	0.026	0.006	0.026
Hexanes	0.726	0.011	0.050	0.011	0.050
Toluene	0.029	0.000	0.002	0.000	0.002
Heptanes	0.300	0.005	0.021	0.005	0.021
Ethylbenzene	0.004	0.000	0.000	0.000	0.000
Xylenes	0.017	0.000	0.001	0.000	0.001
Octanes	0.085	0.001	0.006	0.001	0.006
Nonanes	0.005	0.000	0.000	0.000	0.000
C10+	0.054	0.001	0.004	0.001	0.004
Total	**100.000**	**1.570**	**6.877**	**1.570**	**6.877**
Total VOC	**35.998**	**0.565**	**2.475**	**0.692**	**3.032**
Total HAPs	**0.469**	**0.007**	**0.032**	**0.007**	**0.032**

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.

Bethel Compressor Station
Produced Water Storage Tank Emissions

Equipment Data:

Emission Unit (EU):	**EU7**
Emission Unit Name:	Produced Water Storage Tank

Emissions Data:

Tank Contents = Produced Water
Tank Type = Vertical Fixed Roof
Tank Capacity = 16,800 gallons
Annual Throughput = 10,000 bbl/year per tank
Annual Throughput = 420,000 gallons/year per tank

Emission Unit	Standing Losses (lb/hr)	Working Losses (lb/hr)	Flashing Losses (lb/hr)	Total Losses + 20 % (lb/hr)	Standing Losses (ton/yr)	Working Losses (ton/yr)	Flashing Losses (ton/yr)	Total Losses + 20 % (ton/yr)
Produced Water Storage Tank	0.78	0.17	0.01	1.15	3.41	0.73	0.05	5.02

Notes:

1. Emissions calculated using ProMax model.
2. The liquid stored is essentially water. To be conservative, an additional 20 % safety factor was added to the emissions calculated via ProMax.

Bethel Compressor Station
NGL Truck Loading Emissions

Emissions Data:

Emission Unit (EU):	
Expected Max NGL Daily Volume =	70,000 gal/day
Expected Max NGL Annual Volume =	25,550,000 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	1.43

Notes:

1. The calculation of depressurized volume assumes that any residual vapors in the loading arm at 1 psig and all vapors from

Number of Trucks (#/yr) = Expected Max NGL Volume (gal/yr) /Avg Tank Truck capacity (gal)
Number of Trucks (#/yr) = 2,839 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) = 1.43 tpy

Bethel Compressor Station
Boosting Pigging Blowdown Emissions

Pig Receiver/Pig Launcher	Designation	Pigging Volume	Pig Receiver or Launcher 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)
High Pressure	Pigging	17	1,250	12	36.00	25.41	60	2.75	2750	33000	0.024	795	0.40
High Pressure	Pigging	17	1,250	12	36.00	25.41	60	2.75	2750	33000	0.024	795	0.40
High Pressure	Pigging	14	1,250	12	36.00	25.41	60	2.3	2300	27600	0.024	665	0.33
												Total Losses	**1.13**

Notes:
VOC weight percentage is from Topeka CS Gas Analysis 10-13-2020.
Molecular Weight of Gas = 25.41 approx
VOC Weight Percent = 36.00% approx
Universal Gas Content = 379.5 ft^3/lb-mol @ 60 F and 14.696 psia
Specific Gravity = 0.87739
Calculation:
Pound " X"/ scf = Wt Fraction (wt%) * MW of Gas * 1 lb mol/379.5 scf

lbs NM/E VOC/scf = 0.024

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)

Bethel Compressor Station
New Flare
Emission Unit 6

Emissions Summary

Emission Unit #	Emission Unit Description	PM Total (tpy)	NOx (tpy)	CO (tpy)	SOx (tpy)	VOC (tpy)	Total HAPs (tpy)	CO2e (tpy)	GHG (tpy)
Flare	Compressor Blowdowns	0.04	0.58	2.64	-	2.74	0.04	998	998
Flare	Other Gas and Purge Gas	0.16	2.15	9.79	-	10.14	0.14	3698	3694
Flare	Pilot Gas	0.01	0.13	0.11	0.001	0.01	0.002	0	0
Total Flare Emissions		**0.21**	**2.86**	**12.54**	**0.001**	**12.89**	**0.174**	**4696**	**4692**

Bethel Compressor Station
Site Emissions Summary

Emission Unit 6
Compressor Blowdowns

Compressor Blowdowns Design =	7.0	MMscfd
Compressor Blowdowns Design =	291,667	scfh (7 MMscfd*1000000 scf/MMscf*1 day/24 hours)
Compressor Blowdowns Estimated =	21.92	MCF/blowdown event
Number of Events =	234	number of blowdown events per year (max blowdowns events * 1.20)
Compressor Blowdowns Estimated =	5.13	MMscf/year (MMscf/event * number of events)
Hours of Events =	39.00	hours (10 minutes/event * 234 events * 1 hour/60 min)
Total Estimated scfh =	131,520	scfh (5.13 MMscf/year*1000000*1/39 hours)
Total Design scfh =	291,667	scfh
Total Design scfm =	4861	scfm
Gas Heating Value =	1,500	Btu/scf
Total Design MMBTU =	17,063	MMBTU/year
Total Design MMSCF=	11.4	MMscf/year

Component	Flow										Efficiency	VOC Emissions	
	MW	Wt %	Mol%	Vol%	lb/hr	tpy	scf/hr	MMscf/yr	mol/hr	mol/yr	%	(lb/hr)	(tpy)
Methane	16.043	39.12%	61.94%	61.94%	7,637.68	148.93	180,661.25	7.05	476.076	18,566.96	98%	152.7537	2.9787
Ethane	30.069	21.37%	18.06%	18.06%	4,173.14	81.38	52,666.25	2.05	138.79	5,412.63	98%	83.4627	1.6275
Propane	44.096	16.46%	9.48%	9.48%	3,213.64	62.67	27,655.83	1.08	72.88	2,842.25	98%	64.2728	1.2533
Iso-butane	58.122	3.01%	1.31%	1.31%	586.99	11.45	3,832.50	0.15	10.10	393.87	98%	11.7399	0.2289
N-butane	58.122	9.30%	4.06%	4.06%	1,815.48	35.40	11,853.33	0.46	31.24	1,218.19	98%	36.3097	0.7080
Iso-pentane	72.149	2.34%	0.82%	0.82%	456.38	8.90	2,400.42	0.09	6.33	246.70	98%	9.1276	0.1780
N-pentane	72.149	3.26%	1.15%	1.15%	637.16	12.42	3,351.25	0.13	8.83	344.42	98%	12.7432	0.2485
Cyclopentane	72.150	0.03%	0.011%	0.011%	6.10	0.12	32.08	0.00	0.08	3.30	98%	0.1220	0.0024
Cyclohexane	86.180	0.06%	0.019%	0.019%	12.59	0.25	55.42	0.00	0.15	5.70	98%	0.2517	0.0049
Other Hexanes	86.180	0.58%	0.171%	0.171%	113.27	2.21	498.75	0.02	1.31	51.26	98%	2.2653	0.0442
Methylcyclohexane	86.180	0.08%	0.024%	0.024%	15.90	0.31	70.00	0.00	0.18	7.19	98%	0.3179	0.0062
Heptanes +	100.200	0.39%	0.098%	0.098%	75.47	1.47	285.83	0.01	0.75	29.38	98%	1.5095	0.0294
2,2,4-Trimethylpentane	72.150	0.01%	0.004%	0.00%	2.22	0.04	11.67	0.00	0.03	1.20	98%	0.0444	0.0009
n-Hexane	86.180	0.37%	0.110%	0.11%	72.86	1.42	320.83	0.01	0.85	32.97	98%	1.4572	0.0284
Benzene	78.110	0.05%	0.015%	0.02%	9.01	0.18	43.75	0.00	0.12	4.50	98%	0.1801	0.0035
Toluene	92.140	0.03%	0.008%	0.01%	5.67	0.11	23.33	0.00	0.06	2.40	98%	0.1133	0.0022
Ethylbenzene	106.170	0.00%	0.001%	0.00%	0.82	0.02	2.92	0.00	0.01	0.30	98%	0.0163	0.0003
Xylenes	106.170	0.02%	0.004%	0.00%	3.26	0.06	11.67	0.00	0.03	1.20	98%	0.0653	0.0013
CO_2	44.01	1.49%	0.86%	0.86%	290.56	5.67	2,505.42	0.10	6.60	257.49	0%	290.5644	5.6660
N_2	28.01	2.04%	1.85%	1.85%	397.41	7.75	5,384.17	0.21	14.19	553.34	0%	397.4136	7.7496
TOTAL		100.0%	100.0%	100%	19,525.61	380.75	234.00	11.38	768.60	29,975.23	**TOTAL VOC**	**140.5362**	**2.7405**
Notes:											**TOTAL HAP**	**1.8766**	**0.0366**

1. Gas Mol % composition based on Topeka Gas Analysis. No sulfur related emissions from flare based on Topeka Gas Analysis.
2. VOC lb/hr and tons/yr based on 39 hours of compressor blowdowns and design scf/hr.

Emission Unit 6
Compressor Blowdowns

Pollutant	Emission Factor	Units	Emissions Factor Reference	Emissions (lb/hr)	Emissions (ton/yr)
PM Total	7.6	lb/MMscf	AP-42 Table 1.4-2 (07/98)	2.22	0.04
NOx	0.068	lb/MMBtu	AP-42 Table 13.5-1 (02/18)	29.75	0.58
CO	0.31	lb/MMBtu	AP-42 Table 13.5-2 (02/18)	135.63	2.64
GHG - CO2	116.98	lb/MMBtu	40 CFR 98 Subpart C Tables C-1 and C-2	51179	998
GHG - CH4	0.0022	lb/MMBtu	40 CFR 98 Subpart C Tables C-1 and C-2	0.96	0.02
GHG - N2O	0.0002	lb/MMBtu	40 CFR 98 Subpart C Tables C-1 and C-2	0.09	0.00
Total GHG	117.0	lb/MMBtu	40 CFR 98 Subpart C Tables C-1 and C-2	51180	998
CO_2e			Global warming potentials from 40 CFR 98 Subpart A Table A-1	51229	998

1.. Total lb/hr and tons/yr based on 39 hours of compressor blowdowns, yearly MMscf, and yearly MMBtu.

Sample Calculation:

NOx Emissions (lb/hr) = (Emission Factor, lb/MMscf) x (Processed Gas, MMscf/yr) x Gas Heating Value (MMBtu/MMscf) / (Hours of Operation, hr/yr)
NOx Emissions (lb/hr) = (0.068 lb/MMBtu) x (39 MMscf/yr) x (1500 MMBtu/MMscf / (39 hr/yr) = 29.75 lb/hr

NOx Emissions (ton/yr) = (Emission Factor, lb/MMscf) x (Processed Gas, MMscf/yr) x Gas Heating Value (MMBtu/MMscf) / (2,000 lb/ton)
NOx Emissions (ton/yr) = (0.068 lb/MMBtu) x (39.00 hours (10 minutes/event * 234 events * 1 hour/60 min)) x (1500 Btu/scf) / (2,000 lb/ton) = 0.58 ton/yr

Bethel Compressor Station
Site Emissions Summary

Emission Unit 6
Other Process Gas and Purge Gas

Other Process Gas to Flare =	40.80	MMscf /yr (2018 Metered Flow 20.4 MMscf * 2.0)
Purge Gas =	149.0	scf/hr (85 scfh + 64 scfh to prevent oxygen intrusion into the flare header)
Purge Gas =	1.3	MMscf/yr
Total Estimated (Purge + Other Process Gas) to Flare =	42.11	MMscf/yr (40.80 MMscf + 1.3 MMscf)
Total Estimated scf/hr =	4,807	scf/hr (42.11 MMscf * 1000000 scf/MMscf *1 year/8760 hours)
Gas Heating Value =	1,500	Btu/scf
Total scf/yr =	42,105,240	scf/yr
Total Estimated scf/hr =	4,807	scf/hr
Hours of Operation =	8,760	hr/yr
Total MMBTU =	63158	MMBTU/year

Component	Flow										Efficiency	VOC Emissions	
	MW	Wt %	Mol%	Vol%	lb/hr	tpy	scf/hr	MMscf/yr	mol/hr	mol/yr	%	(lb/hr)	(tpy)
Methane	16.04	39.11%	61.94%	61.94%	125.84	551.19	2,977.22	26.08	7.846	68,726.70	98%	2.5168	11.0238
Ethane	30.07	21.37%	18.06%	18.06%	68.77	301.23	867.92	7.60	2.29	20,035.16	98%	1.3755	6.0246
Propane	44.10	16.46%	9.48%	9.48%	52.96	231.98	455.76	3.99	1.20	10,520.76	98%	1.0593	4.6397
Iso-butane	58.12	3.01%	1.31%	1.31%	9.67	42.37	63.16	0.55	0.17	1,457.95	98%	0.1935	0.8474
N-butane	58.12	9.30%	4.06%	4.06%	29.92	131.04	195.34	1.71	0.51	4,509.22	98%	0.5983	2.6208
Iso-pentane	72.15	2.34%	0.82%	0.82%	7.52	32.94	39.56	0.35	0.10	913.16	98%	0.1504	0.6588
N-pentane	72.15	3.26%	1.15%	1.15%	10.50	45.99	55.23	0.48	0.15	1,274.87	98%	0.2100	0.9198
Cyclopentane	72.15	0.03%	0.011%	0.01%	0.10	0.44	0.53	0.00	0.00	12.21	98%	0.0020	0.0088
Cyclohexane	86.18	0.06%	0.019%	0.02%	0.21	0.91	0.91	0.01	0.00	21.08	98%	0.0041	0.0182
Other Hexanes	86.18	0.58%	0.171%	0.17%	1.87	8.18	8.22	0.07	0.02	189.73	98%	0.0373	0.1635
Methylcyclohexane	86.18	0.08%	0.024%	0.02%	0.26	1.15	1.15	0.01	0.00	26.63	98%	0.0052	0.0229
Heptanes +	100.20	0.39%	0.098%	0.10%	1.24	5.45	4.71	0.04	0.01	108.74	98%	0.0249	0.1090
2,2,4-Trimethylpentane	72.15	0.01%	0.004%	0.00%	0.04	0.16	0.19	0.00	0.00	4.44	98%	0.0007	0.0032
n-Hexane	86.18	0.37%	0.110%	0.11%	1.20	5.26	5.29	0.05	0.01	122.05	98%	0.0240	0.1052
Benzene	78.11	0.05%	0.015%	0.02%	0.15	0.65	0.72	0.01	0.00	16.64	98%	0.0030	0.0130
Toluene	92.14	0.03%	0.008%	0.01%	0.09	0.41	0.38	0.00	0.00	8.88	98%	0.0019	0.0082
Ethylbenzene	106.17	0.00%	0.001%	0.00%	0.01	0.06	0.05	0.00	0.00	1.11	98%	0.0003	0.0012
Xylenes	106.17	0.02%	0.004%	0.00%	0.05	0.24	0.19	0.00	0.00	4.44	98%	0.0011	0.0047
CO_2	44.01	1.49%	0.86%	0.86%	4.79	20.97	41.29	0.36	0.11	953.10	0%	4.7884	20.9731
N_2	28.01	2.04%	1.85%	1.85%	6.55	28.69	88.73	0.78	0.23	2,048.23	0%	6.5492	28.6855
TOTAL		100.0%	100.0%	100%	321.76	1,409.29	4,806.53	42.11	12.67	110,955.10	**TOTAL VOC**	**2.3160**	**10.1443**
											TOTAL HAP	**0.0309**	**0.1355**

** Note: Gas Mol % composition based on Topeka Gas Analysis. No sulfur related emissions from flare based on Topeka Gas Analysis.*

*** VOC lb/hr and tons/yr based on 8760 hours and estimated scf/hr.*

Emission Unit 6
Other Process Gas and Purge Gas

Pollutant	Emission Factor	Units	Emissions Factor Reference	Emissions (lb/hr)	Emissions (ton/yr)
PM Total	7.6	lb/MMscf	AP-42 Table 1.4-2 (07/98)	0.04	0.16
NOx	0.068	lb/MMBtu	AP-42 Table 13.5-1 (02/18)	0.0002	2.15
CO	0.31	lb/MMBtu	AP-42 Table 13.5-2 (02/18)	0.0011	9.79
GHG - CO2	116.98	lb/MMBtu	40 CFR 98 Subpart C Tables C-1 and C-2	0.4217	3694
GHG - CH4	0.0022	lb/MMBtu	40 CFR 98 Subpart C Tables C-1 and C-2	0.0000	0.07
GHG - N2O	0.0002	lb/MMBtu	40 CFR 98 Subpart C Tables C-1 and C-2	0.0000	0.01
Total GHG	117.0	lb/MMBtu	40 CFR 98 Subpart C Tables C-1 and C-2	0.4217	3694
CO_2e			Global warming potentials from 40 CFR 98 Subpart A Table A-1	0.42	3698

Sample Calculation:

NOx Emissions (lb/hr) = (Emission Factor, lb/MMscf) x (Processed Gas, MMscf/yr) x Gas Heating Value (MMBtu/MMscf) / (Hours of Operation, hr/yr)
NOx Emissions (lb/hr) = (0.068 lb/MMBtu) x (42.11 MMscf/yr) x (1500 MMBtu/MMscf / (8760 hr/yr) = 0.0002 lb/hr

NOx Emissions (ton/yr) = (Emission Factor, lb/MMscf) x (Processed Gas, MMscf/yr) x Gas Heating Value (Btu/scf) / (2,000 lb/ton)
NOx Emissions (ton/yr) = (0.068 lb/MMBtu) x (42.1 MMscf/yr (40.80 MMscf + 1.3 MMscf)) x (1500 Btu/scf) / (2,000 lb/ton) = 2.15 ton/yr

Bethel Compressor Station

Emission Unit 6
Pilot Gas

Fuel Usage =	100	scf/hr for each pilot
Number of Pilots =	2	
Total Fuel Usage =	200.00	scf/hr
Total Fuel Usage =	1.752	MMscf/year
Hours of Operation =	8,760	hr/yr
Max. Heat Input =	0.30	MMBtu/hr
Max. Heat Input =	2,628	MMBtu/year
Fuel Heating Value =	1,500	Btu/scf

Pollutant	Emission Factor	Units	Emission Factor Reference	Emissions (lb/hr)	Emissions (ton/yr)
PM Total	7.6	lb/MMscf	AP-42 Table 1.4-2 (07/98)	0.002	0.010
PM-10/PM-2.5 Filterable	1.9	lb/MMscf	AP-42 Table 1.4-2 (07/98)	0.001	0.002
PM Condensable	5.7	lb/MMscf	AP-42 Table 1.4-2 (07/98)	0.002	0.007
SOx	0.6	lb/MMscf	AP-42 Table 1.4-2 (07/98)	0.000	0.001
NOx	100	lb/MMscf	AP-42 Table 1.4-1 (07/98)	0.029	0.129
CO	84	lb/MMscf	AP-42 Table 1.4-1 (07/98)	0.025	0.108
VOC	5.5	lb/MMscf	AP-42 Table 1.4-2 (07/98)	0.002	0.007
Total HAPs	1.88	lb/MMscf	AP-42 Table 1.4-3 (July 1998)	0.001	0.002
Benzene	0.0021	lb/MMscf	AP-42 Table 1.4-3 (July 1998)	0.000	0.000
Formaldehyde	0.075	lb/MMscf	AP-42 Table 1.4-3 (July 1998)	0.000	0.000
Hexane	1.8	lb/MMscf	AP-42 Table 1.4-3 (July 1998)	0.001	0.002
GHG - CO2	116.98	lb/MMBtu	40 CFR 98 Subpart C Tables C-1 and C-2	0.000	0
GHG - CH4	0.0022	lb/MMBtu	41 CFR 98 Subpart C Tables C-1 and C-2	0.000	0
GHG - N2O	0.0002	lb/MMBtu	42 CFR 98 Subpart C Tables C-1 and C-2	0.000	0
Total GHG	117.0	lb/MMBtu	43 CFR 98 Subpart C Tables C-1 and C-2	0.000	0
CO2e	---	---	---	0.000	0

** Total HAPs emission factor is based on summation of all Emission Factors for Speciated Organic Compounds from Natural Gas Combustion (July 1998) in Table 1.4-3 (July 1998).*

Sample Calculation:

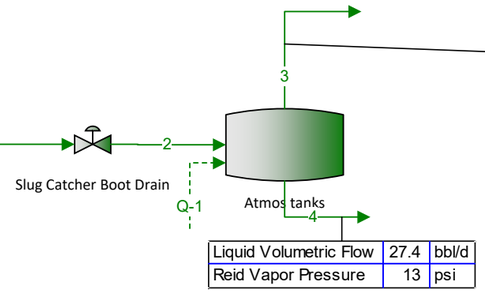
Fuel Usage (MMscf/yr) = (Max Heat Input, MMBtu/hr) / (Fuel Heating Value, MMBtu/MMscf)
Fuel Usage (MMscf/yr) = (0.3 MMBtu/hr) / (1500 MMBtu/MMscf) x (8760 hr/yr) = 1.752 MMscf/yr

PM Emissions (lb/hr) = (Emission Factor, lb/MMscf) x (Fuel Heating Value, Btu/scf) / (1,020 Btu/scf) x (Fuel Usage, MMscf/yr) / (Hours of Operation, hr/yr)
PM Emissions (lb/hr) = (7.6 lb/MMscf) x (1500 Btu/scf) / (1,020 Btu/scf) x (1.75 MMscf/yr) / (8760 hr/yr) = 0.002 ton/yr

PM Emissions (ton/yr) = (Emissions, lb/hr) x (Hours of Operation, hr/yr) / (2,000 lb/ton)
PM Emissions (ton/yr) = (0.0022 lb/hr) x (8760 hr/yr) / (2000 lb/ton) = 0.01 ton/yr

APPEDIX A: PROMAX SIMULATION REPORTS

Bethel Compressor Station
Produced Water Tank Analysis



Liquid Volumetric Flow	27.4	bbl/d
Reid Vapor Pressure	13	psi

Names	Units	To API
Water(Mole Fraction)	%	99.4*
Hydrogen Sulfide(Mole Fraction)	%	0*
CO2(Mole Fraction)	%	0.001*
Nitrogen(Mole Fraction)	%	0*
Methane(Mole Fraction)	%	0.003*
Ethane(Mole Fraction)	%	0.001*
Propane(Mole Fraction)	%	0.006*
Isobutane(Mole Fraction)	%	0.014*
n-Butane(Mole Fraction)	%	0.031*
Methanol(Mole Fraction)	%	0.048*
Isopentane(Mole Fraction)	%	0.011*
n-Pentane(Mole Fraction)	%	0.022*
Heptane(Mole Fraction)	%	0.032*
Octane(Mole Fraction)	%	0.019*
Nonane(Mole Fraction)	%	0.004*
Decane(Mole Fraction)	%	0.094*
2-Methylpentane(Mole Fraction)	%	0.005*
3-Methylpentane(Mole Fraction)	%	0.003*
Hexane(Mole Fraction)	%	0.005*
2,2,4-Trimethylpentane(Mole Fraction)	%	0.001*
Benzene(Mole Fraction)	%	0.017*
Toluene(Mole Fraction)	%	0.026*
Ethylbenzene(Mole Fraction)	%	0.002*
m-Xylene(Mole Fraction)	%	0.006*
p-Xylene(Mole Fraction)	%	0.026*
o-Xylene(Mole Fraction)	%	0.011*
TEG(Mole Fraction)	%	0.214*

Water(Mole Fraction)	1.42	%
Hydrogen Sulfide(Mole Fraction)	0	%
CO2(Mole Fraction)	1.24	%
Nitrogen(Mole Fraction)	0	%
Methane(Mole Fraction)	47.3	%
Ethane(Mole Fraction)	5.42	%
Propane(Mole Fraction)	11.5	%
Isobutane(Mole Fraction)	10.6	%
n-Butane(Mole Fraction)	15.7	%
Methanol(Mole Fraction)	0.00534	%
Isopentane(Mole Fraction)	2	%
n-Pentane(Mole Fraction)	3	%
Heptane(Mole Fraction)	0.336	%
Octane(Mole Fraction)	0.0526	%
Nonane(Mole Fraction)	0.00323	%
Decane(Mole Fraction)	0.0221	%
2-Methylpentane(Mole Fraction)	0.265	%
3-Methylpentane(Mole Fraction)	0.14	%
Hexane(Mole Fraction)	0.177	%
2,2,4-Trimethylpentane(Mole Fraction)	0.0114	%
Benzene(Mole Fraction)	0.45	%
Toluene(Mole Fraction)	0.205	%
Ethylbenzene(Mole Fraction)	0.0043	%
m-Xylene(Mole Fraction)	0.0118	%
p-Xylene(Mole Fraction)	0.0536	%
o-Xylene(Mole Fraction)	0.0188	%
TEG(Mole Fraction)	4.6e-09	%

Bethel Produced Water Tank

Annual tank loss calculations for "To API".
Total working and breathing losses from the Vertical Cylinder are 4.139 ton/yr.
Flashing losses are 0.05061 ton/yr.

* Only Non-Exempt VOCs are reported.
Vapor adjusted to ensure mass balance

Process Stream	To API	
Tank Geometry	Vertical Cylinder	
Shell Length	12	ft
Shell Diameter	20	ft
Number of Storage Tanks Employed	1	
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	-2.50E-02	psig
Roof Type	Cone	
Slope of Coned Roof	0.0625	
Roof Color	Tan	
Roof Paint Condition	Good	
Flashing Temperature	54.57398917	°F
Maximum Average Temperature	53.81666667	°F
Minimum Average Temperature	29.04166667	°F
Average Absolute Pressure	13.8185	psia
Daily Solar Insolation	1217.5	Btu/ft^2/day
Average Wind Speed	9.991666667	mi/h
Underground Tank?	TRUE	
Calculate Loading Losses?	TRUE	
Output Loading Losses?	FALSE	
Output Flashing Losses?	TRUE	
Output Working/Breathing Losses?	TRUE	

Atmospheric Pressure	13.82	psia
True Vapor Pressure at Average Temperature	12.38	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	16.55	
Flashing Losses	0.05	ton/yr
Total W/B Losses	4.14	ton/yr
Working Losses per Tank	0.73	ton/yr
Standing Losses per Tank	3.4057	ton/yr
Rim Seal Losses per Tank	0	ton/yr
Withdrawal Loss per Tank	0	ton/yr
Deck Fitting Losses per Tank	0	ton/yr
Deck Seam Losses per Tank	0	ton/yr

ProMax AP-42 Emissions Report
Annual Emissions
Vertical Cylinder

Components	Working Losses (ton/yr)	Breathing Losses (ton/yr)	Total Losses (ton/yr)
Mixture	0.7330	3.4060	4.1390
Propane	0.0381	0.1770	0.2151
Isobutane	0.1201	0.5581	0.6782
n-Butane	0.2674	1.2420	1.5100
Methanol	0.0001	0.0004	0.0005
Isopentane	0.0871	0.4044	0.4915
n-Pentane	0.1297	0.6024	0.7320
Heptane	0.0191	0.0886	0.1076
Octane	0.0033	0.0154	0.0187
Nonane	0.0002	0.0010	0.0013
Decane	0.0016	0.0076	0.0093
2-Methylpentane	0.0134	0.0624	0.0759
3-Methylpentane	0.0071	0.0328	0.0399
Hexane	0.0089	0.0411	0.0500
2,2,4-Trimethylpentane	0.0007	0.0034	0.0042
Benzene	0.0205	0.0951	0.1155
Toluene	0.0107	0.0497	0.0604
Ethylbenzene	0.0003	0.0012	0.0014
m-Xylene	0.0007	0.0032	0.0039
p-Xylene	0.0031	0.0146	0.0177
o-Xylene	0.001098	0.005099	0.006197
TEG	2.72E-10	1.26E-09	1.54E-09

Flashing Emissions Report
Annual Emissions
Tank flashed at the daily maximum surface temperature (54.57 °F) and the average atmospheric pressure of Williston, North Dakota (13.82 psia)

Components	Flashing Losses (ton/yr)
Mixture	0.0506
Propane	0.0099
Isobutane	0.0122
n-Butane	0.0181
Methanol	0.0000
Isopentane	0.0029
n-Pentane	0.0043
Heptane	0.0007
Octane	0.0001
Nonane	0.0000
Decane	0.0001
2-Methylpentane	0.0005
3-Methylpentane	0.0002
Hexane	0.0003
2,2,4-Trimethylpentane	0.0000
Benzene	0.0007
Toluene	0.0004
Ethylbenzene	0.0000
m-Xylene	0.0000
p-Xylene	0.0001
o-Xylene	4.08E-05
TEG	1.53E-11

Source

Shell Length		12	ft
Shell Diameter		20	ft
Breather Vent Pressure		0.25	psig
Breather Vacuum Pressure		-0.025	psig
Operating Pressure		0.25	psig
Average Fraction Fill of Tank		50	%
Maximum Fraction Fill of Tank		90	%
Net Throughput		27.397	bbl/day
Overall Reduction Efficiency		0	
Maximum Hourly Loading Rate		140	gpm
Flashing Temperature		54.57398917	°F
Land Based Mode of Operation	Submerged Loading: Dedicated Normal Service		
Cargo Carrier	Tank Truck or Rail Tank Car		

APPEDIX B: FLARE MANUFACTURER INFORMATION

Kinder Morgan Bethel Air-Assist Flare FL-401 Specification Sheet
MRW Technologies, Inc.
Model Number: 032101-AAF
PO# 6637390-0-KMPO

Expected Destruction Removal Efficiency (DRE):	98% or Greater of Non-Methane Hydrocarbons (Smokeless Capacity)
Unit Size:	2.0-ft Diameter 50-ft Overall Height
Smokeless Capacity	
Design Flow Rate (lb/hr):	3,947
Design Flow Rate (MMSCFD):	1.25
Design Heat Release (MMBTU/hr):	78.5
Emergency Capacity (Non-smokeless)	
Design Flow Rate (lb/hr):	22,105
Design Flow Rate (MMSCFD):	7.0
Design Heat Release (MMBTU/hr):	439
Temperature (°F):	-67.17
Maximum Tip Velocity, STP (ft/s):	158
Maximum Pressure Drop (psi):	1 psig
Atmospheric Pressure (psia):	13.5 psia
Vapor MW:	28.8
Approximate Ground Level Radiation, Including Solar (BTU/hr-ft^2):	1,700
Vapor Heating Value (LHV, BTU/SCF):	1,502
Purge Flow Rate:	85 SCFH
Purge/Fuel Media:	Natural Gas
Pilot Ignition Type:	Self-Inspirated Flame Front Ignition
Pilot Operation:	Continuous
Pilot Fuel Consumption:	100 SCFH or less / pilot
Number of Pilots:	2
Pilot Monitoring Device:	Thermocouple
Automatic Ignition:	Included
Remote Alarm Indication:	Included

C O M B U S T I O N S Y S T E M S
2301 West 171st Street S., Glenpool, OK 74033 • tel: 918.827.6030 • fax: 918.827.6034 • email: mrw@mrw-tech.com

APPENDIX C: GAS AND LIQUID ANALYSES

Topeka Compressor Station
Gas Analysis

Sample name	Gas Taken Before Dehydrator
Sample location	Topeka Compressor Station
Sample temperature and pressure	85 °F, 1080 psig
Date of sample	10/13/2020
Specific Gravity	0.87739

Component	**MW (g/mol)**	**Mole %**	**Gas Weight (lb/lbmol)**	**Weight %**
CO2	44.010	0.8590	0.378	1.4879
Nitrogen	28.013	1.8460	0.517	2.0353
methane (C1)	16.042	61.9410	9.937	39.1096
ethane (C2)	30.069	18.0570	5.430	21.3697
propane (C3)	44.096	9.4820	4.181	16.4562
iso-butane (C4)	58.122	1.3140	0.764	3.0059
nor-butane (C4)	58.122	4.0640	2.362	9.2967
iso-pentane (C5)	72.149	0.8230	0.594	2.3370
nor pentane	72.149	1.1490	0.829	3.2628
Cyclopentane	72.149	0.0110	0.008	0.0312
2,2,4 Trimethyl pentane	72.149	0.0040	0.003	0.0114
n-Hexane	86.180	0.1100	0.095	0.3731
Cyclohexane	86.180	0.0190	0.016	0.0644
Other hexanes	86.180	0.1710	0.147	0.5800
Methylcyclohexane	86.180	0.0240	0.021	0.0814
heptane (C7+)	100.200	0.0760	0.076	0.2997
octane (C8+)	114.230	0.0190	0.022	0.0854
nonane (C9+)	128.260	0.0010	0.001	0.0050
decane (C10+)	142.290	0.0020	0.003	0.0112
benzene	78.110	0.0150	0.012	0.0461
toluene	92.140	0.0080	0.007	0.0290
Ethylbenzene	106.170	0.0010	0.001	0.0042
xylenes (M, P, O)	106.170	0.0040	0.004	0.0167
H2S	34.082	0.0000	0.000	0.0000
Total		100.0000	25.4078	100.0000
Vapor MW (lb/lb-mol)		**25.408**		
VOC Weight (%)		**35.9975**		
HAPs Weight (%)		**0.4805**		

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-1
Date Tested 9-3-2020

Sample Identification ..... **PRODUCED WATER**
BETHEL STATION
Sample Location ..... NORTH DAKOTA
Sample Pressure ..... 125 PSIG
Type Sample ..... SPOT
Test Method ..... GPA 2186M

Sample Temperature ..... 34 F
County ..... N/A
Cylinder ID ..... KMI 1212

Components	Mole %	Weight %	Liq. Vol. %
Water	99.398	96.298	95.787
Hydrogen Sulfide	0.000	0.000	0.000
Carbon Dioxide	0.001	0.002	0.003
Nitrogen	0.000	0.000	0.000
Methane	0.003	0.003	0.009
Ethane	0.001	0.002	0.005
Propane	0.006	0.014	0.028
iso-Butane	0.014	0.044	0.077
n-Butane	0.031	0.097	0.165
Methanol	0.048	0.083	0.103
iso-Pentane	0.011	0.043	0.068
n-Pentane	0.022	0.085	0.135
Hexanes	0.008	0.037	0.056
Heptanes	0.032	0.172	0.249
Octanes	0.019	0.117	0.164
Nonanes	0.004	0.028	0.038
Decanes+	0.094	0.761	1.023
Benzene	0.017	0.071	0.080
Toluene	0.026	0.129	0.147
Ethylbenzene	0.002	0.011	0.013
Xylenes	0.043	0.246	0.282
n-Hexane	0.005	0.023	0.035
2,2,4-Trimethylpentane	0.001	0.006	0.009
Glycol	0.214	1.728	1.525
Totals	**100.000**	**100.000**	**100.000**

ADDITIONAL BETX DATA

Components	Mole %	Weight %	Liq. Vol. %
2-Methylpentane	0.005	0.024	0.036
3-Methylpentane	0.003	0.013	0.019
n-Hexane	0.005	0.023	0.035
2,2,4-Trimethylpentane	0.001	0.006	0.009
Benzene	0.017	0.071	0.080
Toluene	0.026	0.129	0.147
Ethylbenzene	0.002	0.011	0.013
m-Xylene	0.006	0.037	0.042
p-Xylene	0.026	0.147	0.169
o-Xylene	0.011	0.061	0.070

API GRAVITY AT 60/60 F, calculated	**10.75**
SPECIFIC GRAVITY AT 60/60 F, calculated	**0.99469**
RELATIVE SPECIFIC GRAVITY OF DECANES+ (C10+) FRACTION, calculated	**0.73984**
AVERAGE MOLECULAR WEIGHT	**18.595**
AVERAGE MOLECULAR WEIGHT OF DECANES+ (C10+) FRACTION, calculated	**150.558**
TRUE VAPOR PRESSURE AT 100 F, PSIA, calculated	**1.150**
AVERAGE BOILING POINT, F, calculated	**214.789**
CUBIC FEET OF GAS / GALLON OF LIQUID, as Ideal Gas, calculated	**168.886**
BTU / GALLON OF LIQUID AT 14.73 PSIA, calculated	**11,711.87**
LBS / GALLON OF LIQUID, calculated	**8.293**

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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CERTIFICATE OF ANALYSIS

OXYGENATES IN HYDROCARBON GASES

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

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

Study Number CR-1B
Date Tested 9-9-2020

Sample Location ..... BETHEL STATION, WATFORD CITY, NORTH DAKOTA.
Sample Pressure ..... 125 PSIG
Sample Type..... SPOT
Test Method ..... ASTM D-7423

Sample Temperature ..... 34 F
County ..... N/A
Sample Container ..... AMR 041

Component	Concentration, ppm by Volume
Dimethyl Ether (DME)	4.30 PPMV
Acetone	16.08 PPMV
sec-Butyl Methyl Ether	< 1.0 PPMV
Methyl tert-Butyl Ether (MTBE)	< 1.0 PPMV
Methyl Ethyl Ketone (MEK)	11.96 PPMV
Methyl Alcohol (MeOH)	828.94 PPMV
Ethyl tert-Butyl Ether (EtBE)	< 1.0 PPMV
Ethyl Alcohol (EtOH)	1.16 PPMV
tert-Amyl Methyl Ether (TAME)	< 1.0 PPMV
iso-Propanol (IPA)	27.22 PPMV
tert-Butyl Alcohol (tBA)	< 1.0 PPMV
n-Propanol (nPA)	6.47 PPMV
sec-Butyl Alcohol	< 1.0 PPMV
2-Methyl-1-Propanol	< 1.0 PPMV
Butyl Alcohol	< 1.0 PPMV
Total Glycols (EG, DEG, TEG)	17,280.15 PPMV
Total Oxygenates	18,176.28 PPMV

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

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EXTENDED HYDROCARBON GAS (GLYCALC) STUDY

CERTIFICATE OF ANALYSIS

Company ..... **KINDER MORGAN, INC.**
Lab Number CR-20925
Date Sampled 10-13-2020
Time Sampled ..... 8:00 AM
Method of Analysis ..... Dual TCD-FID Chromatography

Study Number CR-28
Date Tested 10-22-2020
Time Tested ..... 11:22 AM
Ambient Temp at Sampling ..... N/A

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

Sample Location ..... NORTH DAKOTA
Type Sample ..... Spot
Effective Date ..... N/A
Sample Pressure ..... 1,080 PSIG
Cylinder ID ..... AMR 527
Instrument Used ..... Shimadzu GC-2014
Sample Method ..... Trap & Purge
Test Method GPA-2286

County ..... N/A
Composite From ..... N/A
Sample Temperature ..... 85 F
Cylinder Heated To ..... 130 F
Calibration Date 10-22-2020
Un-Normalized Total ..... 98.381 %
Sampled By ..... KMI - K. Knutson

Components	Mole %	Weight %	Liq. Vol. %
Carbon Dioxide	0.859	1.488	0.701
Hydrogen Sulfide	0.000	0.000	0.000
Nitrogen	1.846	2.035	0.971
Methane	61.941	39.104	50.213
Ethane	18.057	21.366	23.092
Propane	9.482	16.454	12.492
iso-Butane	1.314	3.005	2.056
n-Butane	4.064	9.295	6.127
iso-Pentane	0.823	2.337	1.439
n-Pentane	1.149	3.262	1.992
Cyclopentane	0.011	0.030	0.016
n-Hexane	0.110	0.373	0.216
Cyclohexane	0.019	0.063	0.031
Other Hexanes	0.171	0.580	0.334
Heptanes	0.076	0.300	0.168
Methylcyclohexane	0.024	0.093	0.046
2,2,4-Trimethylpentane	0.004	0.018	0.010
Benzene	0.015	0.046	0.020
Toluene	0.008	0.029	0.013
Ethylbenzene	0.001	0.004	0.002
Xylenes	0.004	0.017	0.007
Octanes	0.019	0.085	0.047
Nonanes	0.001	0.005	0.003
Decanes +	0.002	0.011	0.006
Totals	**100.000**	**100.000**	**100.000**

ADDITIONAL BETX DATA

Components	Mole %	Weight %	Liq. Vol. %
Cyclopentane	0.011	0.030	0.016
Cyclohexane	0.019	0.063	0.031
2-Methylpentane	0.122	0.415	0.239
3-Methylpentane	0.049	0.165	0.095
n-Hexane	0.110	0.373	0.216
Methylcyclohexane	0.024	0.093	0.046
2,2,4-Trimethylpentane	0.004	0.018	0.010
Benzene	0.015	0.046	0.020
Toluene	0.008	0.029	0.013
Ethylbenzene	0.001	0.004	0.002
m-Xylene	0.001	0.003	0.001
p-Xylene	0.002	0.010	0.004
o-Xylene	0.001	0.004	0.002
Hexanes, Total	0.311	1.046	0.596
Heptanes, Total	0.119	0.456	0.244
Octanes, Total	0.032	0.135	0.069
Nonanes, Total	0.001	0.005	0.003
Decanes+, Total	0.002	0.011	0.006

SPECIFIC GRAVITY AT 60/60 F, calculated	0.87739
TOTAL GPM (ETHANE INCLUSIVE)	10.036
CALCULATED BTU / REAL CF AT 14.73 PSIA, dry basis	1472.156
CALCULATED BTU / REAL CF AT 14.73 PSIA, wet basis	1446.797
AVERAGE MOLECULAR WEIGHT	25.412
MOLAR MASS RATIO	0.87739
RELATIVE DENSITY (G x Z (Air) / Z), calculated	0.88211
IDEAL GROSS HEATING VALUE, BTU / IDEAL CF AT 14.696 PSIA, calculated	1460.924
COMPRESSIBILITY FACTOR (Z)	0.99465

ETHANE GPM	4.8167
PROPANE GPM	2.6056
iso-BUTANE GPM	0.4289
n-BUTANE GPM	1.2779
iso-PENTANE GPM	0.3002
n-PENTANE GPM	0.4154
GASOLINE RANGE (HEXANES+) GPM	0.1914

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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