MPLX
1515 Arapahoe St, Tower 1, Suite 1600
Denver, CO 80202
MPLX.com

SUBMITTAL VIA CERIS-ND ONLINE PLATFORM

July 20, 2023

Craig Thorstenson
Manager, Permitting Program
North Dakota Department of Environmental Quality
Air Quality Division
4201 Normandy Street
Bismarck, ND 58503-1324

Re: Andeavor Field Services LLC
Robinson Lake Gas Plant (AOP-28404 vl.0)
Federally Enforceable Limits for Glycol Dehydrators

Dear Mr. Thorstenson,

On behalf of Andeavor Field Services LLC (Andeavor), MPLX is requesting federally enforceable permit limits for the three glycol dehydrators located at the Robinson Lake Gas Plant located in Mountrail County, North Dakota. The facility operates under Permit AOP-28404 vl.0. The affected dehydrator emission units are as follows:

- DEHY-1 [87.5-MMscfd ethylene glycol (EG) dehydration unit]
- DEHY-2 [87.5-MMscfd EG dehydration unit]
- DEHY-3 [60.0-MMscfd triethylene glycol (TEG) dehydration unit]

Specifically, MPLX is requesting limits for parameters in the table below that would create federally enforceable limits for VOC and HAP emissions. These parameters are inputs used in the GLYCalc 4.0 emissions modeling that calculated the potential to emit (PTE) for the dehydrators.

Parameter	DEHY-1	DEHY-2	DEHY-3
Dry Gas Throughput, annualized (MMscfd)	87.5	87.5	60.0
Glycol Flow Rate, design maximum (gpm)	13	13	10

In addition, MPLX is requesting a federally enforceable permit limit for methanol that is emitted from the two EG dehydrators of 4.9 tons per year.

Supporting information is attached with this application and includes:

- Permit to Construct (PTC) application narrative, including a summary of state and federal rule applicability. MPLX is also requesting that the requirements be incorporated into a revised Title V operating permit and processed concurrently with the PTC.

- Applicable air quality permit application forms (CERIS-ND attachments: SFN 8516, SFN 58923, SFN 59652, SFN 52858, SFN 61006, SFN 61008)

- A summary of dehydration unit emissions (Attachment B)

- Supporting documentation for dehydration unit emissions and federally enforceable limits (Attachment C)

The $325 Permit to Construct filing fee payment per NDAC 33.1-15-23-02 is being submitted through CERIS-ND.

If you have any questions regarding this request, please contact me at (303) 454-6685 or THGibbons@marathonpetroleum.com.

Sincerely,

Thomas H. Gibbons
Advanced Environmental Specialist

Attachment: Application

Permit to Construct Application

for

Robinson Lake Gas Plant

Mountrail County, North Dakota

Prepared By:

MPLX

1515 Arapahoe Street, Tower 1, Suite 1600
Denver, CO 80202

Submitted To:

North Dakota Department of Environmental Quality

Air Quality Division
4201 Normandy Street
Bismarck, ND 58503-1324

July 2023

Contents

1.0 Source and Update Description 2
1.1 Facility Background 2
1.1.1 Current Process Description 2
1.2 Project Description 3
2.0 Project Emissions 5
2.1 Emission Calculation Methodology 7
2.1.1 Dehydration Units (DEHY-1, DEHY-2, DEHY-3) 7
2.1.2 Tanks and Dehydrators Unit Flare (FLARE-3) 7
2.1.3 Backup Flare & DEHY-3 Flare (FLARE-2) 7
3.0 Regulatory Review 8
3.1 North Dakota Rules 8
3.1.1 33.1-15-07: Control of Organic Compound Emissions 8
3.1.2 33.1-15-14: Designated Air Contaminant Sources, Permit to Construct, Minor Source Permit to Operate, Title V Permit to Operate 8
3.1.3 33.1-15-15: Prevention of Significant Deterioration of Air Quality 8
3.1.4 33.1-15-16: Restriction of Odorous Air Contaminants 9
3.1.5 33.1-15-22: Emission Standards for Hazardous Air Pollutants from Source Categories 9
3.2 40 CFR 63: National Emission Standards for Hazardous Air Pollutants (NESHAP) 9
3.2.1 Subpart A 9
3.2.2 Subpart HH 9
3.3 40 CFR 64: Compliance Assurance Monitoring (CAM) 10
3.4 40 CFR 98: GHG Mandatory Reporting Rule (MRR) 10

List of Tables

Table 1-1 Significant Emission Sources 4
Table 1-2 Insignificant Emission Sources 4
Table 2-1 Robinson Lake Gas Plant PTE 6
Table 3-1 Controlled Potential-to-Emit 9

List of Attachments

Attachment A NDDEQ Division of Air Quality Permitting Forms
Attachment B Potential-to-Emit Calculations
Attachment C Supporting Documentation for Dehydration Unit Emissions and Federally Enforceable Limits

1.0 Source and Update Description

1.1 Facility Background

Andeavor Field Services LLC (Andeavor) owns and operates the Robinson Lake Gas Plant (Plant). The facility is located approximately four miles south of Belden, North Dakota at the southeast corner of the intersection of Highway 8 and 45th Street NW in Mountrail County (NW ¼, NW ¼, Section 23, Township 153N, Range 91W), which is classified as in attainment or unclassifiable for the National Ambient Air Quality Standards (NAAQS). The facility was acquired by Andeavor on January 1, 2017.

1.1.1 Current Process Description

The Plant receives natural gas from a number of production facilities in the Sanish Field, which is captured by gathering lines and routed to the facility inlet. The Plant is currently designed to handle approximately 150 MMscf/day and permitted to handle up to 155 MMscf/day. Inlet gas passes through an inlet separation process where entrained liquids are separated with a knockout vessel. Any entrained condensate or produced water is routed to one of two 400-bbl Condensate Tanks (TANKS) and one 400-bbl Produced Water Storage Tank (PW-TANKS), respectively. The condensate is loaded out by truck (TL-1) and the produced water is as well (TL-3). The two condensate storage tanks are controlled by the Tanks and EG Dehydrators Unit Flare (FLARE-3). FLARE-2 serves as back-up for FLARE-3.

The gas stream from the inlet separator is routed to the Plant's electric-driven inlet compression, where it is compressed from approximately 10-50 psig to 500 psig and subsequently routed to one of the two natural gas liquid (NGL) plants. In the NGL plants, ethylene glycol (EG) is injected at multiple points to prevent hydrate formation. The rich EG is recovered in the cold separators and routed to the EG Regenerators (DEHY-1 and DEHY-2) where it is heated to drive off the adsorbed water. High moisture inlet gas is optionally routed to the TEG Dehydrator (DEHY-3) to supplement water removal prior to being sent to DEHY-1 and DEHY-2. The regenerated (lean) EG is recycled back to the NGL plants. Regenerator still vent emissions are routed to a condenser and eventually FLARE-3. Regenerator flash tank vapors are captured and routed back to the facility inlet. Hot Oil Heaters (HTR-1 and HTR-2) supply heat to the NGL plants, DEHY-1, and DEHY-2. Methanol stored in the 400-bbl Methanol Storage Tank (MT-1) is injected instead of EG in the event an EG regenerator is inoperable. Vapors from MT-1 are routed to FLARE-3. Rich TEG from the dehydrator contactor tower is regenerated at the TEG Reboiler (DEHY-3) in a process similar to the EG regenerators and returned as lean TEG to the process. The TEG Reboiler still vent emissions are routed to a condenser and eventually FLARE-2. For DEHY-3, FLARE-3 serves as back-up for FLARE-2. TEG Reboiler Flash Tank vapors are routed to the fuel gas system. Heat to DEHY-3 is provided by the Reboiler Heater (RBLR-3). Gas from the NGL plant cold separators is routed to the Plant's electric-driven residue compression where it is compressed to approximately 800 psig and sent to the Stanley Booster Station.

Produced NGLs are routed to the pressurized bullet storage tanks which do not have any associated point source air emissions. NGLs are unloaded as needed via pressurized Truck Loadout (TL-2). Produced natural gasoline from the NGL plant is stored in four 400-bbl Natural Gasoline Tanks (STABTANKS) and trucked out as necessary (TL-4). The Plant currently has three emergency generator engines (GEN-1, GEN-2, and GEN-3) that are used in the event of power loss. The Facility Process and Emergency Flare (FLARE-1) combusts

compressor blowdown emissions, natural gasoline truck loadout emissions, and either facility inlet or residue gas during upset events.

1.2 Project Description

As requested by EPA, Andeavor submits this Permit to Construct (PTC) application to seek federally enforceable permit limits for the three glycol dehydrators. Specifically, Andeavor is requesting limits for parameters in the table below that would create federally enforceable limits for VOC and HAP emissions. These parameters are inputs used in the GLYCalc 4.0 emissions modeling that calculated the potential to emit (PTE) for the dehydrators.

Parameter	DEHY-1	DEHY-2	DEHY-3
Dry Gas Throughput, annualized (MMscfd)	87.5	87.5	60.0
Glycol Flow Rate, maximum (gpm)	13	13	10

Compliance monitoring for the above parameters will be accomplished by:

- Tracking annual runtime for each unit
- Monthly averages of the dry gas throughput rates for each unit
- Use of glycol pumps with design ratings that do not exceed the specified gpm rates

In addition, MPLX is requesting a federally enforceable permit limit for methanol that is emitted from the two EG dehydrators of 4.9 tons per year (tpy). This is to account for methanol entering the plant from upstream producers and injected into the process at the plant. A VMG simulation model estimated methanol emissions of 2.0 tpy from field and plant injection. The requested limit of 4.9 tpy is based on a conservative estimate of the modeled emissions and accounts for control by the dehy condenser and flare. Compliance with the limit will be based on a mass balance calculation.

This Plant is a major source of air contaminants (with respect to Title V) and will remain a minor source with respect to the Prevention of Significant Deterioration (PSD) program. All processes at the Plant will remain as described in AOP-28404 v1.0 issued on November 16, 2021. No equipment changes are proposed. Table 1-1 presents the status of the significant emission sources at the Plant. Table 1-2 presents the status of the insignificant emission sources at the Plant.

In addition to this PTC requesting federally enforceable limits, MPLX is also requesting that the requirements be incorporated into a revised Title V operating permit and processed concurrently with the PTC. Accordingly, the Title V forms are included with this application.

Table 1-1 Significant Emission Sources

Emission Unit ID	Emission Unit Description	Control Equipment
DEHY-1	87.5 MMscfd EG Dehydration Unit	Condenser and FLARE-3/FLARE-2
DEHY-2	87.5 MMscfd EG Dehydration Unit	Condenser and FLARE-3/FLARE-2
DEHY-3	60 MMscfd TEG Dehydration Unit	Condenser and FLARE-2/FLARE-3
HTR-1	43.64 MMBtu/hr Hot Oil Heater	None
HTR-2	43.64 MMBtu/hr Hot Oil Heater	None
GB-1	(1) 400 bbl Gunbarrel Tank	FLARE-3/FLARE-2
TANKS	(3) 400 bbl Condensate Tanks	FLARE-3/FLARE-2
STABTANKS	(8) 400 bbl Natural Gasoline Tanks	FLARE-3/FLARE-2
TL-1	Condensate Loadout	FLARE-1
TL-1 FUG	Uncollected Condensate Loadout Fugitives	None
TL-4	Natural Gasoline Loadout	FLARE-1
TL-4 FUG	Uncollected Natural Gasoline Loadout Fugitives	None
FLARE-1	Facility Process and Emergency Flare	N/A
FLARE-2	DEHY-3 Flare (and Back-up to FLARE-3)	N/A
FLARE-3	Tanks and EG Dehydrators Unit Flare (and Back-up to FLARE-2)	N/A
FUG-1	Facility Process Piping Fugitives	OOOOa LDAR Program

Table 1-2 Insignificant Emission Sources

Emission Unit ID	Emission Unit Description	Control Equipment
RBLR-3	0.75 MMBtu/hr TEG Reboiler	None
PW-TANKS	(3) 400 bbl Produced Water Storage Tanks	FLARE-3/FLARE-2
MT-1	(1) 400 bbl Methanol Storage Tank	FLARE-3/FLARE-2
TL-2	NGL Loadout	Recycle or FLARE-1
TL-3	Produced Water Loadout	None
GEN-1	Cummins 755 bhp Diesel Generator	None
GEN-2	Caterpillar 230 bhp Diesel Generator	None
GEN-3	Cummins 755 bhp Diesel Generator	None

Insignificant emissions are defined in NDAC 33.1-15-14-06.4.C.

2.0 Project Emissions

Descriptions of each emission source and the calculation methodology are provided in the following sections. Potential-to-emit (PTE) calculations and summaries are presented in Attachment B. Table 2-1 shows the facility's PTE.

Table 2-1 Robinson Lake Gas Plant PTE

Emission Unit ID	Emission Unit Description	NO_X (tpy)	CO (tpy)	VOC (tpy)	SO_2 (tpy)	PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Total HAP (tpy)	CO_2e (tpy)
DEHY-1	87.5 MMscfd EG Dehydration Unit	--	--	1.29	--	--	--	--	1.03	0.70
DEHY-2	87.5 MMscfd EG Dehydration Unit	--	--	1.29	--	--	--	--	1.03	0.70
DEHY-3	60 MMscfd TEG Dehydration Unit	--	--	0.58	--	--	--	--	0.02	0.94
HTR-1	43.64 MMBtu/hr Hot Oil Heater	18.74	15.74	1.03	0.11	1.42	1.42	1.42	0.35	22,323.04
HTR-2	43.64 MMBtu/hr Hot Oil Heater	18.74	15.74	1.03	0.11	1.42	1.42	1.42	0.35	22,323.04
RBLR-3	0.75 MMBtu/hr TEG Reboiler	0.32	0.27	0.02	<0.01	0.02	0.02	0.02	<0.01	383.65
GB-1	(1) 400 bbl Gunbarrel Tank	--	--	4.60	--	--	--	--	0.42	6.19
TANKS	(3) 400 bbl Condensate Tanks	--	--	0.30	--	--	--	--	0.03	0.40
PW-TANKS	(3) 400 bbl Produced Water Storage Tanks	--	--	<0.01	--	--	--	--	<0.01	0.00
MT-1	(1) 400 bbl Methanol Storage Tank	--	--	<0.01	--	--	--	--	<0.01	--
STABTANKS	(8) 400 bbl Natural Gasoline Tanks	--	--	0.93	--	--	--	--	0.05	--
TL-1	Condensate Loadout	--	--	0.40	--	--	--	--	--	--
TL-1 FUG	Uncollected Condensate Loadout Fugitives	--	--	8.50	--	--	--	--	--	--
TL-2	NGL Loadout	--	--	0.03	--	--	--	--	--	--
TL-3	Produced Water Loadout	--	--	0.02	--	--	--	--	--	--
TL-4	Natural Gasoline Loadout	--	--	1.79	--	--	--	--	--	--
TL-4 FUG	Uncollected Natural Gasoline Loadout Fugitives	--	--	38.35	--	--	--	--	--	--
FLARE-1	Facility Process and Emergency Flare	43.72	199.31	80.60	--	--	--	--	4.65	75,028.21
FLARE-2	Back-up Flare	0.06	0.28	0.01	--	--	--	--	0.00	107.23
FLARE-3	Tanks and Dehydrators Unit Flare	0.53	2.43	0.07	--	--	--	--	<0.01	914.51
GEN-1	Cummins 755 bhp Diesel Generator	1.99	1.09	0.12	<0.01	0.06	0.06	0.06	<0.01	196.88
GEN-2	Caterpillar 230 bhp Diesel Generator	0.38	0.33	0.04	<0.01	0.02	0.02	0.02	<0.01	65.72
GEN-3	Cummins 755 bhp Diesel Generator	1.99	1.09	0.12	<0.01	0.06	0.06	0.06	<0.01	196.88
FUG-1	Fugitives	--	--	3.67	--	--	--	--	0.04	47.48
Total		**86.47**	**236.28**	**144.81**	**0.23**	**3.02**	**3.02**	**3.02**	**8.01**	**121,596**

*Facility PTE based on FLARE-1 residue gas flaring only scenario. Yellow-highlighted emission units were updated as part of this submittal.

2.1 Emission Calculation Methodology

2.1.1 Dehydration Units (DEHY-1, DEHY-2, DEHY-3)

Emissions were calculated using GLYCalc 4.0. DEHY-1 and DEHY-2 Flash Tank overheads are recycled and recompressed to the facility inlet. DEHY-3 Flash Tank overheads are recycled to the fuel gas line. Still vent emissions for all three units are equipped with a condenser before vapors are routed to flares for additional control. All three units operate with a condenser and subsequent flare control. Note that the emissions calculated with GLYCalc have been updated with a more recent dehydrator contactor inlet gas analysis (dated March 18, 2021; see Attachment C); the previous analysis used was from 2015. Accordingly, the emissions from the flares that control the dehydrators was also updated.

2.1.2 Tanks and Dehydrators Unit Flare (FLARE-3)

The Tanks and Dehydrators Unit Flare (FLARE-3) controls DEHY-1, DEHY-2, GB-1, TANKS, PW-TANKS, STABTANKS, and MT-1. FLARE-3 is a back-up flare for DEHY-3.

2.1.3 Backup Flare & DEHY-3 Flare (FLARE-2)

The back-up Flare (FLARE-2) serves as a back-up control device to FLARE-3 when demand is high. FLARE-2 is also a primary flare for DEHY-3.

3.0 Regulatory Review

This section describes the regulatory applicability of primary Federal and State air quality rules for the project.

3.1 North Dakota Rules

Title 33.1 Article 15 of the North Dakota Administrative Code (NDAC) contains the state's Air Pollution Control rules. Applicability of specific chapters is discussed in the following subsections.

3.1.1 33.1-15-07: Control of Organic Compound Emissions

This rule applies to DEHY-1, DEHY-2, DEHY-3, FLARE-2, and FLARE-3 at the Plant. DEHY-1, DEHY-2, and DEHY-3 still vent overheads are routed to a condenser prior to being controlled by flare combustion.

3.1.2 33.1-15-14: Designated Air Contaminant Sources, Permit to Construct, Minor Source Permit to Operate, Title V Permit to Operate

All new or modified air contaminant sources, as designated in NDAC 33.1-15-14-01, are required to submit an application for a Permit to Construct under Section 02 of Chapter 33.1-15-14 and are required to comply with the Policy for the Control of Hazardous Air Pollutant Emissions in North Dakota (Air Toxics Policy). The Department may exempt sources of minor significance from the requirements of this policy.

HAP emissions have been calculated for the entire Plant. The facility-wide HAP emission rate is estimated to be less than the major source HAP thresholds of 10 tons per year (tpy) of an individual HAP or 25 tpy total HAP. For this reason, Andeavor suggests that a more rigorous review of air toxics is unnecessary.

3.1.3 33.1-15-15: Prevention of Significant Deterioration of Air Quality

Mountrail County is designated as in attainment or unclassifiable for the NAAQS for all criteria pollutants: CO, lead (Pb), NOx, ozone (O_3), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), particulate matter less than 10 microns in diameter (PM_{10}), and sulfur dioxide (SO_2). North Dakota has a federally approved PSD program under NDAC 33.1-15-15 for sources proposing to construct on areas other than Indian Reservations.

The PSD rule applies to new sources that:

1. Have the potential-to-emit (PTE) of 100 tpy or more of any criteria pollutant for a facility that is one of the 28 industrial source categories listed in 40 CFR 52.21(b)(1)(i)(a) as referenced in NDAC 33.1-15-15-01.2;
2. Have the PTE of 100,000 tpy or more of carbon dioxide equivalent (CO_2e) emissions; or
3. Have the PTE of 250 tpy or more of any criteria pollutant if the facility is not on the list of industrial source categories.

The facility is not one of the listed industrial source categories subject to PSD at 100 tpy; therefore, the 250 tpy threshold for criteria pollutants applies. Table 3-1 summarizes the facility-wide PTE. Currently, the facility

is not considered a major PSD source because the facility-wide PTE is less than 250 tpy for all criteria pollutants. The facility-wide PTE is above the PSD threshold for CO_2e; however, EPA no longer requires sources classified as major based solely on GHG emissions ("Step 2" sources) to obtain a PSD permit (EPA Memorandum of July 24, 2014). As such, the facility remains a minor source with respect to the PSD program.

Table 3-1 Controlled Potential-to-Emit

	NO_X (tpy)	CO (tpy)	VOC (tpy)	SO_2 (tpy)	PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Total HAP (tpy)	CO_2e (tpy)
Facility PTE	86.47	236.28	144.81	0.23	3.02	3.02	3.02	8.01	121,596
PSD Major Source Thresholds	**250**	**250**	**250**	**250**	**250**	**250**	**250**	**250**	**N/A**

3.1.4 33.1-15-16: Restriction of Odorous Air Contaminants

The Plant is subject to the odor restrictions established in this chapter, including that the Plant may not discharge into the ambient air any objectionable odorous air contaminant that measures seven odor concentrations or higher outside the property boundary.

3.1.5 33.1-15-22: Emission Standards for Hazardous Air Pollutants from Source Categories

This chapter incorporates by reference several of the federal National Emission Standards for Hazardous Air Pollutants (NESHAP) into the NDAC rules. HAP emissions have been calculated for the proposed project and are less than the major source HAP thresholds of 10 tpy of an individual HAP or 25 tpy total HAP. NESHAP applicability to the project is described in further detail in Section 3.2.

3.2 40 CFR 63: National Emission Standards for Hazardous Air Pollutants (NESHAP)

The federal NESHAP apply to new, modified, and reconstructed affected facilities in specific source categories.

3.2.1 Subpart A

NESHAP Subpart A applies to facilities with any other applicable NESHAP standards; therefore, this subpart applies, as there are one or more applicable NESHAP standards below.

3.2.2 Subpart HH

NESHAP Subpart HH applies to major and area sources of HAP emissions. The Plant is an area source of HAP emissions. The only affected source at an area source of HAP emissions is the TEG Dehydration Unit (DEHY-3). The Plant will comply with all applicable standards under this subpart.

3.3 40 CFR 64: Compliance Assurance Monitoring (CAM)

This part applies to an emission unit that has potential pre-control device emissions of applicable regulated air pollutants that are equal to or greater than 100 percent of the amount in tpy required for a source to be classified as a major source, that use a control device to achieve compliance with the emission limitation or standard, and do not have an applicable post 1990 emission limit or standard under NSPS or NESHAP associated with the pollutant triggering CAM. DEHY-3 is potentially subject to the requirements of this subpart because the uncontrolled VOC is greater than 100 tpy, it uses controls to reduce the emissions, and there is no applicable post-1990 NSPS limitation or standard for VOC affecting this emission unit. DEHY-3 has uncontrolled HAP emissions greater than major source thresholds; however, it is subject to MACT HH and therefore a CAM plan is not required for HAP emissions.

3.4 40 CFR 98: GHG Mandatory Reporting Rule (MRR)

The Plant is subject to reporting under Subpart A, Subpart C, Subpart W, and Subpart NN of the GHG Mandatory Reporting Rule (MRR).

Attachment A

NDDEQ Division of Air Quality Permitting Forms
(attached to CERIS-ND submittal)

- SFN 8516 – Permit Application for Air Contaminant Sources
- SFN 58923 – Glycol Dehydration Units
- SFN 59652 – Flares, FLARE-2
- SFN 59652 – Flares, FLARE-3
- SFN 52858 – Permit Application for Title V Permit to Operate
- SFN 61006 – Emission Unit for Title V Permit to Operate, DEHY-1
- SFN 61006 – Emission Unit for Title V Permit to Operate, DEHY-2
- SFN 61006 – Emission Unit for Title V Permit to Operate, DEHY-3
- SFN 61006 – Emission Unit for Title V Permit to Operate, FLARE-2
- SFN 61006 – Emission Unit for Title V Permit to Operate, FLARE-3
- SFN 61008 – Compliance Schedule and Plan for Title V Permit to Operate

PERMIT APPLICATION FOR AIR CONTAMINANT SOURCES

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 8516 (9-2021)

SECTION A - FACILITY INFORMATION

Name of Firm or Organization Andeavor Field Services LLC		
Applicant's Name Darren Snow		
Title North West Area Operations Director	Telephone Number (701) 250-1960	E-mail Address DJSnow@marathonpetroleum.com
Contact Person for Air Pollution Matters Thomas Gibbons		
Title Advanced Environmental Specialist	Telephone Number (303) 454-6685	E-mail Address THGibbons@marathonpetroleum.com
Mailing Address (Street & No.) 1515 Arapahoe Street, Tower 1, Suite 1600		
City Denver	State CO	ZIP Code 80202
Facility Name Robinson Lake Gas Plant		
Facility Address (Street & No.) Southeast corner of the intersection of Highway 8 and 45th Street NW		
City Stanley	State ND	ZIP Code 58784

County Mountrail	Coordinates NAD 83 in Decimal Degrees (to forth decimal degree) Latitude 48.06596500	Longitude -102.35095000

Legal Description of Facility Site

Quarter	Quarter	Section	Township	Range
NW	NW	23	153N	91W

Land Area at Facility Site 30 Acres (or) _____ Sq. Ft.	MSL Elevation at Facility 2195

SECTION B – GENERAL NATURE OF BUSINESS

Describe Nature of Business	North American Industry Classification System Number	Standard Industrial Classification Number (SIC)
Natural Gas Processing	211112	1321

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

All equipment is existing and no physical construction is part of the application. Therefore, no dates are needed here.

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
DEHY-1	87.5-MMscfd EG Dehy	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐
DEHY-2	87.5-MMscfd EG Dehy	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐
DEHY-3	60-MMscfd TEG Dehy	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐
FLARE-2	DEHY-3 and Back-up to FLARE-3	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐
FLARE-3	Tanks and DEHY-1 & DEHY-2 Flare	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Add additional pages if necessary

SECTION D2 – APPLICABLE REGULATIONS

Source ID No.	Applicable Regulations (NSPS/MACT/NESHAP/etc.)
Facility-wide	NESHAP: Subparts A, HH

SECTION E – TOTAL POTENTIAL EMISSIONS

Pollutant	Amount (Tons Per Year)
NO_x	0.60
CO	2.71
PM	

Pollutant	Amount (Tons Per Year)
PM_{10} (filterable and condensable)	
$PM_{2.5}$ (filterable and condensable)	
SO_2	
VOC	3.24
GHG (as CO_2e)	1024.07
Largest Single HAP	2.03
Total HAPS	2.08

*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.	Please see Table of Contents at beginning of application	4.	
2.		5.	
3.		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
Darren Scott	7-20-2023

INSTRUCTIONS

SITE PLANS TO BE ATTACHED TO APPLICATION:

Prepare and attach a plot plan drawn to scale or properly dimensioned, showing at least the following:

a. The property involved and the outlines and heights of all buildings on the property. Identify property lines plainly. Also, indicate if there is a fence around the property that prevents public access.

b. Location and identification of all existing or proposed equipment, manufacturing processes, etc., and points of emission or discharge of air contaminants to the atmosphere.

c. Location of the facility or property with respect to the surrounding area, including residences, businesses and other permanent structures, streets and roadways. Identify all such structures and roadways. Indicate direction (**NORTH**) on the drawing and the prevailing wind direction.

EQUIPMENT PLANS AND SPECIFICATIONS FOR PERMIT TO CONSTRUCT:

Supply plans and specifications, including as a minimum an assembly drawing, dimensioned and to scale, in plan, elevation and as many sections as are needed to show clearly the design and operation of the equipment and the means by which air contaminants are controlled.

The following must be shown:

a. Size and shape of the equipment. Show exterior and interior dimensions and features.

b. Locations, sizes, and shape details of all features which may affect the production, collection, conveying, or control of air contaminants of any kind, location, size, and shape details concerning all material handling equipment.

c. All data and calculations used in selecting or designing the equipment.

d. Horsepower rating of all internal combustion engines driving the equipment.

NOTE: **STRUCTURAL DESIGN CALCULATIONS AND DETAILS ARE NOT REQUIRED.** WHEN STANDARD COMMERCIAL EQUIPMENT IS TO BE INSTALLED, THE MANUFACTURER'S CATALOG DESCRIBING THE EQUIPMENT MAY BE SUBMITTED IN LIEU OF ITEMS a, b, c, and d OF ABOVE, WHICH THE CATALOG COVERS. ALL INFORMATION REQUIRED ABOVE THAT THE CATALOG DOES NOT CONTAIN MUST BE SUBMITTED BY THE APPLICANT.

ADDITIONAL INFORMATION MAY BE REQUIRED:

If the application is signed by an authorized representative of the owner, a LETTER OF AUTHORIZATION must be attached to the application.

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Environmental Quality
Division of Air Quality
4201 Normandy Street, 2nd Floor
Bismarck, ND 58503-1324
(701) 328-5188

PERMIT APPLICATION FOR GLYCOL DEHYDRATION UNITS

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 58923 (9-2021)

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
Andeavor Field Services LLC	Robinson Lake Gas Plant

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
87.5-MMscfd EG Dehy	DEHY-1	27	VOC (includes MeOH)	0.29	1.29	Flash tank w/ recycle, condenser, flare
87.5-MMscfd EG Dehy	DEHY-2	27	VOC (includes MeOH)	0.29	1.29	Flash tank w/ recycle, condenser, flare
60-MMscfd TEG Dehy	DEHY-3	23	VOC	0.13	0.58	Flash tank w/ recycle, condenser, flare

* *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		
DEHY-1	87.5	87.5	500	100	saturated	2.2	13	1.29
DEHY-2	87.5	87.5	500	100	saturated	2.2	13	1.29
DEHY-3	60.0	60.0	381	81	saturated	2.2	10	0.58

SECTION D – STACK DATA

No changes are being made that require revision to SFN 8532

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

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Environmental Quality
Division of Air Quality
4201 Normandy Street, 2nd Floor
Bismarck, ND 58503-1324
(701)328-5188

PERMIT APPLICATION FOR FLARES

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 59652 (9-2021)

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
Andeavor Field Services LLC	Robinson Lake Gas Plant

SECTION B - FLARE INFORMATION

Use: ☐ Emergency ☒ Process ☐ Both			Subject to NSPS (40 CFR 60.18) ○ Yes ◉ No
Emission Point ID FLARE-2	Height Above Ground Level (ft.)	Diameter at Top (ft.)	
Flame Monitor: ☒ Thermocouple ☐ Infrared ☐ Ultraviolet ☐ Acoustic ☐ Other:			
Ignition: ☐ Automatic ☒ Continuous Burning Pilot ☐ Other:			
Average Btu/1000 scf 1,467,058	Percent H_2S 0.00	Maximum Hourly Flow Rate to Flare 143 scf/hr	
List source ID numbers controlled by this unit, if any: DEHY-3 (back-up for GB-1, TANKS, PW-TANKS, MT-1, STABTANKS, DEHY-1, DEHY-2)			

SECTION C – AIR CONTAMINANTS EMITTED

Pollutant	Amount (Tons Per Year)	Basis of Estimate*
NO_x	0.06	AP-42
CO	0.28	AP-42
PM		
PM_{10} (filterable and condensable)		
$PM_{2.5}$ (filterable and condensable)		
SO_2		
VOC	0.01	AP-42 (pilot only)
GHG (as CO_2e)	107.23	40 CFR 98, Subpart C
Largest Single HAP	<0.01	Mass Balance & Gas Analysis
Total HAPS	<0.01	Mass Balance & Gas Analysis

*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
4201 Normandy Street, 2nd Floor
Bismarck, ND 58503-1324
(701)328-5188

PERMIT APPLICATION FOR FLARES

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 59652 (9-2021)

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
Andeavor Field Services LLC	Robinson Lake Gas Plant

SECTION B - FLARE INFORMATION

Use: ☐ Emergency ■ Process ☐ Both	Subject to NSPS (40 CFR 60.18) ○ Yes ◉ No	
Emission Point ID FLARE-3	Height Above Ground Level (ft.) 140	Diameter at Top (ft.) 1.5
Flame Monitor: ■ Thermocouple ☐ Infrared ☐ Ultraviolet ☐ Acoustic ☐ Other:		
Ignition: ☐ Automatic ■ Continuous Burning Pilot ☐ Other:		
Average Btu/1000 scf 2,081,423	Percent H_2S 0.00	Maximum Hourly Flow Rate to Flare 868 scf/hr
List source ID numbers controlled by this unit, if any: GB-1, TANKS, PW-TANKS, MT-1, STABTANKS, DEHY-1, DEHY-2, (back-up for DEHY-3)		

SECTION C – AIR CONTAMINANTS EMITTED

Pollutant	Amount (Tons Per Year)	Basis of Estimate*
NO_x	0.53	AP-42
CO	2.43	AP-42
PM		
PM_{10} (filterable and condensable)		
$PM_{2.5}$ (filterable and condensable)		
SO_2		
VOC	0.07	AP-42 (pilot only)
GHG (as CO_2e)	914.51	40 CFR 98, Subpart C
Largest Single HAP	<0.01	Mass Balance & Gas Analysis
Total HAPS	<0.01	Mass Balance & Gas Analysis

*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
4201 Normandy Street, 2nd Floor
Bismarck, ND 58503-1324
(701)328-5188

PERMIT APPLICATION FOR TITLE V PERMIT TO OPERATE

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

SECTION A - FACILITY INFORMATION

Name of Firm or Organization Andeavor Field Services LLC		
Responsible Person Darren Snow		
Title Operations Director, North West Area	Telephone Number (701) 250-1960	E-mail Address DJSnow@marathonpetroleum.com
Mailing Address (Street & Number) 1611 E Century Ave, Suite 300		
City Bismarck	State ND	ZIP Code 58503
Contact Person for Air Pollution Matters Thomas Gibbons		
Title Advanced Environmental Specialist	Telephone Number (303) 454-6685	E-mail Address THGibbons@marathonpetroleum.com
Mailing Address (Street & Number) 1515 Arapahoe Street, Tower 1, Suite 1600		
City Denver	State CO	ZIP Code 80202
Facility Name Robinson Lake Gas Plant		
Facility Address (Street & Number) Southeast corner of the intersection of Highway 8 and 45th Street NW		
City Stanley	State ND	ZIP Code 58784

County Mountrail	Latitude (decimal degrees) 48.065965	Longitude (decimal degrees) -102.35095

Legal Description of Facility Site

Quarter NNW	Quarter NW	Section 23	Township 153N	Range 91W

Land Area at Facility Site 30 Acres (or) _____ Sq. Ft.	MSL Elevation at Facility 2195 ft

SECTION B – GENERAL NATURE OF BUSINESS

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

SECTION C – GENERAL PERMIT INFORMATION

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

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

Current Permit to Operate Number: AOP-28404 v1.0 Renewal:_____ Revision: _____	Current Permit to Operate Expiration Date: 11/16/2026

SECTION D – MINOR PERMIT MODIFICATION

Affected Emission Unit(s):	Description of Proposed Change:
DEHY-1, DEHY-2, DEHY-3, FLARE-2, FLARE-3	See Permit to Construct application
Applicable Requirements (NSPS, PSD, etc.): MACT HH (DEHY-3)	Net Effect on Source Emissions Emission Unit(s): Facility:
Are you requesting that minor permit modification procedures be used in accordance with NDAC 33.1-15-14-06.e(1)(a)? ☒ Yes ☐ No	

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

Your Emission Unit Number	Emission Unit Description	New Emission Unit? (check if yes)	PTC Number/ ACP Number	Initial Application	Minor Modification	Significant Modification	Other	Explain if Other
DEHY-1	87.5-MMscfd EG Dehydration Unit	☐	ACP pending (concurrent processing)	☐	☑	☐	☐	
DEHY-2	87.5-MMscfd EG Dehydration Unit	☐	ACP pending (concurrent processing)	☐	☑	☐	☐	
DEHY-3	60.0-MMscfd EG Dehydration Unit	☐	ACP pending (concurrent processing)	☐	☑	☐	☐	
FLARE-2	DEHY-3 and Back-up to FLARE-3	☐	ACP pending (concurrent processing)/	☐	☑	☐	☐	
FLARE-3	Tanks and DEHY-1 & DEHY-2 Flare	☐	ACP pending (concurrent processing)	☐	☑	☐	☐	
		☐		☐	☐	☐	☐	
		☐		☐	☐	☐	☐	
		☐		☐	☐	☐	☐	
		☐		☐	☐	☐	☐	
		☐		☐	☐	☐	☐	
		☐		☐	☐	☐	☐	
		☐		☐	☐	☐	☐	
		☐		☐	☐	☐	☐	

		☐		☐	☐	☐	☐	
		☐		☐	☐	☐	☐	
		☐		☐	☐	☐	☐	
		☐		☐	☐	☐	☐	
		☐		☐	☐	☐	☐	
		☐		☐	☐	☐	☐	
		☐		☐	☐	☐	☐	
		☐		☐	☐	☐	☐	
		☐		☐	☐	☐	☐	

Add additional pages if necessary

SECTION F1 – IDENTIFICATION OF AIR CONTAMINANTS

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

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

List Specific Compounds:

HAP emissions (BTEX, n-hexane, 2,2,4-trimethylpentane, methanol)

SECTION F2 – IDENTIFICATION OF AIR CONTAMINANTS

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

Emission Unit No.	Last Date when a Testing Program was Completed	If Program is Continuous, Give Approximate Testing Frequency	Regulation requiring frequency (NSPS, MACT, Permit Requirement-list permit number)

Add additional pages if necessary

SECTION G1 – ADDITIONAL FORMS

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

SECTION G2 – OTHER ATTACHMENTS INCLUDED AS PART OF THIS APPLICATION

1.	Application Narrative	4.	Supporting Documentation
2.	NDDEQ Forms	5.	
3.	Potential-to-Emit (PTE) Calculations	6.	

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

Signature of Applicant	Date
Darren Schmidt	7-20-2023

INSTRUCTIONS

These instructions are intended to assist permit applicants in the completion of the enclosed forms with the degree of accuracy and detail necessary to allow the determination of whether to grant or deny a permit to operate an air contaminant source or modification.

All information included in the application, including maximum estimated emission rates, will be used to make the above determination. The information that is supplied in the application may be used to establish permit conditions. The emission rates provided should be based on the most credible data available. Although AP-42 provides general information, it should not be solely relied on to develop emission rates. Other sources of information that accurately represent the actual conditions that the emission unit will be operated under, such as actual test data or manufacturer's data, may be preferable.

For any air contaminant source or modification described in SFN 52858, SFN 61006 must also be must be completed and attached for each emission unit. For the facility's compliance schedule, SFN 61008 must be completed and submitted. If the facility requests a flexible permit SFN 61007, must be completed and submitted.

Those existing sources of air contaminants which are proven by the applicant to be designed or controlled so as to operate without emitting air contaminants in violation of air pollution rules and regulations will be granted a permit to operate.

Certain sizes and types of existing or new sources are exempted from the requirement to obtain a permit to continue operating or to construct. These sizes are specified in the instruction sheets for the relevant permit application forms or can be obtained by contacting the Department.

Any information included on the forms, other than emission data, that would divulge production or sales figures or methods, processes or production unique to such person or would otherwise tend to affect adversely the competitive position of such person by revealing trade secrets should be noted by inserting the word "confidential" in the margin next to the appropriate item. Any information, other than production figures, that is requested to be kept in confidence must be justified by a written statement setting forth the reasons for the request. All information not marked confidential will be available for public inspection.

These forms are intended to inform permit applicants of the type of information required in order that a permit to operate or construct be granted. It is not possible to design forms which are ideally suited to every conceivable operation. Permit applicants are encouraged to submit additional supplementary material when it is felt that the completion of these forms does not provide an adequate explanation of the operation.

It will be necessary to refer to the North Dakota Air Pollution Control Rules (Article 33.1-15 NDAC; online at www.legis.nd.gov/information/acdata/html/33.1-15.html), especially those parts which deal with the permit system and those chapters which specify emission limitations for each air contaminant, in order to satisfactorily complete a permit application. Electronic copies of air pollution control permit application forms are available online at www.deq.nd.gov/AQ/forms.aspx. Paper copies of all forms, as well as the rules, are available on request. To cover the costs of printing and postage, the charge for a copy of the North Dakota Air Pollution Control Rules is $15.00.

Applicants should contact the Department prior to preparation and submittal of an application to determine what additional information will be required for a particular source or modification and the method to be used in performing the analyses.

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Environmental Quality
Division of Air Quality
4201 Normandy Street, 2nd Floor
Bismarck, ND 58503-1324
(701) 328-5188

EMISSION UNIT FOR TITLE V PERMIT TO OPERATE

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

SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.)	Emission Unit Number:	Emission Point Number:
Dehydrator (DEHY-1)	2	27
Make	**Model**	**Installation or manufacture date**
Alco		
Capacity (manufacturer's or designer's guaranteed maximum)	**Operating Capacity (specific units)**	
	87.5 MMscf/day	
Brief description of operation of unit or process:		
Ethylene glycol (EG) dehydration unit		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	**Alternative Emission Point:**	

SECTION B –OPERATING SCHEDULE

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

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

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

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

Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	
Dry Gas	24	7	52	87.5 MMscf/day

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.

Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
NDAC 33.1-15-07					

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

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

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

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

SECTION F – FUELS USED

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

SECTION G – STACK PARAMETERS

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

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.

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

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

SECTION I – AIR CONTAMINANTS EMITTED

Known or Suspected - Use emission rates after control equipment.

Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
See Attachment B			

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT

Type: ☐ Cyclone ☐ Multiclone ☐ Baghouse ☐ Electrostatic Precipitator

☐ Wet Scrubber ☐ Spray Dryer ☐ None

☒ Other – Specify: Flare-3 (Flare-2 backup)

Name of Manufacturer	Model Number	Date to Be Installed
Steffes	SAA-2	

Application: ☐ Boiler ☐ Kiln ☐ Engine

☒ Other – Specify: Combustion device (air-assisted flare), still vent condenser

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

Operating Efficiency (%)	98%	98%		

Describe method used to determine operating efficiency:

Manufacturer's guarantee

SECTION J2 – GAS CONDITIONS

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

Pressure drop through gas cleaning device (in. H_2O)

EMISSION UNIT FOR TITLE V PERMIT TO OPERATE

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

SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.)	Emission Unit Number:	Emission Point Number:
Dehydrator (DEHY-2)	3	27
Make	**Model**	**Installation or manufacture date**
Alco		
Capacity (manufacturer's or designer's guaranteed maximum)	**Operating Capacity (specific units)**	
	87.5 MMscf/day	
Brief description of operation of unit or process:		
Ethylene glycol (EG) dehydration unit		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	**Alternative Emission Point:**	

SECTION B –OPERATING SCHEDULE

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

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

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

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

Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	
Dry Gas	24	7	52	87.5 MMscf/day

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.

Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
NDAC 33.1-15-07					

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

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

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

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

SECTION F – FUELS USED

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

SECTION G – STACK PARAMETERS

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

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.

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

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

SECTION I – AIR CONTAMINANTS EMITTED

Known or Suspected - Use emission rates after control equipment.

Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
See Attachment B			

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT

Type: ☐ Cyclone ☐ Multiclone ☐ Baghouse ☐ Electrostatic Precipitator

☐ Wet Scrubber ☐ Spray Dryer ☐ None

☒ Other – Specify: Flare-3 (Flare-2 backup)

Name of Manufacturer	Model Number	Date to Be Installed
Steffes	SAA-2	

Application: ☐ Boiler ☐ Kiln ☐ Engine

☒ Other – Specify: Combustion device (air-assisted flare), still vent condenser

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

Operating Efficiency (%)	98%	98%		

Describe method used to determine operating efficiency:

Manufacturer's guarantee

SECTION J2 – GAS CONDITIONS

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

Pressure drop through gas cleaning device (in. H_2O)

EMISSION UNIT FOR TITLE V PERMIT TO OPERATE

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

SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.)	Emission Unit Number:	Emission Point Number:
Dehydrator (DEHY-3)	13	22
Make	**Model**	**Installation or manufacture date**
Exterran		
Capacity (manufacturer's or designer's guaranteed maximum)	**Operating Capacity (specific units)**	
	60.0 MMscf/day	
Brief description of operation of unit or process:		
Triethylene glycol (TEG) dehydration unit		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	**Alternative Emission Point:**	

SECTION B –OPERATING SCHEDULE

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

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

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

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

Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	
Dry Gas	24	7	52	60.0 MMscf/day

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.

Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
NDAC 33.1-15-07					
NESHAP Subpart HH		§63.774(d)(1)(ii)		§63.772(b)(2)(i)	0.9 Mg/yr benzene (actual)
AOP-28404 v1.0 Condition 4.b.2	Condenser outlet temperature (daily)	Condenser outlet temperature			≤ 120°F

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

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

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

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

SECTION F – FUELS USED

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

SECTION G – STACK PARAMETERS

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

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.

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

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

SECTION I – AIR CONTAMINANTS EMITTED

Known or Suspected - Use emission rates after control equipment.

Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
See Attachment B			

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT

Type: ☐ Cyclone ☐ Multiclone ☐ Baghouse ☐ Electrostatic Precipitator

☐ Wet Scrubber ☐ Spray Dryer ☐ None

☒ Other – Specify: Flare-2 (Flare-3 backup)

Name of Manufacturer	Model Number	Date to Be Installed
Steffes	SAA-2	

Application: ☐ Boiler ☐ Kiln ☐ Engine

☒ Other – Specify: Combustion device (air-assisted flare), still vent condenser

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

Operating Efficiency (%)	98%	98%		

Describe method used to determine operating efficiency:

Manufacturer's guarantee

SECTION J2 – GAS CONDITIONS

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

Pressure drop through gas cleaning device (in. H_2O)

EMISSION UNIT FOR TITLE V PERMIT TO OPERATE

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

SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.)	Emission Unit Number:	Emission Point Number:
Back-Up Flare (FLARE-2)	22	22
Make	**Model**	**Installation or manufacture date**
Steffes		2015
Capacity (manufacturer's or designer's guaranteed maximum)	**Operating Capacity (specific units)**	
Brief description of operation of unit or process: DEHY-3 flare, Back-up flare for FLARE-3		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	**Alternative Emission Point:**	

SECTION B –OPERATING SCHEDULE

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

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

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

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

Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	
Gas	24	7	52	991 scf/hr (pilot & waste gas, including FLARE-3 waste gas)

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.

Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
NDAC 33.1-15-03-02	< 20% Opacity				
NDAC 33.1-15-03-03.1	< 20% Opacity				
NDAC 33.1-15-07-01.3					

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

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

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

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

SECTION F – FUELS USED

Coal (Tons/Yr)	% Sulfur	% Ash	Oil (Gal/Yr)	% Sulfur	Grade No.
Natural Gas (Thousand CF/Yr) 175		LP Gas (Gal/Yr)		Other (Specify)	

SECTION G – STACK PARAMETERS

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

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.

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

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

SECTION I – AIR CONTAMINANTS EMITTED

Known or Suspected - Use emission rates after control equipment.

Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
See Attachment B			

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT

Type: ☐ Cyclone ☐ Multiclone ☐ Baghouse ☐ Electrostatic Precipitator

☐ Wet Scrubber ☐ Spray Dryer ■ None

☐ Other – Specify: _____

Name of Manufacturer	Model Number	Date to Be Installed

Application: ☐ Boiler ☐ Kiln ☐ Engine

☐ Other – Specify: _____

Pollutants Removed				
Design Efficiency (%)				

Operating Efficiency (%)				
Describe method used to determine operating efficiency:				

SECTION J2 – GAS CONDITIONS

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

EMISSION UNIT FOR TITLE V PERMIT TO OPERATE

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

SECTION A – EQUIPMENT INFORMATION

Type of Unit or Process (rotary dryer, cupola furnace, crusher, pelletizer, engine, etc.)	Emission Unit Number:	Emission Point Number:
Tanks and EG Dehy Flare (FLARE-3)	27	27
Make	**Model**	**Installation or manufacture date**
Steffes Air Assist Flare	SAA-2	~2013
Capacity (manufacturer's or designer's guaranteed maximum) 200 Mscf/d	Operating Capacity (specific units) 200 Mscf/d	
Brief description of operation of unit or process: Flare for tanks and EG dehydration units (DEHY-1 & DEHY-2)		
Brief description of alternative operating scenario (see Section M1 & M2 to elaborate):	Alternative Emission Point:	

SECTION B –OPERATING SCHEDULE

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

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

SECTION C – PRODUCTION RATES (THROUGHPUT LIMITS)

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

Material	Process Time Frame			Specify Units (tons, Btu, Gal., etc)
	Hour	Week	Year	
Gas	24	7	52	9 MMScf/yr

SECTION D1 – APPLICABLE REQUIREMENTS

Generally describe all applicable requirements.

Regulations (i.e. SIP, NESHAP, PSD, NSPS, etc)	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements	Testing Requirements	Applicable Emission Standards (include units)
NDAC 33.1-15-03-02	< 20% Opacity				
NDAC 33.1-15-03-03.1	< 20% Opacity				
NDAC 33.1-15-07-01.3					

SECTION D2 – IDENTIFICATION OF AIR CONTAMINANTS

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

Add additional pages if necessary

SECTION E – PRODUCTS OF UNIT OR PROCESS

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

SECTION F – FUELS USED

Coal (Tons/Yr)	% Sulfur	% Ash	Oil (Gal/Yr)	% Sulfur	Grade No.
Natural Gas (Thousand CF/Yr) 182		LP Gas (Gal/Yr)		Other (Specify)	

SECTION G – STACK PARAMETERS

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

SECTION H – ALTERNATIVE STACK PARAMETERS

List each pollutant separately.

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

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

SECTION I – AIR CONTAMINANTS EMITTED

Known or Suspected - Use emission rates after control equipment.

Pollutant (use CAS for HAPs)	Amount		Basis of Estimate (AP-42, testing, engineering estimate, etc)
	Pounds/Hr	Tons/Yr	
See Attachment B			

SECTION J1 – AIR POLLUTION CONTROL EQUIPMENT

Type: ☐ Cyclone ☐ Multiclone ☐ Baghouse ☐ Electrostatic Precipitator

☐ Wet Scrubber ☐ Spray Dryer ■ None

☐ Other – Specify: _____

Name of Manufacturer	Model Number	Date to Be Installed

Application: ☐ Boiler ☐ Kiln ☐ Engine

☐ Other – Specify: _____

Pollutants Removed				
Design Efficiency (%)				

Operating Efficiency (%)				
Describe method used to determine operating efficiency:				

SECTION J2 – GAS CONDITIONS

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

COMPLIANCE SCHEDULE AND PLAN FOR TITLE V PERMIT TO OPERATE

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY
SFN 61008 (3-2019)

SECTION A1 – COMPLIANCE SCHEDULE AND PLAN

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

SECTION A2 – COMPLIANCE SCHEDULE AND PLAN

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

SECTION A3 – COMPLIANCE CERTIFICATION (METHOD OF COMPLIANCE)

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

SECTION A4 –METHOD OF COMPLIANCE REFERENCE TEST METHOD

Reference Test Method: Method 22
Reference Test Method Citation: 40 CFR Part 60, Appendix A-7

SECTION A5 –METHOD OF COMPLIANCE MONITORING

Monitoring Device Type: ☐Stack Test ■Parameter Monitoring ☐CEM ☐Ambient Monitoring	Monitor Location Description:
Regulated Air Pollutant(s) Monitored:	Monitoring frequency and duration of sampling: (Example: every 15 min, 1 min instantaneous readings are taken to produce an hourly average.)
VOC, HAP	Monthly, 12-month rolling average emissions
Dehydrator Throughputs	Monthly, 12-month rolling average
Glycol Pump Rates	Design rate, gal/min (not to exceed)

SECTION B1 –METHOD OF COMPLIANCE RECORDKEEPING

Data (Parameter) Being Recorded	Frequency of Reporting (6 mo, quarterly, etc.)
VOC, HAP	Semi-annually
Dehydrator Throughputs	Semi-annually
Glycol Pump Rates	Semi-annually (design confirmation)

SECTION B2 –METHOD OF COMPLIANCE REPORTING

Data (Parameter) Being Recorded	Beginning Date (month/day/year)	Frequency of Reporting (6 mo, quarterly, etc.)

SECTION B3 –COMPLIANCE CERTIFICATION

Certification Parameter	Beginning Date (month/day/year)	Frequency of Submittal (6 mo, quarterly, etc.)

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

Attachment B

Potential-to-Emit Calculations

Robinson Lake Gas Plant
Andeavor Field Services LLC
Emission Summary

FLARE-2 & FLARE-3:	*FLARE-2 & FLARE-3:*	*FLARE-2 & FLARE-3, Dehydrators:*	*FLARE-2 & FLARE-3, Dehydrators:*	
0.60 tpy, NOx	2.71 tpy, CO	3.24 tpy, VOC	2.03 largest HAP (MeOH) 2.08 tpy, HAP	1024.07 tpy, CO2e

CONTROLLED POTENTIAL TO EMIT				Emission Rates (tpy)								VOC (lb/hr)		
Source ID	NDDH EU#	NDDH EP#	Equipment Description	PM_{10}	$PM_{2.5}$	NOx	CO	VOC	SO_2	HAPs	CO_2e	GLYCalc	MeOH	TOTAL
DEHY-1	2	27	87.5-MMscfd EG Dehydration Unit	--	--	--	--	1.29	--	1.03	0.70	0.06	0.23	0.29
DEHY-2	3	27	87.5-MMscfd EG Dehydration Unit	--	--	--	--	1.29	--	1.03	0.70	0.06	0.23	0.29
DEHY-3	13	27	60.0-MMscfd TEG Dehydration Unit	--	--	--	--	0.58	--	0.02	0.94	0.13	0	0.13
HTR-1	6	6	43.64 MMBtu/hr Hot Oil Heater	1.42	1.42	18.74	15.74	1.03	0.11	0.35	22,323.04			
HTR-2	15	15	43.64 MMBtu/hr Hot Oil Heater	1.42	1.42	18.74	15.74	1.03	0.11	0.35	22,323.04			
RBLR-3	14	14	0.75 MMBtu/hr TEG Reboiler	0.02	0.02	0.32	0.27	0.02	<0.01	<0.01	383.65			
GB-1	7	27	(1) 400-bbl Gunbarrel Tank	--	--	--	--	4.60	--	0.42	6.19			
TANKS	8	27	(3) 400-bbl Condensate Tanks	--	--	--	--	0.30	--	0.03	0.40			
PW-TANKS	9	27	(3) 400-bbl Produced Water Storage Tanks	--	--	--	--	<0.01	--	<0.01	0.00			
MT-1	25	27	(1) 400-bbl Methanol Storage Tank	--	--	--	--	<0.01	--	<0.01	--			
STABTANKS	18-21	27	(8) 400-bbl Natural Gasoline Tanks	--	--	--	--	0.93	--	0.05	--			
TL-1	10	10	Condensate Loadout	--	--	--	--	0.40	--	<0.01	--			
TL-1 FUG	10	10	Condensate Loadout Fugitives	--	--	--	--	8.50	--	0.03	--			
TL-2	11	11	NGL Loadout	--	--	--	--	0.03	--	--	--			
TL-3	26	26	Produced Water Loadout	--	--	--	--	0.02	--	--	--			
TL-4	28	28	Natural Gasoline Loadout	--	--	--	--	1.79	--	--	--			
TL-4 FUG	28	28	Natural Gasoline Loadout Fugitives	--	--	--	--	38.35	--	--	--			
FLARE-1	12	12	Facility Process and Emergency Flare	--	--	43.72	199.31	80.60	--	4.65	75,028.21			
FLARE-2	22	22	DEHY-3 and Back-up to FLARE-3	--	--	0.06	0.28	0.01	--	0.00	107.23			
FLARE-3	27	27	Tanks and DEHY-1 & DEHY-2 Flare	--	--	0.53	2.43	0.07	--	<0.01	914.51			
GEN-1	16	16	Cummins 755 bhp Diesel Generator	0.06	0.06	1.99	1.09	0.12	<0.01	<0.01	196.88			
GEN-2	17	17	Caterpillar 230 bhp Diesel Generator	0.02	0.02	0.38	0.33	0.04	<0.01	<0.01	65.72			
GEN-3	24	24	Cummins 755 bhp Diesel Generator	0.06	0.06	1.99	1.09	0.12	<0.01	<0.01	196.88			
FUG-1	F1	F1	Fugitives	--	--	--	--	3.67	--	0.04	47.48			
Total Facility Controlled Emissions				3.02	3.02	86.47	236.28	144.81	0.23	8.01	121,596			

Robinson Lake Gas Plant
Andeavor Field Services LLC
87.5-MMscfd EG Dehydration Unit Emission Calculations

Equipment Information
Source ID Number: DEHY-1
Description: 87.5-MMscfd EG Dehydration Unit

GRI-GLYCalc Version 4.0 Inputs:
Emission Controls: Flash Tank Emissions Recycled, Regenerator Emissions with FLARE-3 (FLARE-2 as backup). Once emissions reach a specific pressure level at FLARE-3, additional emissions are routed to FLARE-2 to be burned.

Potential Operation (hr/yr): 8760

GLYCalc Inputs
Wet gas composition: inlet gas, sampled 3/18/2021
Wet Gas: 510 psig, 90°F; saturated
Dry Gas: 87.5 MMscf/day
Glycol circ. rate: 13 gpm
Cold Separator: 22°F, 485 psig
Flash Tank: 100 °F, 55 psig, recycle
Regenerator controlled with Condenser and Flare
Condenser: 130°F and 14.7 psia

GLYCalc Version 4.0 Output [1]

Component	lb/hr	lb/day	tpy
Methane	0.0064	0.153	0.0279
Ethane	0.0193	0.463	0.0844
Propane	0.0365	0.877	0.16
Isobutane	0.0033	0.079	0.0144
n-Butane	0.0141	0.338	0.0617
Isopentane	0.0014	0.034	0.0063
n-Pentane	0.002	0.048	0.0088
Cyclopentane	0.0004	0.01	0.0018
n-Hexane	0.0001	0.004	0.0006
Cyclohexane	0.0003	0.006	0.0011
Other Hexanes	0.0002	0.006	0.001
Heptanes	0.0002	0.004	0.0007
Methylcyclohexane	0	0	0
2,2,4-TMP	0	0	0
Benzene	0.0008	0.02	0.0037
Toluene	0	0	0
Ethylbenzene	0.0009	0.021	0.0039
Xylenes	0.0015	0.036	0.0066
C8+ Heavies	0.0004	0.01	0.0017
Total NMNE VOC Emissions	0.0621	1.4930	**0.2723**
Total HAP Emissions [2]	0.0033	0.0810	0.0148
Total CO2e Emissions [3]	0.1600	3.825	0.6975

[1] Emissions based on GLYCalc version 4.0 run performed on 7/17/2023 (Controlled Regenerator Emissions).

[2] The total HAP emissions displayed in the overall controlled emissions summary table includes the total HAP emissions calculated by GLYCalc (above) plus the methanol emissions calculated from the VMG model run.

[3] CO2e is based on methane GWP of 25, per Table A–1 to Subpart A of Part 98 - Global Warming Potentials (12/11/2014)

Robinson Lake Gas Plant
Andeavor Field Services LLC
87.5-MMscfd EG Dehydration Unit Emission Calculations

Equipment Information
Source ID Number: DEHY-2
Description: 87.5-MMscfd EG Dehydration Unit

GRI-GLYCalc Version 4.0 Inputs:
Emission Controls: Flash Tank Emissions Recycled, Regenerator Emissions with FLARE-3 (FLARE-2 as backup). Once emissions reach a specific pressure level at FLARE-3, additional emissions are routed to FLARE-2 to be burned.

Potential Operation (hr/yr): 8760

GLYCalc Inputs
Wet gas composition: inlet gas, sampled 3/18/2021
Wet Gas: 510 psig, 90°F; saturated
Dry Gas: 87.5 MMscf/day
Glycol circ. rate: 13 gpm
Cold Separator: 22°F, 485 psig
Flash Tank: 100 °F, 55 psig, recycle
Regenerator controlled with Condenser and Flare
Condenser: 130°F and 14.7 psia

GRI-GLYCalc Version 4.0 Output [1]

Component	lb/hr	lb/day	tpy
Methane	0.0064	0.153	0.0279
Ethane	0.0193	0.463	0.0844
Propane	0.0365	0.877	0.16
Isobutane	0.0033	0.079	0.0144
n-Butane	0.0141	0.338	0.0617
Isopentane	0.0014	0.034	0.0063
n-Pentane	0.002	0.048	0.0088
Cyclopentane	0.0004	0.01	0.0018
n-Hexane	0.0001	0.004	0.0006
Cyclohexane	0.0003	0.006	0.0011
Other Hexanes	0.0002	0.006	0.001
Heptanes	0.0002	0.004	0.0007
Methylcyclohexane	0	0	0
2,2,4-TMP	0	0	0
Benzene	0.0008	0.02	0.0037
Toluene	0	0	0
Ethylbenzene	0.0009	0.021	0.0039
Xylenes	0.0015	0.036	0.0066
C8+ Heavies	0.0004	0.01	0.0017
Total NMNE VOC Emissions	0.0621	1.4930	**0.2723**
Total HAP Emissions [2]	0.0033	0.0810	0.0148
Total CO2e Emissions [3]	0.1600	3.825	0.6975

[1] Emissions based on GLYCalc version 4.0 run performed on 7/17/2023 (Controlled Regenerator Emissions).

[2] The total HAP emissions displayed in the overall controlled emissions summary table includes the total HAP emissions calculated by GLYCalc (above) plus the methanol emissions calculated from the VMG model run.

[3] CO2e is based on methane GWP of 25, per Table A–1 to Subpart A of Part 98 - Global Warming Potentials (12/11/2014)

Robinson Lake Gas Plant
Andeavor Field Services LLC
60.0-MMscfd TEG Dehydration Unit Emission Calculations

Equipment Information
Source ID Number: DEHY-3
Description: 60-MMscfd TEG Dehydration Unit

GRI-GLYCalc Version 4.0 Inputs:
Emission Controls: Flash Tank Emissions Recycled, Regenerator Emissions with FLARE-2 (FLARE-3 as backup). Once emissions reach a specific pressure level at FLARE-2, additional emissions are routed to FLARE-3 to be burned.

Potential Operation (hr/yr): 8760

GLYCalc Inputs
Wet gas composition: inlet gas, sampled 3/18/2021
Wet Gas: 381 psig, 81°F; saturated
Dry Gas: 60 MMscf/day, 2.2 lb H2O/MMscf
Glycol circulation rate: 10 gpm, 1% water lean glycol, electric pump
Flash Tank: 180°F, 50 psig, recycle gas
Regenerator controlled with Condenser and Flare
Condenser: 130°F, 14.7 psia

GRI-GLYCalc Version 4.0 Output [1]

Component	lb/hr	lb/day	tpy	
Methane	0.0085	0.205	0.0374	
Ethane	0.0506	1.214	0.2215	
Propane	0.0799	1.917	0.3498	
Isobutane	0.0078	0.188	0.0343	
n-Butane	0.0278	0.668	0.1218	
Isopentane	0.0028	0.068	0.0124	
n-Pentane	0.0043	0.104	0.019	
Cyclopentane	0.0007	0.017	0.0031	
n-Hexane	0.0007	0.017	0.0031	
Cyclohexane	0.0007	0.017	0.0031	
Other Hexanes	0.001	0.024	0.0044	
Heptanes	0.0012	0.03	0.0054	
Methylcyclohexane	0	0	0	
2,2,4-TMP	0	0	0	
Benzene	0	0	0	
Toluene	0	0	0	
Ethylbenzene	0	0	0	
Xylenes	0.0047	0.114	0.0208	Largest HAP from DEHY-3
C8+ Heavies	0.0008	0.019	0.0035	
Total NMNE VOC Emissions	0.1324	3.1830	0.5807	
Total HAP Emissions	0.0054	0.1310	0.0239	
Total CO_2e Emissions [2]	0.2125	5.125	0.9350	

[1] Emissions based on GRI-GLYCalc version 4.0 run performed on 7/17/2023 (Controlled Regenerator Emissions).

[2] CO2e is based on methane GWP of 25, per Table A–1 to Subpart A of Part 98 - Global Warming Potentials (12/11/2014)

Robinson Lake Gas Plant
Andeavor Field Services LLC
Back-up Flare Emission Calculations

EU	22
EP	22
Equipment ID	FLARE-2

Source Description	DEHY-3 and Back-up to FLARE-3		
Make/Model	Steffes Engineered Flare System		
Pilot	Continuous		
Pilot Gas HV	1192	Btu/scf (Residue Gas Stream)	
Pilot Gas Fuel	20	scf/hr	(175 Mscf/yr)
Pilot Gas NMNE VOC Gas wt	2.98	lb/lb-mol	
Pilot Gas HAP Gas wt	0.16	lb/lb-mol	
Waste Gas to Flare	123.00	scf/hr	
Total Gas to Flare	143.00	scf/hr	
Total Gas to Flare (includes gas from FLARE-3)	990.67	scf/hr	
Total Heating Value of Gas to Flare	1,467,058	Btu/Mscf	
VOC Destruction Efficiency	98%		

TEG Dehydration Emissions HV	1511.78	Btu/scf	From GLYCalc Condenser Vent Stream (Glycalc Run dated 7/17/2023)
TEG Dehydration Emissions Sent to Flare (Annual)	1.1	MMscf/yr	
TEG Dehydration Emissions Sent to Flare	123.0	scf/hr	From GLYCalc Condenser Vent Stream (Glycalc Run dated 7/17/2023)
TEG Dehydration Emissions NMNE VOC Gas wt	20.35	lb/lb-mol	From GLYCalc Condenser Vent Stream (Glycalc Run dated 7/17/2023)
TEG Dehydration HAP Gas wt	0.84	lb/lb-mol	From GLYCalc Condenser Vent Stream (Glycalc Run dated 7/17/2023)

Potential Emissions from Pilot Gas

Pollutant	Emission Factor (lb/MMBtu)	Emission Factor (g/hp-hr)	Nominal Rating (hp)	Hrs of Operation (hrs/yr)	Estimated Emissions Maximum (lb/hr)	Estimated Emissions Total (tpy)	Source of Emission Factor
NOx	0.068	--	NA	8760	0.00	0.01	AP-42, Chapter 13.5
CO	0.310	--	NA	8760	0.01	0.03	AP-42, Chapter 13.5
Total NMNE VOC	--	--	NA	8760	0.00	0.01	Gas Analysis
HAP	--	--	NA	8760	0.00	0.00	Gas Analysis
Carbon Dioxide	116.6	-	NA	8760	2.78	12.2	Subpart C Default
Methane	0.0022	-	NA	8760	0.00	0.000	Subpart C Default
CO2e	-	-	-	-	2.8	12.2	Subpart C Default

Potential Emissions from Dehy-3 Vapor Combustion

Pollutant	Emission Factor (lb/MMBtu)	Emission Factor (g/hp-hr)	Nominal Rating (hp)	Hrs of Operation (hrs/yr)	Estimated Emissions Maximum (lb/hr)	Estimated Emissions Total (tpy)	Source of Emission Factor
NOx	0.068	--	NA	8760	0.01	0.06	AP-42, Chapter 13.5
CO	0.31	--	NA	8760	0.06	0.25	AP-42, Chapter 13.5
Total NMNE VOC	--	--	NA	8760	0.13	0.58	Gas Analysis
HAP	--	--	NA	8760	0.01	0.02	Gas Analysis
Carbon Dioxide	116.6	-	NA	8760	21.69	95.0	Subpart C Default
Methane	0.0022	-	NA	8760	0.00	0.002	Subpart C Default
CO_2e	-	-	-	-	21.7	95.0	Subpart C Default

Total Potential Emissions

Pollutant	Emission Factor (lb/MMBtu)	Emission Factor (g/hp-hr)	Nominal Rating (hp)	Hrs of Operation (hrs/yr)	Estimated Emissions Maximum (lb/hr)	Estimated Emissions Total (tpy)	Source of Emission Factor
NOx	0.068	--	NA	8760	0.01	0.06	AP-42, Chapter 13.5
CO	0.31	--	NA	8760	0.07	0.28	AP-42, Chapter 13.5
Total NMNE VOC[1]	--	--	NA	8760	0.00	0.01	AP-42, Chapter 13.5
HAP[1]	--	--	NA	8760	0.00	0.00	Gas Analysis
Carbon Dioxide	116.6	-	NA	8760	24.47	107.18	Subpart C Default
Methane	0.0022	-	NA	8760	0.00	0.00	Subpart C Default
CO_2e	-	-	-	-	24.48	107.23	Subpart C Default

[1] Total VOC and HAP emissions showing only pilot based emissions; individual source emissions are allocated at each source

Robinson Lake Gas Plant
Andeavor Field Services LLC
Tanks and Dehydrators Unit Flare Emission Calculations

EU	27
EP	27
Equipment ID	FLARE-3

Source Description	Tanks and DEHY-1 & DEHY-2 Flare *(excludes DEHY-3 since it is accounted for under FLARE-2)*		
Make/Model	Steffes Air Assist Flare, Model: SAA-2		
VOC Destruction Efficiency	98%		
Pilot	Continuous		
		Btu/scf (Fuel Gas	
Pilot Gas HV	1192	Stream)	
Pilot Gas Fuel	21	scf/hr	(182 Mscf/yr)
Pilot Gas NMNE VOC Gas wt	2.98	lb/lb-mol	
Pilot Gas HAP Gas wt	0.16	lb/lb-mol	
Waste Gas to Flare	847.67	scf/hr	
Total Gas to Flare	868.47	scf/hr	
Total Heating Value of Gas to Flare	2,081,423	Btu/Mscf	

		Btu/scf (Flash	
Gunbarrel Tank Emissions HV	2284.12	Gas)	
Gunbarrel Tank Emissions Sent to Flare	571	scf/hr	
Gunbarrel Tank Emissions NMNE VOC Gas wt	34.86	lb/lb-mol	
Gunbarrel Tank HAP Gas wt	3.19	lb/lb-mol	

		Btu/scf (Flash	
Condensate Tank Emissions HV	2284.12	Gas)	
Condensate Tank Emissions Sent to Flare	37.28	scf/hr	
Condensate Tank Emissions NMNE VOC Gas wt	34.86	lb/lb-mol	
Condensate Tank HAP Gas wt	3.19	lb/lb-mol	

		Btu/scf (Flash	
PW Tank Emissions HV	2284.12	Gas)	
PW Tank Emissions Sent to Flare	0.26	scf/hr	
PW Tank Emissions NMNE VOC Gas wt	34.86	lb/lb-mol	
PW Tank HAP Gas wt	3.19	lb/lb-mol	

Methanol Tank Emissions HV	1.81	Btu/scf	726.1 KJ/mol (heat of combustion from Methanol.org)*(0.9478 Btu/KJ)/(379.4 scf/lb-mol)
Methanol Tank Emissions Sent to Flare	0.49	scf/hr	
Methanol Tank Emissions NMNE VOC Gas wt	32.04	lb/lb-mol	Methanol MW
Methanol Tank HAP Gas wt	32.04	lb/lb-mol	Methanol MW

Natural Gasoline Tank Emissions HV	3445.48	Btu/scf	
Natural Gasoline Emissions Sent to Flare	59.77	scf/hr	
Natural Gasoline Emissions NMNE VOC Gas wt	67.18	lb/lb-mol	
Natural Gasoline Tank HAP Gas wt	9.83	lb/lb-mol	

Dehy-1 Emissions HV	944.16	Btu/scf	From GLYCalc Condenser Vent Stream (GLYCalc Run dated 7/17/2023)
Dehy-1 Emissions Sent to Flare (Annual)	0.8	MMscf/yr	
Dehy-1 Emissions Sent to Flare	89.6	scf/hr	From GLYCalc Condenser Vent Stream (GLYCalc Run dated 7/17/2023)
Dehy-1 Emissions NMNE VOC Gas wt	13.12	lb/lb-mol	From GLYCalc Condenser Vent Stream (GLYCalc Run dated 7/17/2023)
Dehy-1 HAP Gas wt	0.7141	lb/lb-mol	From GLYCalc Condenser Vent Stream (GLYCalc Run dated 7/17/2023)

Dehy-2 Emissions HV	944.16	Btu/scf	From GLYCalc Condenser Vent Stream (GLYCalc Run dated 7/17/2023)
Dehy-2 Emissions Sent to Flare (Annual)	0.8	MMscf/yr	
Dehy-2 Emissions Sent to Flare	89.6	scf/hr	From GLYCalc Condenser Vent Stream (GLYCalc Run dated 7/17/2023)
Dehy-2 Emissions NMNE VOC Gas wt	13.12	lb/lb-mol	From GLYCalc Condenser Vent Stream (GLYCalc Run dated 7/17/2023)
Dehy-2 HAP Gas wt	0.7141	lb/lb-mol	From GLYCalc Condenser Vent Stream (GLYCalc Run dated 7/17/2023)

Emissions from DEHY-3 are controlled primarily by FLARE-2; therefore, excluded in FLARE-3 emissions:

TEG Dehydration Emissions HV	1511.78	Btu/scf	From GLYCalc Condenser Vent Stream (GLYCalc Run dated 7/17/2023)
TEG Dehydration Emissions Sent to Flare (Annual)	0.0	MMscf/yr	
TEG Dehydration Emissions Sent to Flare	0.0	scf/hr	From GLYCalc Condenser Vent Stream (GLYCalc Run dated 7/17/2023)
TEG Dehydration Emissions NMNE VOC Gas wt	20.35	lb/lb-mol	From GLYCalc Condenser Vent Stream (GLYCalc Run dated 7/17/2023)
TEG Dehydration HAP Gas wt	0.84	lb/lb-mol	From GLYCalc Condenser Vent Stream (GLYCalc Run dated 7/17/2023)

Potential Emissions from Pilot Gas

Pollutant	Emission Factor (lb/MMBtu)	Emission Factor (g/hp-hr)	Nominal Rating (hp)	Hrs of Operation (hrs/yr)	Estimated Emissions Maximum (lb/hr)	Estimated Emissions Total (tpy)	Source of Emission Factor
NOx	0.068	--	NA	8760	0.00	0.01	AP-42, Chapter 13.5
CO	0.31	--	NA	8760	0.01	0.03	AP-42, Chapter 13.5
Total NMNE VOC	0.66	--	NA	8760	0.02	0.07	AP-42, Chapter 13.5
HAP	--	--	NA	8760	0.00	0.00	Gas Analysis
Carbon Dioxide	116.6	-	NA	8760	2.89	12.7	Subpart C Default
Methane	0.0022	-	NA	8760	0.00	0.000	Subpart C Default
CO_2e	-	-	-	-	2.9	12.7	Subpart C Default

Potential Emissions from Gunbarrel Tank Vapor Combustion

Pollutant	Emission Factor (lb/MMBtu)	Emission Factor (g/hp-hr)	Nominal Rating (hp)	Hrs of Operation (hrs/yr)	Estimated Emissions Maximum (lb/hr)	Estimated Emissions Total (tpy)	Source of Emission Factor
NOx	0.068	--	NA	8760	0.09	0.39	AP-42, Chapter 13.5
CO	0.31	--	NA	8760	0.40	1.77	AP-42, Chapter 13.5
Total NMNE VOC	--	--	NA	8760	1.05	4.59	Gas Analysis
HAP	--	--	NA	8760	0.10	0.42	Gas Analysis
Carbon Dioxide	116.6	-	NA	8760	152.05	666.0	Subpart C Default
Methane	0.0022	-	NA	8760	0.00	0.013	Subpart C Default
CO_2e	-	-	-	-	152.1	666.3	Subpart C Default

Potential Emissions from Condensate Tank Vapor Combustion

Pollutant	Emission Factor (lb/MMBtu)	Emission Factor (g/hp-hr)	Nominal Rating (hp)	Hrs of Operation (hrs/yr)	Estimated Emissions Maximum (lb/hr)	Estimated Emissions Total (tpy)	Source of Emission Factor
NOx	0.068	--	NA	8760	0.01	0.03	AP-42, Chapter 13.5
CO	0.31	--	NA	8760	0.03	0.12	AP-42, Chapter 13.5
Total NMNE VOC	--	--	NA	8760	0.07	0.30	Gas Analysis
HAP	--	--	NA	8760	0.01	0.03	Gas Analysis
Carbon Dioxide	116.6	-	NA	8760	9.93	43.5	Subpart C Default
Methane	0.0022	-	NA	8760	0.00	0.001	Subpart C Default
CO_2e	-	-	-	-	9.9	43.5	Subpart C Default

Potential Emissions from Produced Water Tank Vapor Combustion

Pollutant	Emission Factor (lb/MMBtu)	Emission Factor (g/hp-hr)	Nominal Rating (hp)	Hrs of Operation (hrs/yr)	Estimated Emissions Maximum (lb/hr)	Estimated Emissions Total (tpy)	Source of Emission Factor
NOx	0.068	--	NA	8760	0.00	0.00	AP-42, Chapter 13.5
CO	0.31	--	NA	8760	0.00	0.00	AP-42, Chapter 13.5
Total NMNE VOC	--	--	NA	8760	0.00	0.00	Gas Analysis
HAP	--	--	NA	8760	0.00	0.00	Gas Analysis
Carbon Dioxide	116.6	-	NA	8760	0.07	0.3	Subpart C Default
Methane	0.0022	-	NA	8760	0.00	0.000	Subpart C Default
CO_2e	-	-	-	-	0.1	0.3	Subpart C Default

Potential Emissions from Methanol Tank Vapor Combustion

Pollutant	Emission Factor (lb/MMBtu)	Emission Factor (g/hp-hr)	Nominal Rating (hp)	Hrs of Operation (hrs/yr)	Estimated Emissions Maximum (lb/hr)	Estimated Emissions Total (tpy)	Source of Emission Factor
NOx	0.068	--	NA	8760	0.00	0.00	AP-42, Chapter 13.5
CO	0.31	--	NA	8760	0.00	0.00	AP-42, Chapter 13.5
Total NMNE VOC	--	--	NA	8760	0.00	0.00	Gas Analysis
HAP	--	--	NA	8760	0.00	0.00	Gas Analysis
Carbon Dioxide	116.6	-	NA	8760	0.00	0.0	Subpart C Default
Methane	0.0022	-	NA	8760	0.00	0.000	Subpart C Default
CO_2e	-	-	-	-	0.0	0.0	Subpart C Default

Potential Emissions from Natural Gasoline Tank Vapor Combustion

Pollutant	Emission Factor (lb/MMBtu)	Emission Factor (g/hp-hr)	Nominal Rating (hp)	Hrs of Operation (hrs/yr)	Estimated Emissions Maximum (lb/hr)	Estimated Emissions Total (tpy)	Source of Emission Factor
NOx	0.068	--	NA	8760	0.01	0.06	AP-42, Chapter 13.5
CO	0.31	--	NA	8760	0.06	0.28	AP-42, Chapter 13.5
Total NMNE VOC	--	--	NA	8760	0.21	0.93	Gas Analysis
HAP	--	--	NA	8760	0.03	0.14	Gas Analysis
Carbon Dioxide	116.6	-	NA	8760	24.02	105.2	Subpart C Default
Methane	0.0022	-	NA	8760	0.00	0.002	Subpart C Default
CO_2e	-	-	-	-	24.0	105.3	Subpart C Default

Potential Emissions from Dehy-1 Vapor Combustion

Pollutant	Emission Factor (lb/MMBtu)	Emission Factor (g/hp-hr)	Nominal Rating (hp)	Hrs of Operation (hrs/yr)	Estimated Emissions Maximum (lb/hr)	Estimated Emissions Total (tpy)	Source of Emission Factor
NOx	0.068	--	NA	8760	0.01	0.03	AP-42, Chapter 13.5
CO	0.31	--	NA	8760	0.03	0.11	AP-42, Chapter 13.5
Total NMNE VOC	--	--	NA	8760	0.06	0.27	Gas Analysis
HAP	--	--	NA	8760	0.00	0.01	Gas Analysis
Carbon Dioxide	116.6	-	NA	8760	9.87	43.2	Subpart C Default
Methane	0.0022	-	NA	8760	0.00	0.001	Subpart C Default
CO_2e	-	-	-	-	9.9	43.2	Subpart C Default

Potential Emissions from Dehy-2 Vapor Combustion

Pollutant	Emission Factor (lb/MMBtu)	Emission Factor (g/hp-hr)	Nominal Rating (hp)	Hrs of Operation (hrs/yr)	Estimated Emissions Maximum (lb/hr)	Estimated Emissions Total (tpy)	Source of Emission Factor
NOx	0.068	--	NA	8760	0.01	0.03	AP-42, Chapter 13.5
CO	0.31	--	NA	8760	0.03	0.11	AP-42, Chapter 13.5
Total NMNE VOC	--	--	NA	8760	0.06	0.27	Gas Analysis
HAP	--	--	NA	8760	0.00	0.01	Gas Analysis
Carbon Dioxide	116.6	-	NA	8760	9.87	43.2	Subpart C Default
Methane	0.0022	-	NA	8760	0.00	0.001	Subpart C Default
CO_2e	-	-	-	-	9.9	43.2	Subpart C Default

Emissions from DEHY-3 are controlled primarily by FLARE-2; therefore, excluded in FLARE-3 emissions:

Potential Emissions from Dehy-3 Vapor Combustion

Pollutant	Emission Factor (lb/MMBtu)	Emission Factor (g/hp-hr)	Nominal Rating (hp)	Hrs of Operation (hrs/yr)	Estimated Emissions Maximum (lb/hr)	Estimated Emissions Total (tpy)	Source of Emission Factor
NOx	0.068	--	NA	8760	0.00	0.00	AP-42, Chapter 13.5
CO	0.31	--	NA	8760	0.00	0.00	AP-42, Chapter 13.5
Total NMNE VOC	--	--	NA	8760	0.00	0.00	Gas Analysis
HAP	--	--	NA	8760	0.00	0.00	Gas Analysis
Carbon Dioxide	116.6	-	NA	8760	0.00	0.0	Subpart C Default
Methane	0.0022	-	NA	8760	0.00	0.000	Subpart C Default
CO_2e	-	-	-	-	0.0	0.0	Subpart C Default

Total Potential Emissions

Pollutant	Emission Factor (lb/MMBtu)	Emission Factor (g/hp-hr)	Nominal Rating (hp)	Hrs of Operation (hrs/yr)	Estimated Emissions Maximum (lb/hr)	Estimated Emissions Total (tpy)	Source of Emission Factor
NOx	0.068	--	NA	8760	0.12	0.53	AP-42, Chapter 13.5
CO	0.31	--	NA	8760	0.55	2.43	AP-42, Chapter 13.5
Total NMNE VOC[1]	--	--	NA	8760	0.02	0.07	AP-42, Chapter 13.5
HAP[1]	--	--	NA	8760	0.00	0.00	Gas Analysis
Carbon Dioxide	116.6	-	NA	8760	208.69	914.08	Subpart C Default
Methane	0.0022	-	NA	8760	0.00	0.02	Subpart C Default
CO_2e	-	-	-	-	208.79	914.51	Subpart C Default

[1] Total VOC and HAP emissions showing only pilot based emissions; individual source emissions are allocated at each source

Robinson Lake Gas Plant

Andeavor Field Services LLC

Robinson Lake Gas Plant DEHY-1 + DEHY-2 Condenser Vent Stream (From GLYCalc)

Compound	Molecular Wt (lb/lb-mol)	Mol %	Mole Frac.	Gas Weight (lb/lb-mol)	Weight %	Corrected Weight % [1]	Btu/scf	Btu/scf*MoleFrac
Methane	16.04	8.41%	0.0841	1.35	3.605%	7.27%	909.4	76.5
Ethane	30.07	13.60%	0.1360	4.09	10.928%	22.03%	1618.7	220.1
Total HC (Non-VOC)		*22.01%*	*0.2201*	*5.44*	*14.53%*	*29.30%*	*2528.1*	*296.6*
Propane	44.09	17.50%	0.1750	7.72	20.618%	41.57%	2314.9	405.1
i-Butane	58.12	1.20%	0.0120	0.70	1.864%	3.76%	3000.4	36.0
n-Butane	58.12	5.13%	0.0513	2.98	7.967%	16.06%	3010.8	154.5
i-Pentane	72.15	0.42%	0.0042	0.30	0.810%	1.63%	3699.0	15.5
n-Pentane	72.15	0.59%	0.0059	0.42	1.136%	2.29%	3706.9	21.8
Hexanes+	86.16	0.33%	0.0033	0.29	0.763%	1.54%	4403.8	14.6
Total NMNE VOC		*25.17%*	*0.2517*	*12.41*	*33.158%*	*66.85%*	*20135.8*	*647.5*
n-Hexane	86.16	0.04%	0.0004	0.03	0.083%	0.17%	2314.9	0.8
2,2,4-Trimethylpentane	114.24	0.00%	0.0000	0.00	0.000%	0.00%	3000.4	0.0
Benzene	78.11	0.23%	0.0023	0.18	0.478%	0.96%	3010.8	6.9
Toluene	92.13	0.00%	0.0000	0.00	0.000%	0.00%	3699.0	0.0
Ethylbenzene	106.17	0.18%	0.0018	0.19	0.499%	1.01%	3706.9	6.5
Xylenes	106.17	0.30%	0.0030	0.32	0.848%	1.71%	4403.8	13.2
Total HAPs		*0.74%*	*0.0074*	*0.71*	*1.908%*	*3.85%*	*20135.8*	*27.4*
Carbon dioxide	43.99	36.30%	0.3630	15.97	42.672%	NA	0	0
Nitrogen	28.02	0.48%	0.0048	0.14	0.361%	NA	0	0
Hydrogen sulfide	34.06	0.00%	0.0000	0.00	0.000%	NA	586.8	0.0017604
Water	18.02	15.30%	0.1530	2.76	7.368%	NA	0	0
Helium	4.00	0.00%	0.0000	0.00	0.000%	NA	0	0
Totals:		100%		37.422	100.00%	100%		944.2

[1] Weight fraction corrected to remove Carbon dioxide, Nitrogen, Hydrogen sulfide and Helium content.

*Other HAPs are included in n-Hexane above based on the gas analyses.

Fraction of NMNE VOC:	35.067%	wt%
Fraction of NMNE VOC:	13.1225	lb/lb-mole
Fraction of HAPs:	0.7141	lb/lb-mole
LHV BTU Content (Btu/scf):	944.2	

Robinson Lake Gas Plant

Andeavor Field Services LLC

Robinson Lake Gas Plant DEHY-3 Condenser Vent Stream (From GLYCalc)

Compound	Molecular Wt (lb/lb-mol)	Mol %	Mole Frac.	Gas Weight (lb/lb-mol)	Weight %	Corrected Weight % [1]	Btu/scf	Btu/scf*MoleFrac
Methane	16.04	8.19%	0.0819	1.31	3.587%	4.46%	909.4	74.5
Ethane	30.07	25.90%	0.2590	7.79	21.268%	26.45%	1618.7	419.2
Total HC (Non-VOC)		*34.09%*	*0.3409*	*9.10*	*24.86%*	*30.91%*	*2528.1*	*493.7*
Propane	44.09	27.90%	0.2790	12.30	33.592%	41.77%	2314.9	645.9
i-Butane	58.12	2.07%	0.0207	1.20	3.285%	4.09%	3000.4	62.1
n-Butane	58.12	7.36%	0.0736	4.28	11.682%	14.53%	3010.8	221.6
i-Pentane	72.15	0.61%	0.0061	0.44	1.192%	1.48%	3699.0	22.4
n-Pentane	72.15	0.92%	0.0092	0.67	1.821%	2.26%	3706.9	34.3
Hexanes+	86.16	0.72%	0.0072	0.62	1.703%	2.12%	4403.8	31.9
Total NMNE VOC		*39.58%*	*0.3958*	*19.51*	*53.275%*	*66.25%*	*20135.8*	*1018.1*
n-Hexane	86.16	0.13%	0.0013	0.11	0.294%	0.37%	2314.9	2.9
2,2,4-Trimethylpentane	114.24	0.00%	0.0000	0.00	0.000%	0.00%	3000.4	0.0
Benzene	78.11	0.00%	0.0000	0.00	0.000%	0.00%	3010.8	0.0
Toluene	92.13	0.00%	0.0000	0.00	0.000%	0.00%	3699.0	0.0
Ethylbenzene	106.17	0.00%	0.0000	0.00	0.000%	0.00%	3706.9	0.0
Xylenes	106.17	0.69%	0.0069	0.73	1.992%	2.48%	4403.8	30.3
Total HAPs		*0.81%*	*0.0081*	*0.84*	*2.286%*	*2.84%*	*20135.8*	*33.1*
Carbon dioxide	43.99	9.58%	0.0958	4.21	11.508%	NA	0	0
Nitrogen	28.02	0.78%	0.0078	0.22	0.595%	NA	0	0
Hydrogen sulfide	34.06	0.00%	0.0000	0.00	0.000%	NA	586.8	0.0017604
Water	18.02	15.20%	0.1520	2.74	7.480%	NA	0	0
Helium	4.00	0.00%	0.0000	0.00	0.000%	NA	0	0
Totals:		100%		36.619	100.00%	100%		1511.8

[1] Weight fraction corrected to remove Carbon dioxide, Nitrogen, Hydrogen sulfide and Helium content.

*Other HAPs are included in n-Hexane above based on the gas analyses.

Fraction of NMNE VOC:	55.560%	wt%
Fraction of NMNE VOC:	20.3455	lb/lb-mole
Fraction of HAPs:	0.8371	lb/lb-mole
LHV BTU Content (Btu/scf):	1511.8	

Methanol Emissions from Injection of Methanol -> Represented under DEHY-1 and DEHY-2

The VMG simulation model is used for estimating methanol emissions from field and plant injection of methanol. The assumptions and results of this model are summarized below

1. Total capacity of EG DEHY-1 and EG DEHY-2 is 150 MMscfd (75 MMscfd per unit)
2. 600 gallons/day (300 gallons/day per unit) of methanol is injected in the field. This is done for all days during the months of November to March and only 50% of the days in April and October.
3. 100 gallons/day is injected in the plant. This is done throughout the year (365 days/year).

Condenser Control Efficiency	80%
Flare-3 Destruction Efficiency	98%

Emission Estimation (Per Day)

Category	DEHY-1 (lb/hr)	DEHY-2 (lb/hr)	Total Uncontrolled Emissions (lb/hr)	Total Uncontrolled Emissions (ton/day)	Controlled Emissions (after control by condenser) (ton/day)	Controlled Emissions (after control by flare) (ton/day)
Methanol Emissions from Field and Plant Injection	100.65	100.65	201.30	2.42	0.4831	0.010
Plant Injection	27.63	27.63	55.26	0.66	0.1326	0.003
Field Injection	73.02	73.02	146.04	1.75	0.3505	0.007

Emission Estimation (Per Month Emissions) [1,2]

Month	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Days/Month	31	28	31	30	31	30	31	31	30	31	30	31
% Methanol injected in the field [1]	100%	100%	100%	50%	0%	0%	0%	0%	0%	0%	50%	100%
Total Emissions (tons/month) [2]	0.300	0.271	0.300	0.185	0.082	0.080	0.082	0.082	0.080	0.082	0.185	0.300

[1] During winter months December to March) methanol is injected in the field 100% of the time, during April and November 50% of the time and not injected during rest of the months. Plant Injection is done through the year.

[2] Total Emissions (tons/month) = Percentage of Methanol being injected (%) x No of days in a month (day/month) x Controlled Emissions from Plant Injection (ton/day) + No of days in month (day/month) x Controlled Emissions from Field Injection (tons/day)

Emission Estimation (Annual Emissions)[1,2]

Category	Uncontrolled Emissions (tpy)	Controlled Emissions (tpy)
Total Annual Emissions of Methanol	506.66	2.03
Total Annual Emissions of Methanol from DEHY-1	253.33	1.01
Total Annual Emissions of Methanol from DEHY-2	253.33	1.01

[1] Total Annual Emissions are split evenly between DEHY-1 and DEHY-2. Total Annual Emissions = Sum of All monthly emissions.

[2] Methanol emissions are included in the total HAP emissions from DEHY-1 and DEHY-2.

SPL
5057 Owan Industrial Park
Williston, ND 58801
701-368-7180

Sample ID:	RLGP Pre-EG Dehydrator Inlet	Sample Pressure:	510 PSI
Unique #:	N/A	Sample Temperature:	90 DEG F
Sampled By:	Nick Warnke	Analysis Date:	3/18/2021
Purpose:	Environmental	Date Sampled:	3/18/2021
Type Sample:	On-Site		
County:	Mountrail		

Component	Mol%	Wt%	LV%
Carbon Dioxide	0.8432	1.5796	0.7239
Nitrogen	5.8904	7.024	3.2599
Methane	62.0542	42.376	52.9206
Ethane	18.7688	24.0232	25.25
Propane	9.95	18.6764	13.7896
Isobutane	0.6784	1.6784	1.1167
n-Butane	1.629	4.0303	2.5835
Isopentane	0.0848	0.2604	0.156
n-Pentane	0.078	0.2396	0.1422
Cyclopentane	0.00138	0.00506	0.00253
n-Hexane	0.0025	0.0092	0.0051
Cyclohexane	0.0004	0.0014	0.0007
Other Hexanes	0.00642	0.02404	0.01237
Heptanes	0.0013	0.0055	0.003
Methylcyclohexane	0	0	0
2,2,4 Trimethylpentane	0	0	0
Benzene	0.0002	0.0007	0.0003
Toluene	0	0	0
Ethylbenzene	0.0001	0.0005	0.0002
Xylenes	0.0001	0.0005	0.0002
C8+ Heavies	0.0108	0.0652	0.0332
Total	100	100	100

SPL
5057 Owan Industrial Park
Williston, ND 58801
701-368-7180

Sample ID:	RLGP Pre-TEG Dehydrator Inlet	Sample Pressure:	381 PSI
Unique #:	N/A	Sample Temperature:	81 DEG F
Sampled By:	Nick Warnke	Analysis Date:	3/18/2021
Purpose:	Environmental	Date Sampled:	3/18/2021
Type Sample:	On-Site		
County:	Mountrail		

Component	Mol%	Wt%	LV%
Carbon Dioxide	0.884	1.7441	0.7724
Hydrogen Sulfide	0	0	0
Nitrogen	6.0214	7.562	3.3919
Methane	64.2624	46.2167	55.7816
Ethane	21.0398	28.3617	28.8104
Propane	6.7928	13.4281	9.5821
Isobutane	0.2699	0.7033	0.4522
n-Butane	0.6237	1.6251	1.0068
Isopentane	0.0441	0.1426	0.0826
n-Pentane	0.0472	0.1527	0.0876
Cyclopentane	0.001242	0.004807	0.002323
n-Hexane	0.0029	0.0112	0.0061
Cyclohexane	0.0005	0.0019	0.0009
Other Hexanes	0.006058	0.023993	0.011977
Heptanes	0.0018	0.0081	0.0043
Methylcyclohexane	0	0	0
2,2,4 Trimethylpentane	0	0	0
Benzene	0	0	0
Toluene	0	0	0
Ethylbenzene	0	0	0
Xylenes	0.0001	0.0005	0.0002
C8+ Heavies	0.0021	0.0132	0.0066
Total	100	100	100

Attachment C

Supporting Documentation for Dehydration Unit Emissions and Federally Enforceable Limits

- GLYCalc Inputs for DEHY-1 and DEHY-2
- GLYCalc Report for DEHY-1 and DEHY-2
- GLYCalc Inputs for DEHY-3
- GLYCalc Report for DEHY-3

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Robinson Lake Gas Plant - DEHY-1 & DEHY-2
File Name: H:\EHS\NORTH DAKOTA\FACILITIES\Robinson Lake Gas Plant\Air\02 Permit Applications\2023_Request Enforceable Dehy Requirements\GLYCalc Runs\Robinson Lake GP DEHY-1_DEHY-2 PTE_2023-07-17.ddf
Date: July 17, 2023

DESCRIPTION:

Description: 2023 PTC Application PTE
87.5-MMscfd (per unit); 13 gpm EG.
Inlet 90F, 510 psig. Condenser 130F.
Flare 98%; Recycle flash gas.
Site-specific gas sample 3/18/2021.

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 90.00 deg. F
Pressure: 510.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.8432
Nitrogen	5.8904
Methane	62.0542
Ethane	18.7688
Propane	9.9500
Isobutane	0.6784
n-Butane	1.6290
Isopentane	0.0848
n-Pentane	0.0780
Cyclopentane	0.0014
n-Hexane	0.0025
Cyclohexane	0.0004
Other Hexanes	0.0064
Heptanes	0.0013
Benzene	0.0002
Ethylbenzene	0.0001
Xylenes	0.0001

C8+ Heavies 0.0108

DRY GAS:

Flow Rate: 87.5 MMSCF/day

LEAN GLYCOL:

Glycol Type: EG
Water Content: 20.0 wt% H2O
Flow Rate: 13.0 gpm

COLD SEPARATOR:

Temperature: 22.0 deg. F
Pressure: 485.0 psig

PUMP:

Glycol Pump Type: Electric/Pneumatic

FLASH TANK:

Flash Control: Recycle/recompression
Temperature: 100.0 deg. F
Pressure: 55.0 psig

REGENERATOR OVERHEADS CONTROL DEVICE:

Control Device: Condenser
Temperature: 130.0 deg. F
Pressure: 14.7 psia

Control Device:	Combustion Device
Destruction Efficiency:	98.0 %
Excess Oxygen:	1.5 %
Ambient Air Temperature:	45.0 deg. F

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Robinson Lake Gas Plant - DEHY-1 & DEHY-2
File Name: H:\EHS\NORTH DAKOTA\FACILITIES\Robinson Lake Gas Plant\Air\02 Permit Applications\2023_Request Enforceable Dehy Requirements\GLYCalc Runs\Robinson Lake GP DEHY-1_DEHY-2 PTE_2023-07-17.ddf
Date: July 17, 2023

DESCRIPTION:

Description: 2023 PTC Application PTE
87.5-MMscfd (per unit); 13 gpm EG.
Inlet 90F, 510 psig. Condenser 130F.
Flare 98%; Recycle flash gas.
Site-specific gas sample 3/18/2021.

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0064	0.153	0.0279
Ethane	0.0193	0.463	0.0844
Propane	0.0365	0.877	0.1600
Isobutane	0.0033	0.079	0.0144
n-Butane	0.0141	0.338	0.0617
Isopentane	0.0014	0.034	0.0063
n-Pentane	0.0020	0.048	0.0088
Cyclopentane	0.0004	0.010	0.0018
n-Hexane	0.0001	0.004	0.0006
Cyclohexane	0.0003	0.006	0.0011
Other Hexanes	0.0002	0.006	0.0010
Heptanes	0.0002	0.004	0.0007
Benzene	0.0008	0.020	0.0037
Ethylbenzene	0.0009	0.021	0.0039
Xylenes	0.0015	0.036	0.0066
C8+ Heavies	0.0004	0.010	0.0017

Total Emissions	0.0878	2.108	0.3847
Total Hydrocarbon Emissions	0.0878	2.108	0.3847
Total VOC Emissions	0.0622	1.492	0.2724
Total HAP Emissions	0.0034	0.081	0.0148
Total BTEX Emissions	0.0032	0.077	0.0141

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.3190	7.655	1.3970
Ethane	0.9648	23.155	4.2258
Propane	1.8286	43.887	8.0093
Isobutane	0.1646	3.951	0.7211
n-Butane	0.7049	16.918	3.0876
Isopentane	0.0717	1.720	0.3139
n-Pentane	0.1005	2.411	0.4400
Cyclopentane	0.0209	0.501	0.0914
n-Hexane	0.0073	0.175	0.0320
Cyclohexane	0.0128	0.308	0.0561
Other Hexanes	0.0117	0.280	0.0512
Heptanes	0.0083	0.200	0.0365
Benzene	0.0455	1.092	0.1994
Ethylbenzene	0.0463	1.111	0.2028
Xylenes	0.0798	1.915	0.3494
C8+ Heavies	0.0200	0.479	0.0875
Total Emissions	4.4066	105.758	19.3009
Total Hydrocarbon Emissions	4.4066	105.758	19.3009
Total VOC Emissions	3.1229	74.948	13.6781
Total HAP Emissions	0.1789	4.293	0.7835
Total BTEX Emissions	0.1716	4.118	0.7515

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	3.1888	76.530	13.9668
Ethane	5.2329	125.589	22.9199
Propane	4.3029	103.270	18.8468
Isobutane	0.3803	9.127	1.6656
n-Butane	1.2050	28.920	5.2779
Isopentane	0.0916	2.197	0.4010
n-Pentane	0.1031	2.474	0.4515
Cyclopentane	0.0041	0.098	0.0179
n-Hexane	0.0049	0.117	0.0213
Cyclohexane	0.0017	0.040	0.0073
Other Hexanes	0.0104	0.250	0.0457
Heptanes	0.0035	0.085	0.0155
Benzene	0.0014	0.034	0.0062
Ethylbenzene	0.0009	0.022	0.0039
Xylenes	0.0009	0.023	0.0042
C8+ Heavies	0.0027	0.064	0.0117
Total Emissions	14.5350	348.841	63.6634
Total Hydrocarbon Emissions	14.5350	348.841	63.6634
Total VOC Emissions	6.1134	146.722	26.7768
Total HAP Emissions	0.0081	0.195	0.0357
Total BTEX Emissions	0.0033	0.079	0.0143

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature:	130.00 deg. F
Condenser Pressure:	14.70 psia
Condenser Duty:	2.00e-002 MM BTU/hr
Produced Water:	17.51 bbls/day
Ambient Temperature:	45.00 deg. F
Excess Oxygen:	1.50 %
Combustion Efficiency:	98.00 %
Supplemental Fuel Requirement:	2.00e-002 MM BTU/hr

Component	Emitted	Destroyed
Methane	2.00%	98.00%
Ethane	2.00%	98.00%
Propane	2.00%	98.00%
Isobutane	2.00%	98.00%
n-Butane	2.00%	98.00%
Isopentane	2.00%	98.00%
n-Pentane	2.00%	98.00%
Cyclopentane	1.99%	98.01%
n-Hexane	2.00%	98.00%
Cyclohexane	1.99%	98.01%
Other Hexanes	2.00%	98.00%
Heptanes	2.00%	98.00%
Benzene	1.85%	98.15%
Ethylbenzene	1.91%	98.09%
Xylenes	1.88%	98.12%
C8+ Heavies	2.00%	98.00%

COLD SEPARATOR

Cold Separator Temperature:	22.0	deg. F
Cold Separator Pressure:	485.0	psig
Dry Gas Flow Rate:	87.5000	MMSCF/day
Calculated Dry Gas Dew Point:	3.62	lbs. H2O/MMSCF
Glycol Losses with Dry Gas:	0.7893	lb/hr
Wet Gas Water Content:	Saturated	
Calculated Wet Gas Water Content:	73.78	lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	3.05	gal/lb H2O

Component	Remaining in Dry Gas	Absorbed or Condensed
Water	4.90%	95.10%
Carbon Dioxide	99.84%	0.16%
Nitrogen	100.00%	0.00%
Methane	100.00%	0.00%
Ethane	99.99%	0.01%
Propane	99.99%	0.01%
Isobutane	99.99%	0.01%
n-Butane	99.98%	0.02%
Isopentane	99.97%	0.03%

n-Pentane	99.96%	0.04%
Cyclopentane	99.73%	0.27%
n-Hexane	99.94%	0.06%
Cyclohexane	99.55%	0.45%
Other Hexanes	99.96%	0.04%
Heptanes	99.90%	0.10%
Benzene	96.87%	3.13%
Ethylbenzene	95.37%	4.63%
Xylenes	92.09%	7.91%
C8+ Heavies	99.99%	0.01%

FLASH TANK

Flash Control: Recycle/recompression
Flash Temperature: 100.0 deg. F
Flash Pressure: 55.0 psig

Component	Left in Oil and Glycol	Removed in Flash Gas
Water	100.00%	0.00%
Carbon Dioxide	65.75%	34.25%
Nitrogen	6.89%	93.11%
Methane	9.09%	90.91%
Ethane	15.57%	84.43%
Propane	29.82%	70.18%
Isobutane	30.21%	69.79%
n-Butane	36.91%	63.09%
Isopentane	44.19%	55.81%
n-Pentane	49.61%	50.39%
Cyclopentane	83.66%	16.34%
n-Hexane	60.23%	39.77%
Cyclohexane	88.84%	11.16%
Other Hexanes	53.30%	46.70%
Heptanes	70.30%	29.70%
Benzene	97.11%	2.89%
Ethylbenzene	98.29%	1.71%
Xylenes	98.98%	1.02%
C8+ Heavies	89.60%	10.40%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	84.67%	15.33%
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	1.13%	98.87%
n-Pentane	1.01%	98.99%
Cyclopentane	0.60%	99.40%
n-Hexane	0.83%	99.17%
Cyclohexane	3.60%	96.40%
Other Hexanes	1.88%	98.12%
Heptanes	0.71%	99.29%
Benzene	5.15%	94.85%
Ethylbenzene	10.58%	89.42%
Xylenes	13.03%	86.97%
C8+ Heavies	13.39%	86.61%

STREAM REPORTS:

WET GAS STREAM

Temperature: 90.00 deg. F
Pressure: 524.70 psia
Flow Rate: 3.65e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.55e-001	2.69e+002
Carbon Dioxide	8.42e-001	3.57e+003

Nitrogen	5.88e+000	1.59e+004
Methane	6.20e+001	9.56e+004
Ethane	1.87e+001	5.42e+004
Propane	9.93e+000	4.22e+004
Isobutane	6.77e-001	3.79e+003
n-Butane	1.63e+000	9.10e+003
Isopentane	8.47e-002	5.88e+002
n-Pentane	7.79e-002	5.41e+002
Cyclopentane	1.38e-003	9.30e+000
n-Hexane	2.50e-003	2.07e+001
Cyclohexane	3.99e-004	3.23e+000
Other Hexanes	6.41e-003	5.32e+001
Heptanes	1.30e-003	1.25e+001
Benzene	2.00e-004	1.50e+000
Ethylbenzene	9.98e-005	1.02e+000
Xylenes	9.98e-005	1.02e+000
C8+ Heavies	1.08e-002	1.77e+002
Total Components	100.00	2.26e+005

DRY GAS STREAM

Temperature: 22.00 deg. F
Pressure: 499.70 psia
Flow Rate: 3.65e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.63e-003	1.32e+001
Carbon Dioxide	8.42e-001	3.56e+003
Nitrogen	5.89e+000	1.59e+004
Methane	6.21e+001	9.56e+004
Ethane	1.88e+001	5.42e+004
Propane	9.95e+000	4.22e+004
Isobutane	6.78e-001	3.79e+003
n-Butane	1.63e+000	9.10e+003
Isopentane	8.48e-002	5.88e+002
n-Pentane	7.80e-002	5.41e+002
Cyclopentane	1.38e-003	9.27e+000
n-Hexane	2.50e-003	2.07e+001
Cyclohexane	3.98e-004	3.22e+000
Other Hexanes	6.42e-003	5.31e+001

Heptanes	1.30e-003	1.25e+001
Benzene	1.94e-004	1.45e+000
Ethylbenzene	9.54e-005	9.73e-001
Xylenes	9.21e-005	9.39e-001
C8+ Heavies	1.08e-002	1.77e+002
Total Components	100.00	2.26e+005

LEAN GLYCOL STREAM

Temperature: 90.00 deg. F
Flow Rate: 1.30e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
EG	8.00e+001	5.66e+003
Water	2.00e+001	1.41e+003
Carbon Dioxide	8.28e-012	5.86e-010
Nitrogen	6.55e-013	4.63e-011
Methane	1.67e-018	1.18e-016
Ethane	4.14e-008	2.93e-006
Propane	3.53e-009	2.50e-007
Isobutane	2.31e-010	1.63e-008
n-Butane	6.70e-010	4.74e-008
Isopentane	1.16e-005	8.20e-004
n-Pentane	1.45e-005	1.02e-003
Cyclopentane	1.77e-006	1.25e-004
n-Hexane	8.65e-007	6.12e-005
Cyclohexane	6.77e-006	4.79e-004
Other Hexanes	3.16e-006	2.23e-004
Heptanes	8.45e-007	5.97e-005
Benzene	3.49e-005	2.47e-003
Ethylbenzene	7.74e-005	5.48e-003
Xylenes	1.69e-004	1.20e-002
C8+ Heavies	4.37e-005	3.09e-003
Total Components	100.00	7.07e+003

RICH GLYCOL STREAM

Temperature: 22.00 deg. F

Pressure: 499.70 psia
Flow Rate: 1.36e+001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
EG	7.69e+001	5.66e+003
Water	2.27e+001	1.67e+003
Carbon Dioxide	7.97e-002	5.86e+000
Nitrogen	6.30e-003	4.63e-001
Methane	4.77e-002	3.51e+000
Ethane	8.43e-002	6.20e+000
Propane	8.34e-002	6.13e+000
Isobutane	7.41e-003	5.45e-001
n-Butane	2.60e-002	1.91e+000
Isopentane	2.23e-003	1.64e-001
n-Pentane	2.78e-003	2.05e-001
Cyclopentane	3.41e-004	2.51e-002
n-Hexane	1.66e-004	1.22e-002
Cyclohexane	2.04e-004	1.50e-002
Other Hexanes	3.04e-004	2.23e-002
Heptanes	1.62e-004	1.19e-002
Benzene	6.72e-004	4.94e-002
Ethylbenzene	7.16e-004	5.27e-002
Xylenes	1.26e-003	9.27e-002
C8+ Heavies	3.50e-004	2.57e-002
Total Components	100.00	7.35e+003

COLD SEPARATOR OIL STREAM

Temperature: 22.00 deg. F

The calculated flow rate is less than 0.000001 #mol/hr.
The stream flow rate and composition are not reported.

FLASH TANK OFF GAS STREAM

Temperature: 100.00 deg. F
Pressure: 69.70 psia
Flow Rate: 2.15e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.33e-001	7.47e-002
Carbon Dioxide	8.06e+000	2.01e+000
Nitrogen	2.72e+000	4.31e-001
Methane	3.51e+001	3.19e+000
Ethane	3.08e+001	5.23e+000
Propane	1.72e+001	4.30e+000
Isobutane	1.16e+000	3.80e-001
n-Butane	3.66e+000	1.20e+000
Isopentane	2.24e-001	9.16e-002
n-Pentane	2.52e-001	1.03e-001
Cyclopentane	1.03e-002	4.10e-003
n-Hexane	9.98e-003	4.87e-003
Cyclohexane	3.51e-003	1.67e-003
Other Hexanes	2.14e-002	1.04e-002
Heptanes	6.26e-003	3.55e-003
Benzene	3.23e-003	1.43e-003
Ethylbenzene	1.50e-003	9.00e-004
Xylenes	1.58e-003	9.49e-004
C8+ Heavies	2.78e-003	2.68e-003
Total Components	100.00	1.70e+001

FLASH TANK OIL STREAM

Temperature: 100.00 deg. F

The calculated flow rate is less than 0.000001 #mol/hr.
The stream flow rate and composition are not reported.

FLASH TANK GLYCOL STREAM

Temperature: 100.00 deg. F
Flow Rate: 1.35e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
EG	7.71e+001	5.66e+003	771140.
Water	2.28e+001	1.67e+003	227726.
Carbon Dioxide	5.25e-002	3.85e+000	525.

Nitrogen	4.35e-004	3.19e-002	4.
Methane	4.35e-003	3.19e-001	43.
Ethane	1.32e-002	9.65e-001	132.
Propane	2.49e-002	1.83e+000	249.
Isobutane	2.24e-003	1.65e-001	22.
n-Butane	9.61e-003	7.05e-001	96.
Isopentane	9.88e-004	7.25e-002	10.
n-Pentane	1.38e-003	1.01e-001	14.
Cyclopentane	2.86e-004	2.10e-002	3.
n-Hexane	1.00e-004	7.37e-003	1.
Cyclohexane	1.81e-004	1.33e-002	2.
Other Hexanes	1.62e-004	1.19e-002	2.
Heptanes	1.14e-004	8.40e-003	1.
Benzene	6.54e-004	4.80e-002	7.
Ethylbenzene	7.06e-004	5.18e-002	7.
Xylenes	1.25e-003	9.17e-002	13.
C8+ Heavies	3.14e-004	2.31e-002	3.
Total Components	100.00	7.34e+003	1000002.

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: 5.47e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.86e+001	2.56e+002
Carbon Dioxide	6.07e-001	3.85e+000
Nitrogen	7.90e-003	3.19e-002
Methane	1.38e-001	3.19e-001
Ethane	2.22e-001	9.65e-001

Propane	2.87e-001	1.83e+000
Isobutane	1.96e-002	1.65e-001
n-Butane	8.41e-002	7.05e-001
Isopentane	6.89e-003	7.17e-002
n-Pentane	9.65e-003	1.00e-001
Cyclopentane	2.06e-003	2.09e-002
n-Hexane	5.88e-004	7.31e-003
Cyclohexane	1.06e-003	1.28e-002
Other Hexanes	9.40e-004	1.17e-002
Heptanes	5.77e-004	8.34e-003
Benzene	4.04e-003	4.55e-002
Ethylbenzene	3.02e-003	4.63e-002
Xylenes	5.21e-003	7.98e-002
C8+ Heavies	8.13e-004	2.00e-002
Total Components	100.00	2.64e+002

CONDENSER PRODUCED WATER STREAM

Temperature: 130.00 deg. F
Flow Rate: 5.11e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	1.00e+002	2.55e+002	999653.
Carbon Dioxide	2.89e-002	7.38e-002	289.
Nitrogen	6.79e-006	1.73e-005	0.
Methane	1.28e-004	3.27e-004	1.
Ethane	4.30e-004	1.10e-003	4.
Propane	8.99e-004	2.30e-003	9.
Isobutane	4.37e-005	1.12e-004	0.
n-Butane	2.45e-004	6.26e-004	2.
Isopentane	1.73e-005	4.43e-005	0.
n-Pentane	2.60e-005	6.64e-005	0.
Cyclopentane	3.65e-005	9.33e-005	0.
n-Hexane	1.54e-006	3.93e-006	0.
Cyclohexane	1.47e-005	3.75e-005	0.
Other Hexanes	1.99e-006	5.10e-006	0.
Heptanes	9.61e-007	2.46e-006	0.
Benzene	1.30e-003	3.32e-003	13.
Ethylbenzene	8.18e-004	2.09e-003	8.
Xylenes	1.90e-003	4.86e-003	19.

C8+ Heavies	1.37e-006	3.51e-006	0.
Total Components	100.00	2.56e+002	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 130.00 deg. F

The calculated flow rate is less than 0.000001 #mol/hr.
The stream flow rate and composition are not reported.

CONDENSER VENT STREAM

Temperature: 130.00 deg. F
Pressure: 14.70 psia
Flow Rate: 8.96e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.53e+001	6.49e-001
Carbon Dioxide	3.63e+001	3.78e+000
Nitrogen	4.82e-001	3.19e-002
Methane	8.41e+000	3.19e-001
Ethane	1.36e+001	9.64e-001
Propane	1.75e+001	1.83e+000
Isobutane	1.20e+000	1.65e-001
n-Butane	5.13e+000	7.04e-001
Isopentane	4.20e-001	7.16e-002
n-Pentane	5.89e-001	1.00e-001
Cyclopentane	1.25e-001	2.08e-002
n-Hexane	3.59e-002	7.31e-003
Cyclohexane	6.43e-002	1.28e-002
Other Hexanes	5.74e-002	1.17e-002
Heptanes	3.52e-002	8.34e-003
Benzene	2.29e-001	4.22e-002
Ethylbenzene	1.76e-001	4.42e-002
Xylenes	2.99e-001	7.49e-002
C8+ Heavies	4.96e-002	2.00e-002
Total Components	100.00	8.85e+000

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 8.59e-001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	1.75e+001	6.37e-003
Ethane	2.83e+001	1.93e-002
Propane	3.66e+001	3.65e-002
Isobutane	2.50e+000	3.29e-003
n-Butane	1.07e+001	1.41e-002
Isopentane	8.77e-001	1.43e-003
n-Pentane	1.23e+000	2.01e-003
Cyclopentane	2.62e-001	4.15e-004
n-Hexane	7.49e-002	1.46e-004
Cyclohexane	1.34e-001	2.56e-004
Other Hexanes	1.20e-001	2.34e-004
Heptanes	7.35e-002	1.67e-004
Benzene	4.77e-001	8.44e-004
Ethylbenzene	3.68e-001	8.84e-004
Xylenes	6.23e-001	1.50e-003
C8+ Heavies	1.04e-001	3.99e-004
Total Components	100.00	8.78e-002

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Robinson Lake Gas Plant - DEHY-3
File Name: H:\EHS\NORTH DAKOTA\FACILITIES\Robinson Lake Gas Plant\Air\02 Permit Applications\2023_Request Enforceable Dehy Requirements\GLYCalc Runs\Robinson Lake GP DEHY-3 PTE_2023-07-17.ddf
Date: July 17, 2023

DESCRIPTION:

Description: 60-MMscfd; 10 gpm; 2.2 lb/MMscf dry gas
Condenser 130F. Flare 98%. Recycle flash
gas; Site-specific gas sample 3/18/2021.
Inlet 81F, 381 psig.

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 81.00 deg. F
Pressure: 381.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.8840
Nitrogen	6.0214
Methane	64.2624
Ethane	21.0398
Propane	6.7928
Isobutane	0.2699
n-Butane	0.6237
Isopentane	0.0441
n-Pentane	0.0472
Cyclopentane	0.0012
n-Hexane	0.0029
Cyclohexane	0.0005
Other Hexanes	0.0061
Heptanes	0.0018
Xylenes	0.0001
C8+ Heavies	0.0021

DRY GAS:

Flow Rate:	60.0 MMSCF/day
Water Content:	2.2 lbs. H2O/MMSCF

LEAN GLYCOL:

Glycol Type:	TEG
Water Content:	1.0 wt% H2O
Flow Rate:	10.0 gpm

PUMP:

Glycol Pump Type:	Electric/Pneumatic

FLASH TANK:

Flash Control:	Recycle/recompression
Temperature:	180.0 deg. F
Pressure:	50.0 psig

REGENERATOR OVERHEADS CONTROL DEVICE:

Control Device:	Condenser
Temperature:	130.0 deg. F
Pressure:	14.7 psia

Control Device:	Combustion Device
Destruction Efficiency:	98.0 %
Excess Oxygen:	1.5 %
Ambient Air Temperature:	45.0 deg. F

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Robinson Lake Gas Plant - DEHY-3
File Name: H:\EHS\NORTH DAKOTA\FACILITIES\Robinson Lake Gas Plant\Air\02 Permit Applications\2023_Request Enforceable Dehy Requirements\GLYCalc Runs\Robinson Lake GP DEHY-3 PTE_2023-07-17.ddf
Date: July 17, 2023

DESCRIPTION:

Description: 60-MMscfd; 10 gpm; 2.2 lb/MMscf dry gas
Condenser 130F. Flare 98%. Recycle flash
gas; Site-specific gas sample 3/18/2021.
Inlet 81F, 381 psig.

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0085	0.205	0.0374
Ethane	0.0506	1.214	0.2215
Propane	0.0799	1.917	0.3498
Isobutane	0.0078	0.188	0.0343
n-Butane	0.0278	0.668	0.1218
Isopentane	0.0028	0.068	0.0124
n-Pentane	0.0043	0.104	0.0190
Cyclopentane	0.0007	0.017	0.0031
n-Hexane	0.0007	0.017	0.0031
Cyclohexane	0.0007	0.017	0.0031
Other Hexanes	0.0010	0.024	0.0044
Heptanes	0.0012	0.030	0.0054
Xylenes	0.0047	0.114	0.0208
C8+ Heavies	0.0008	0.019	0.0035
Total Emissions	0.1917	4.600	0.8395
Total Hydrocarbon Emissions	0.1917	4.600	0.8395
Total VOC Emissions	0.1326	3.182	0.5807
Total HAP Emissions	0.0054	0.131	0.0238

Total BTEX Emissions	0.0047	0.114	0.0208

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.4270	10.248	1.8703
Ethane	2.5305	60.732	11.0835
Propane	4.0016	96.039	17.5272
Isobutane	0.3925	9.420	1.7191
n-Butane	1.3965	33.516	6.1166
Isopentane	0.1430	3.432	0.6263
n-Pentane	0.2189	5.253	0.9587
Cyclopentane	0.0360	0.863	0.1575
n-Hexane	0.0359	0.862	0.1573
Cyclohexane	0.0361	0.867	0.1582
Other Hexanes	0.0507	1.216	0.2219
Heptanes	0.0654	1.569	0.2863
Xylenes	0.3037	7.289	1.3303
C8+ Heavies	0.6170	14.808	2.7025
Total Emissions	10.2547	246.113	44.9156
Total Hydrocarbon Emissions	10.2547	246.113	44.9156
Total VOC Emissions	7.2972	175.133	31.9617
Total HAP Emissions	0.3396	8.151	1.4876
Total BTEX Emissions	0.3037	7.289	1.3303

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	4.7077	112.984	20.6196
Ethane	9.4261	226.227	41.2865
Propane	7.3568	176.562	32.2226
Isobutane	0.5370	12.888	2.3521
n-Butane	1.5379	36.909	6.7359

Isopentane	0.1500	3.600	0.6570
n-Pentane	0.1911	4.587	0.8372
Cyclopentane	0.0083	0.199	0.0362
n-Hexane	0.0197	0.474	0.0865
Cyclohexane	0.0052	0.124	0.0227
Other Hexanes	0.0353	0.846	0.1545
Heptanes	0.0200	0.481	0.0877
Xylenes	0.0026	0.062	0.0113
C8+ Heavies	0.1346	3.230	0.5894
Total Emissions	24.1322	579.173	105.6992
Total Hydrocarbon Emissions	24.1322	579.173	105.6992
Total VOC Emissions	9.9984	239.962	43.7930
Total HAP Emissions	0.0223	0.536	0.0977
Total BTEX Emissions	0.0026	0.062	0.0113

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature:	130.00 deg. F
Condenser Pressure:	14.70 psia
Condenser Duty:	4.20e-002 MM BTU/hr
Hydrocarbon Recovery:	0.05 bbls/day
Produced Water:	11.73 bbls/day
Ambient Temperature:	45.00 deg. F
Excess Oxygen:	1.50 %
Combustion Efficiency:	98.00 %
Supplemental Fuel Requirement:	4.20e-002 MM BTU/hr

Component	Emitted	Destroyed
Methane	2.00%	98.00%
Ethane	2.00%	98.00%
Propane	2.00%	98.00%
Isobutane	1.99%	98.01%
n-Butane	1.99%	98.01%
Isopentane	1.98%	98.02%
n-Pentane	1.98%	98.02%
Cyclopentane	1.97%	98.03%

n-Hexane	1.96%	98.04%
Cyclohexane	1.93%	98.07%
Other Hexanes	1.96%	98.04%
Heptanes	1.89%	98.11%
Xylenes	1.56%	98.44%
C8+ Heavies	0.13%	99.87%

ABSORBER

Calculated Absorber Stages:	1.65	
Specified Dry Gas Dew Point:	2.20	lbs. H2O/MMSCF
Temperature:	81.0	deg. F
Pressure:	381.0	psig
Dry Gas Flow Rate:	60.0000	MMSCF/day
Glycol Losses with Dry Gas:	0.1485	lb/hr
Wet Gas Water Content:	Saturated	
Calculated Wet Gas Water Content:	70.99	lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	3.49	gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	3.09%	96.91%
Carbon Dioxide	99.88%	0.12%
Nitrogen	99.99%	0.01%
Methane	99.99%	0.01%
Ethane	99.97%	0.03%
Propane	99.94%	0.06%
Isobutane	99.91%	0.09%
n-Butane	99.88%	0.12%
Isopentane	99.86%	0.14%
n-Pentane	99.82%	0.18%
Cyclopentane	99.23%	0.77%
n-Hexane	99.66%	0.34%
Cyclohexane	98.51%	1.49%
Other Hexanes	99.75%	0.25%
Heptanes	99.28%	0.72%
Xylenes	56.21%	43.79%
C8+ Heavies	96.81%	3.19%

FLASH TANK

Flash Control: Recycle/recompression
Flash Temperature: 180.0 deg. F
Flash Pressure: 50.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.92%	0.08%
Carbon Dioxide	43.30%	56.70%
Nitrogen	8.07%	91.93%
Methane	8.32%	91.68%
Ethane	21.16%	78.84%
Propane	35.23%	64.77%
Isobutane	42.23%	57.77%
n-Butane	47.59%	52.41%
Isopentane	49.06%	50.94%
n-Pentane	53.61%	46.39%
Cyclopentane	81.39%	18.61%
n-Hexane	64.70%	35.30%
Cyclohexane	87.85%	12.15%
Other Hexanes	59.36%	40.64%
Heptanes	76.66%	23.34%
Xylenes	99.27%	0.73%
C8+ Heavies	84.26%	15.74%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	24.66%	75.34%
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	1.02%	98.98%
n-Pentane	0.93%	99.07%

Cyclopentane	0.61%	99.39%
n-Hexane	0.77%	99.23%
Cyclohexane	3.64%	96.36%
Other Hexanes	1.68%	98.32%
Heptanes	0.65%	99.35%
Xylenes	13.03%	86.97%
C8+ Heavies	14.33%	85.67%

STREAM REPORTS:

WET GAS STREAM

Temperature: 81.00 deg. F
Pressure: 395.70 psia
Flow Rate: 2.50e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.50e-001	1.78e+002
Carbon Dioxide	8.83e-001	2.56e+003
Nitrogen	6.01e+000	1.11e+004
Methane	6.42e+001	6.79e+004
Ethane	2.10e+001	4.17e+004
Propane	6.78e+000	1.97e+004
Isobutane	2.69e-001	1.03e+003
n-Butane	6.23e-001	2.39e+003
Isopentane	4.40e-002	2.10e+002
n-Pentane	4.71e-002	2.24e+002
Cyclopentane	1.24e-003	5.74e+000
n-Hexane	2.90e-003	1.65e+001
Cyclohexane	4.99e-004	2.77e+000
Other Hexanes	6.05e-003	3.44e+001
Heptanes	1.80e-003	1.19e+001
Xylenes	9.99e-005	7.00e-001
C8+ Heavies	2.10e-003	2.36e+001
Total Components	100.00	1.47e+005

DRY GAS STREAM

Temperature: 81.00 deg. F
Pressure: 395.70 psia
Flow Rate: 2.50e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	4.64e-003	5.50e+000
Carbon Dioxide	8.83e-001	2.56e+003
Nitrogen	6.02e+000	1.11e+004
Methane	6.43e+001	6.79e+004
Ethane	2.10e+001	4.17e+004
Propane	6.79e+000	1.97e+004
Isobutane	2.70e-001	1.03e+003
n-Butane	6.23e-001	2.39e+003
Isopentane	4.40e-002	2.09e+002
n-Pentane	4.71e-002	2.24e+002
Cyclopentane	1.23e-003	5.70e+000
n-Hexane	2.89e-003	1.64e+001
Cyclohexane	4.93e-004	2.73e+000
Other Hexanes	6.04e-003	3.43e+001
Heptanes	1.79e-003	1.18e+001
Xylenes	5.62e-005	3.93e-001
C8+ Heavies	2.03e-003	2.28e+001
Total Components	100.00	1.47e+005

LEAN GLYCOL STREAM

Temperature: 81.00 deg. F
Flow Rate: 1.00e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.90e+001	5.58e+003
Water	1.00e+000	5.63e+001
Carbon Dioxide	5.67e-012	3.20e-010
Nitrogen	1.56e-012	8.79e-011
Methane	3.06e-018	1.73e-016
Ethane	1.00e-007	5.64e-006
Propane	8.21e-009	4.62e-007
Isobutane	4.95e-010	2.79e-008

n-Butane	1.29e-009	7.28e-008
Isopentane	2.61e-005	1.47e-003
n-Pentane	3.66e-005	2.06e-003
Cyclopentane	3.95e-006	2.22e-004
n-Hexane	4.96e-006	2.80e-004
Cyclohexane	2.42e-005	1.37e-003
Other Hexanes	1.54e-005	8.68e-004
Heptanes	7.62e-006	4.29e-004
Xylenes	8.07e-004	4.55e-002
C8+ Heavies	1.83e-003	1.03e-001
Total Components	100.00	5.63e+003

RICH GLYCOL STREAM

Temperature: 81.00 deg. F
Pressure: 395.70 psia
Flow Rate: 1.04e+001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.54e+001	5.57e+003
Water	3.91e+000	2.29e+002
Carbon Dioxide	5.47e-002	3.20e+000
Nitrogen	1.50e-002	8.78e-001
Methane	8.79e-002	5.13e+000
Ethane	2.05e-001	1.20e+001
Propane	1.94e-001	1.14e+001
Isobutane	1.59e-002	9.29e-001
n-Butane	5.02e-002	2.93e+000
Isopentane	5.04e-003	2.94e-001
n-Pentane	7.05e-003	4.12e-001
Cyclopentane	7.61e-004	4.45e-002
n-Hexane	9.57e-004	5.59e-002
Cyclohexane	7.31e-004	4.27e-002
Other Hexanes	1.49e-003	8.68e-002
Heptanes	1.47e-003	8.58e-002
Xylenes	6.02e-003	3.52e-001
C8+ Heavies	1.46e-002	8.55e-001
Total Components	100.00	5.84e+003

FLASH TANK OFF GAS STREAM

Temperature: 180.00 deg. F
Pressure: 64.70 psia
Flow Rate: 3.40e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.18e+000	1.91e-001
Carbon Dioxide	4.59e+000	1.81e+000
Nitrogen	3.21e+000	8.07e-001
Methane	3.27e+001	4.71e+000
Ethane	3.50e+001	9.43e+000
Propane	1.86e+001	7.36e+000
Isobutane	1.03e+000	5.37e-001
n-Butane	2.95e+000	1.54e+000
Isopentane	2.32e-001	1.50e-001
n-Pentane	2.95e-001	1.91e-001
Cyclopentane	1.32e-002	8.27e-003
n-Hexane	2.55e-002	1.97e-002
Cyclohexane	6.87e-003	5.19e-003
Other Hexanes	4.56e-002	3.53e-002
Heptanes	2.23e-002	2.00e-002
Xylenes	2.70e-003	2.57e-003
C8+ Heavies	8.81e-002	1.35e-001
Total Components	100.00	2.69e+001

FLASH TANK GLYCOL STREAM

Temperature: 180.00 deg. F
Flow Rate: 1.04e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.59e+001	5.57e+003
Water	3.93e+000	2.28e+002
Carbon Dioxide	2.38e-002	1.38e+000
Nitrogen	1.22e-003	7.08e-002
Methane	7.34e-003	4.27e-001
Ethane	4.35e-002	2.53e+000

Propane	6.88e-002	4.00e+000
Isobutane	6.75e-003	3.92e-001
n-Butane	2.40e-002	1.40e+000
Isopentane	2.48e-003	1.44e-001
n-Pentane	3.80e-003	2.21e-001
Cyclopentane	6.22e-004	3.62e-002
n-Hexane	6.22e-004	3.62e-002
Cyclohexane	6.45e-004	3.75e-002
Other Hexanes	8.86e-004	5.15e-002
Heptanes	1.13e-003	6.58e-002
Xylenes	6.01e-003	3.49e-001
C8+ Heavies	1.24e-002	7.20e-001
Total Components	100.00	5.82e+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: 3.73e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.71e+001	1.72e+002
Carbon Dioxide	3.20e-001	1.38e+000
Nitrogen	2.57e-002	7.08e-002
Methane	2.71e-001	4.27e-001
Ethane	8.56e-001	2.53e+000
Propane	9.23e-001	4.00e+000
Isobutane	6.87e-002	3.92e-001
n-Butane	2.44e-001	1.40e+000
Isopentane	2.01e-002	1.43e-001
n-Pentane	3.08e-002	2.19e-001
Cyclopentane	5.21e-003	3.60e-002

n-Hexane	4.24e-003	3.59e-002
Cyclohexane	4.36e-003	3.61e-002
Other Hexanes	5.98e-003	5.07e-002
Heptanes	6.63e-003	6.54e-002
Xylenes	2.91e-002	3.04e-001
C8+ Heavies	3.68e-002	6.17e-001
Total Components	100.00	1.84e+002

CONDENSER PRODUCED WATER STREAM

Temperature: 130.00 deg. F
Flow Rate: 3.42e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	1.00e+002	1.71e+002	999851.
Carbon Dioxide	7.61e-003	1.30e-002	76.
Nitrogen	1.10e-005	1.88e-005	0.
Methane	1.24e-004	2.13e-004	1.
Ethane	8.20e-004	1.40e-003	8.
Propane	1.42e-003	2.44e-003	14.
Isobutane	7.51e-005	1.29e-004	1.
n-Butane	3.50e-004	5.99e-004	3.
Isopentane	2.48e-005	4.24e-005	0.
n-Pentane	4.05e-005	6.93e-005	0.
Cyclopentane	4.49e-005	7.69e-005	0.
n-Hexane	5.33e-006	9.12e-006	0.
Cyclohexane	2.90e-005	4.96e-005	0.
Other Hexanes	6.12e-006	1.05e-005	0.
Heptanes	5.13e-006	8.78e-006	0.
Xylenes	4.35e-003	7.44e-003	43.
C8+ Heavies	1.98e-006	3.39e-006	0.
Total Components	100.00	1.71e+002	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 130.00 deg. F
Flow Rate: 1.55e-003 gpm

Component	Conc.	Loading

	(wt%)	(lb/hr)
Water	2.58e-002	1.70e-004
Carbon Dioxide	2.65e-002	1.75e-004
Nitrogen	1.38e-004	9.10e-007
Methane	3.92e-003	2.58e-005
Ethane	1.26e-001	8.27e-004
Propane	8.88e-001	5.85e-003
Isobutane	1.63e-001	1.07e-003
n-Butane	7.60e-001	5.01e-003
Isopentane	1.57e-001	1.03e-003
n-Pentane	3.04e-001	2.00e-003
Cyclopentane	8.07e-002	5.32e-004
n-Hexane	1.17e-001	7.72e-004
Cyclohexane	1.73e-001	1.14e-003
Other Hexanes	1.36e-001	8.96e-004
Heptanes	5.40e-001	3.56e-003
Xylenes	8.98e+000	5.92e-002
C8+ Heavies	8.75e+001	5.77e-001
Total Components	100.00	6.59e-001

CONDENSER VENT STREAM

Temperature: 130.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.23e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.52e+001	8.92e-001
Carbon Dioxide	9.58e+000	1.37e+000
Nitrogen	7.78e-001	7.08e-002
Methane	8.19e+000	4.27e-001
Ethane	2.59e+001	2.53e+000
Propane	2.79e+001	3.99e+000
Isobutane	2.07e+000	3.91e-001
n-Butane	7.36e+000	1.39e+000
Isopentane	6.05e-001	1.42e-001
n-Pentane	9.24e-001	2.17e-001
Cyclopentane	1.55e-001	3.54e-002
n-Hexane	1.25e-001	3.51e-002
Cyclohexane	1.28e-001	3.49e-002

Other Hexanes	1.78e-001	4.97e-002
Heptanes	1.90e-001	6.18e-002
Xylenes	6.87e-001	2.37e-001
C8+ Heavies	7.26e-002	4.02e-002
Total Components	100.00	1.19e+001

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.84e+000 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	1.10e+001	8.54e-003
Ethane	3.48e+001	5.06e-002
Propane	3.74e+001	7.99e-002
Isobutane	2.78e+000	7.83e-003
n-Butane	9.89e+000	2.78e-002
Isopentane	8.13e-001	2.84e-003
n-Pentane	1.24e+000	4.34e-003
Cyclopentane	2.08e-001	7.07e-004
n-Hexane	1.69e-001	7.02e-004
Cyclohexane	1.72e-001	6.99e-004
Other Hexanes	2.39e-001	9.95e-004
Heptanes	2.55e-001	1.24e-003
Xylenes	9.23e-001	4.74e-003
C8+ Heavies	9.76e-002	8.04e-004
Total Components	100.00	1.92e-001