



February 9, 2018

BY: U.S. CERTIFIED MAIL, RETURN RECEIPT REQUESTED

7017 1070 0000 4417 1747

William F. Durham
Director, Division of Air Quality
WVDEP
601 57th Street
Charleston, WV 25304

**RE: Dominion Energy Transmission, Inc. – General Permit Application (G35-D)
Class II Administrative Update
Maxwell Compressor Station**

Dear Mr. Durham:

Enclosed are one complete original and two (2) cd copies of a G35-D General Permit application to update the dehydration unit potential to emission calculations at Dominion Energy Transmission, Inc.'s Maxwell Compressor Station in Doddridge County, WV. This application is being submitted to update the actual operations at worst case scenarios. No other emission units at the facility are being updated.

The public notice affidavit will be submitted to WVDEP once it is received from the newspaper.

If you require any additional information, please contact Andy Gates at (804) 273-2950 or via email at Andy.Gates@dominionenergy.com.

Sincerely,

A handwritten signature in blue ink, appearing to read "Amanda B. Tornabene".

Amanda B. Tornabene
Director, Environmental Services (Air Program and Gas Infrastructure Group)



west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25304
Phone (304) 926-0475
Fax (304) 926-0479
www.dep.wv.gov

G35-D GENERAL PERMIT REGISTRATION APPLICATION

PREVENTION AND CONTROL OF AIR POLLUTION IN REGARD TO THE CONSTRUCTION, MODIFICATION, RELOCATION, ADMINISTRATIVE UPDATE AND OPERATION OF NATURAL GAS COMPRESSOR AND/OR DEHYDRATION FACILITIES

- CONSTRUCTION
- MODIFICATION
- RELOCATION
- CLASS I ADMINISTRATIVE UPDATE
- CLASS II ADMINISTRATIVE UPDATE

SECTION I. GENERAL INFORMATION

Name of Applicant (as registered with the WV Secretary of State's Office): Dominion Energy Transmission, Inc.

Federal Employer ID No. (FEIN): 550629203

Applicant's Mailing Address: 925 White Oaks Blvd.

City: Bridgeport	State: WV	ZIP Code: 26330
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Facility Name: Maxwell Compressor Station

Operating Site Physical Address: County Route 19/11 (Porto Rico Road)
If none available, list road, city or town and zip of facility.

City: Porto Rico	Zip Code: 26411	County: Doddridge
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Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):

Latitude: 39.18178
Longitude: -80.76227

SIC Code: 4922
NAICS Code: 486210

DAQ Facility ID No. (For existing facilities)
017-00005

CERTIFICATION OF INFORMATION

This G35-D General Permit Registration Application shall be signed below by a Responsible Official. A Responsible Official is a President, Vice President, Secretary, Treasurer, General Partner, General Manager, a member of the Board of Directors, or Owner, depending on business structure. A business may certify an Authorized Representative who shall have authority to bind the Corporation, Partnership, Limited Liability Company, Association, Joint Venture or Sole Proprietorship. Required records of daily throughput, hours of operation and maintenance, general correspondence, compliance certifications and all required notifications must be signed by a Responsible Official or an Authorized Representative. If a business wishes to certify an Authorized Representative, the official agreement below shall be checked off and the appropriate names and signatures entered. **Any administratively incomplete or improperly signed or unsigned G35-D Registration Application will be returned to the applicant. Furthermore, if the G35-D forms are not utilized, the application will be returned to the applicant. No substitution of forms is allowed.**

I hereby certify that Brian C. Sheppard is an Authorized Representative and in that capacity shall represent the interest of the business (e.g., Corporation, Partnership, Limited Liability Company, Association Joint Venture or Sole Proprietorship) and may obligate and legally bind the business. If the business changes its Authorized Representative, a Responsible Official shall notify the Director of the Division of Air Quality immediately.

I hereby certify that all information contained in this G35-D General Permit Registration Application and any supporting documents appended hereto is, to the best of my knowledge, true, accurate and complete, and that all reasonable efforts have been made to provide the most comprehensive information possible.

Responsible Official Signature: 
Name and Title: Brian C. Sheppard, VP Eastern Pipeline Operations Phone: 681-842-3733 Fax: 681-842-3323
Email: Brian.C.Sheppard@dominionenergy.com Date: 01/30/18

If applicable:
 Authorized Representative Signature: _____
Name and Title: _____ Phone: _____ Fax: _____
Email: _____ Date: _____

If applicable:
 Environmental Contact
Name and Title: Andy Gates, Environmental Consultant Phone: 804-273-2950 Fax: 804-273-2964
Email: Andy.Gates@dominionenergy.com Date: _____

OPERATING SITE INFORMATION	
Briefly describe the proposed new operation and/or any change(s) to the facility: Increase in dehydration unit limits	
Directions to the facility: From New Martinsville, take WV Route 7. Turn right at WV Route 20. Travel 14.5 miles to Hastings Extraction Plant. Travel another 1.0 miles to Lower Run Road. Turn left. Site is 0.2 miles on the left	
ATTACHMENTS AND SUPPORTING DOCUMENTS	
I have enclosed the following required documents:	
Check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR13 and 45CSR22).	
<input checked="" type="checkbox"/> Check attached to front of application. <input type="checkbox"/> I wish to pay by electronic transfer. Contact for payment (incl. name and email address): <input type="checkbox"/> I wish to pay by credit card. Contact for payment (incl. name and email address):	
<input type="checkbox"/> \$500 (Construction, Modification, and Relocation) <input checked="" type="checkbox"/> \$300 (Class II Administrative Update) <input type="checkbox"/> \$1,000 NSPS fee for 40 CFR60, Subpart IIII, JJJJ and/or OOOO and/or OOOOa ¹ <input checked="" type="checkbox"/> \$2,500 NESHAP fee for 40 CFR63, Subpart ZZZZ and/or HH ²	
¹ Only one NSPS fee will apply. ² Only one NESHAP fee will apply. The Subpart ZZZZ NESHAP fee will be waived for new engines that satisfy requirements by complying with NSPS, Subparts IIII and/or JJJJ. <i>NSPS and NESHAP fees apply to new construction or if the source is being modified.</i>	
<input checked="" type="checkbox"/> Responsible Official or Authorized Representative Signature (if applicable)	
<input type="checkbox"/> Single Source Determination Form (must be completed in its entirety) – Attachment A	
<input type="checkbox"/> Siting Criteria Waiver (if applicable) – Attachment B	<input checked="" type="checkbox"/> Current Business Certificate – Attachment C
<input checked="" type="checkbox"/> Process Flow Diagram – Attachment D	<input checked="" type="checkbox"/> Process Description – Attachment E
<input checked="" type="checkbox"/> Plot Plan – Attachment F	<input checked="" type="checkbox"/> Area Map – Attachment G
<input checked="" type="checkbox"/> G35-D Section Applicability Form – Attachment H	<input checked="" type="checkbox"/> Emission Units/ERD Table – Attachment I
<input type="checkbox"/> Fugitive Emissions Summary Sheet – Attachment J	
<input type="checkbox"/> Storage Vessel(s) Data Sheet (include gas sample data, USEPA Tanks, simulation software (e.g. ProMax, E&P Tanks, HYSYS, etc.), etc. where applicable) – Attachment K	
<input type="checkbox"/> Natural Gas Fired Fuel Burning Unit(s) Data Sheet (GPUs, Heater Treaters, In-Line Heaters if applicable) – Attachment L	
<input type="checkbox"/> Internal Combustion Engine Data Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment M	
<input type="checkbox"/> Tanker Truck Loading Data Sheet (if applicable) – Attachment N	
<input checked="" type="checkbox"/> Glycol Dehydration Unit Data Sheet(s) (include wet gas analysis, GRI- GLYCalc™ input and output reports and information on reboiler if applicable) – Attachment O	
<input type="checkbox"/> Pneumatic Controllers Data Sheet – Attachment P	
<input type="checkbox"/> Centrifugal Compressor Data Sheet – Attachment Q	
<input type="checkbox"/> Reciprocating Compressor Data Sheet – Attachment R	
<input checked="" type="checkbox"/> Blowdown and Pigging Operations Data Sheet – Attachment S	
<input type="checkbox"/> Air Pollution Control Device/Emission Reduction Device(s) Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment T	
<input checked="" type="checkbox"/> Emission Calculations (please be specific and include all calculation methodologies used) – Attachment U	
<input checked="" type="checkbox"/> Facility-wide Emission Summary Sheet(s) – Attachment V	
<input checked="" type="checkbox"/> Class I Legal Advertisement – Attachment W	
<input checked="" type="checkbox"/> One (1) paper copy and two (2) copies of CD or DVD with pdf copy of application and attachments	

All attachments must be identified by name, divided into sections, and submitted in order.

Attachment C

Current Business Certificate

**WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION
CERTIFICATE**

ISSUED TO:
**DOMINION ENERGY TRANSMISSION, INC.
120 TREDEGAR ST
RICHMOND, VA 23219-4306**

BUSINESS REGISTRATION ACCOUNT NUMBER: 1038-3470

This certificate is issued on: **09/20/2017**

*This certificate is issued by
the West Virginia State Tax Commissioner
in accordance with Chapter 11, Article 12, of the West Virginia Code*

*The person or organization identified on this certificate is registered
to conduct business in the State of West Virginia at the location above.*

This certificate is not transferrable and must be displayed at the location for which issued
This certificate shall be permanent until cessation of the business for which the certificate of registration
was granted or until it is suspended, revoked or cancelled by the Tax Commissioner.

Change in name or change of location shall be considered a cessation of the business and a new
certificate shall be required.

TRAVELING/STREET VENDORS: Must carry a copy of this certificate in every vehicle operated by them.
CONTRACTORS, DRILLING OPERATORS, TIMBER/LOGGING OPERATIONS: Must have a copy of
this certificate displayed at every job site within West Virginia.

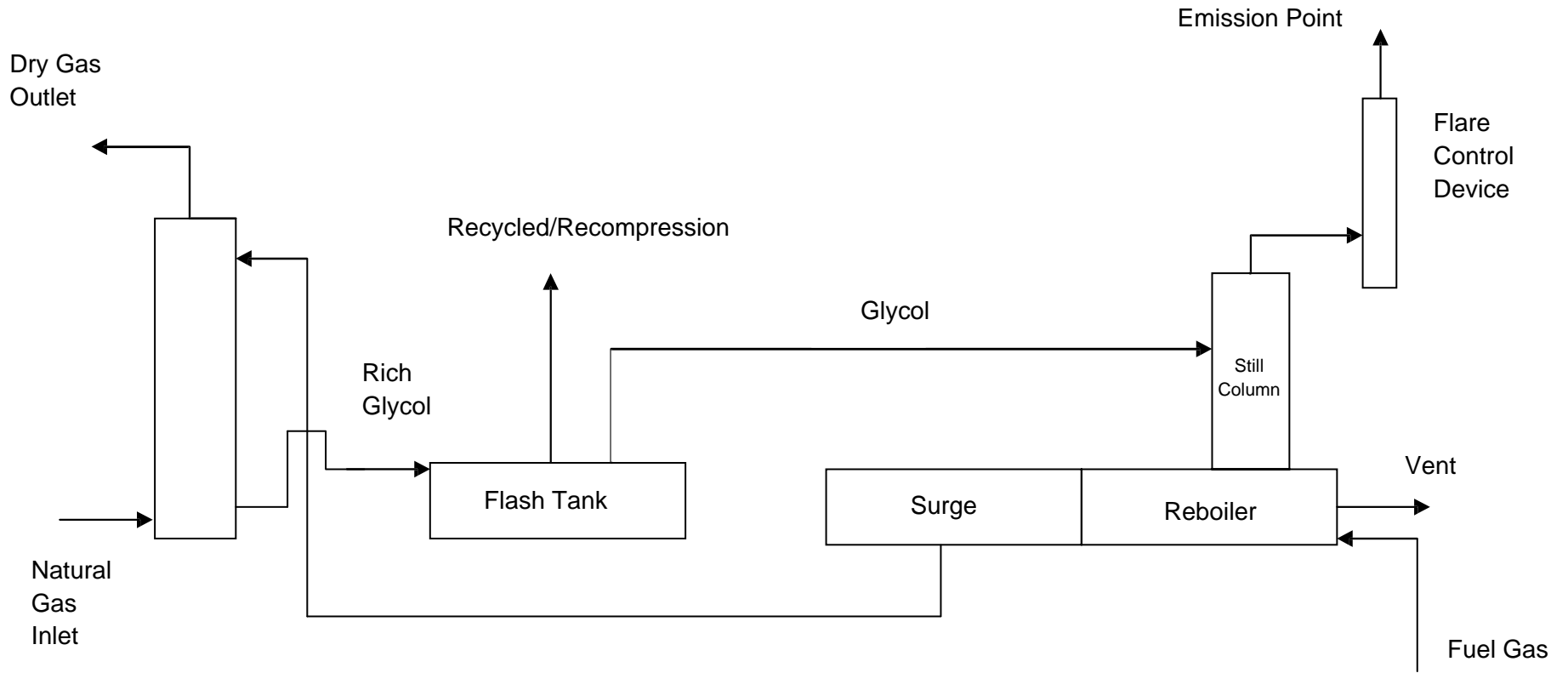
Attachment D

Process Flow Diagram

Dominion Energy Transmission, Inc.

Maxwell Compressor Station

Dehydration Unit (F-1, RSV-1, and RBV-1) Process Flow Diagram



Attachment E

Process Description

PROCESS DESCRIPTION

Maxwell Station is a natural gas compressor station that services a natural gas pipeline system. The purpose of this facility is to recompress natural gas flowing through a pipeline for transportation. The compressor engine (CE-2) at the facility receives natural gas from a valve on a pipeline and compresses it to enable further transportation in the pipeline. Prior to entering the pipeline, the compressed natural gas is processed by the dehydration unit. The purpose of the dehydration unit is to remove moisture from the gas stream to comply with gas quality specifications. The process to remove the moisture begins with the compressed gas being passed through a triethylene glycol dehydration system consisting of a contactor bed, a reboiler (RBV-1), and associated equipment. During this process, a small amount of hydrocarbons are extracted from the gas stream. The wet gas enters the contactor where moisture and some hydrocarbons are absorbed into the lean glycol. The glycol, which has become rich with absorbed moisture and hydrocarbons, is regenerated in the still column (RSV-1) using the heat generated in the natural gas fired reboiler (RBV-1) to liberate the moisture and hydrocarbon vapors. The regenerator vapors are vented to the flare (F1) to combust the hydrocarbons; thereby, reducing overall emissions and odor. The compressed, dehydrated gas then enters the pipeline.

The purpose of this permit application is to update the dehydration unit emission limits based on an updated stripping gas rate and a recent BTEX wet gas sample, in addition to small changes in other parameters.

National Emission Standards for Hazardous Air Pollutants (NESHAP) Subpart HH

The dehydration unit at Maxwell Station is subject to this Subpart. Maxwell Station, having the existing flare permitted for control efficiency, is considered an area source and thus is subject to the requirements of Subpart HH. The unit is exempted under §63.764(e)(1)(ii) from the requirements of the Subpart due to actual benzene emissions being less than 1 ton/yr as shown by the potential to emit for the unit.

West Virginia Minor Source Regulations (R13 – General Permit G35-D)

The update to the dehydration unit emissions does not trigger a modification to permitting as potential to emit calculations are below exemption thresholds of:

- 6 lbs/hr and 10 tons/yr, or
- 144 lbs/day, or
- 2 lbs/hr or 5 tons/yr of HAPs

Since the proposed increase in emissions from the dehydration unit are not above these threshold levels, this permit action will be a Class II Administrative Update to the existing general permit (G35 – A031B).

Pollutant	Current PTE of Dehy Unit		New PTE with Updated Dehy Limits		Change in PTE Emissions		
	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(lbs/day)	(tons/yr)
VOC	4.52	19.79	2.33	10.20	- 2.19	- 52.56	- 9.59
Benzene	0.02	0.09	0.06	0.24	+ 0.04	+ 0.96	+0.15
Ethylbenzene	0.03	0.14	--	--	- 0.03	- 0.72	- 0.14
n-Hexane	0.05	0.24	0.06	0.25	+ 0.01	+ 0.24	+ 0.01
Toluene	0.05	0.23	0.12	0.52	+ 0.07	+ 1.68	+ 0.29
Xylene	0.09	0.39	0.15	0.63	+ 0.06	+ 1.44	+ 0.27
Total HAPs	0.24	1.09	0.38	1.63	+ 0.14	+ 3.36	+ 0.54

****Note:** The potential to emit (PTE) calculations for the dehydration unit have been updated to represent actual operations at worst case scenarios. A new GLYCalc run has been processed and a 200% safety factor has been included to the VOC and HAP limits to help with variability in operating parameters and wet gas samples.

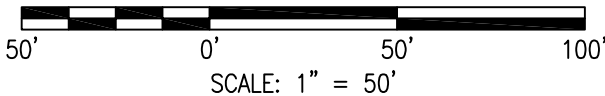
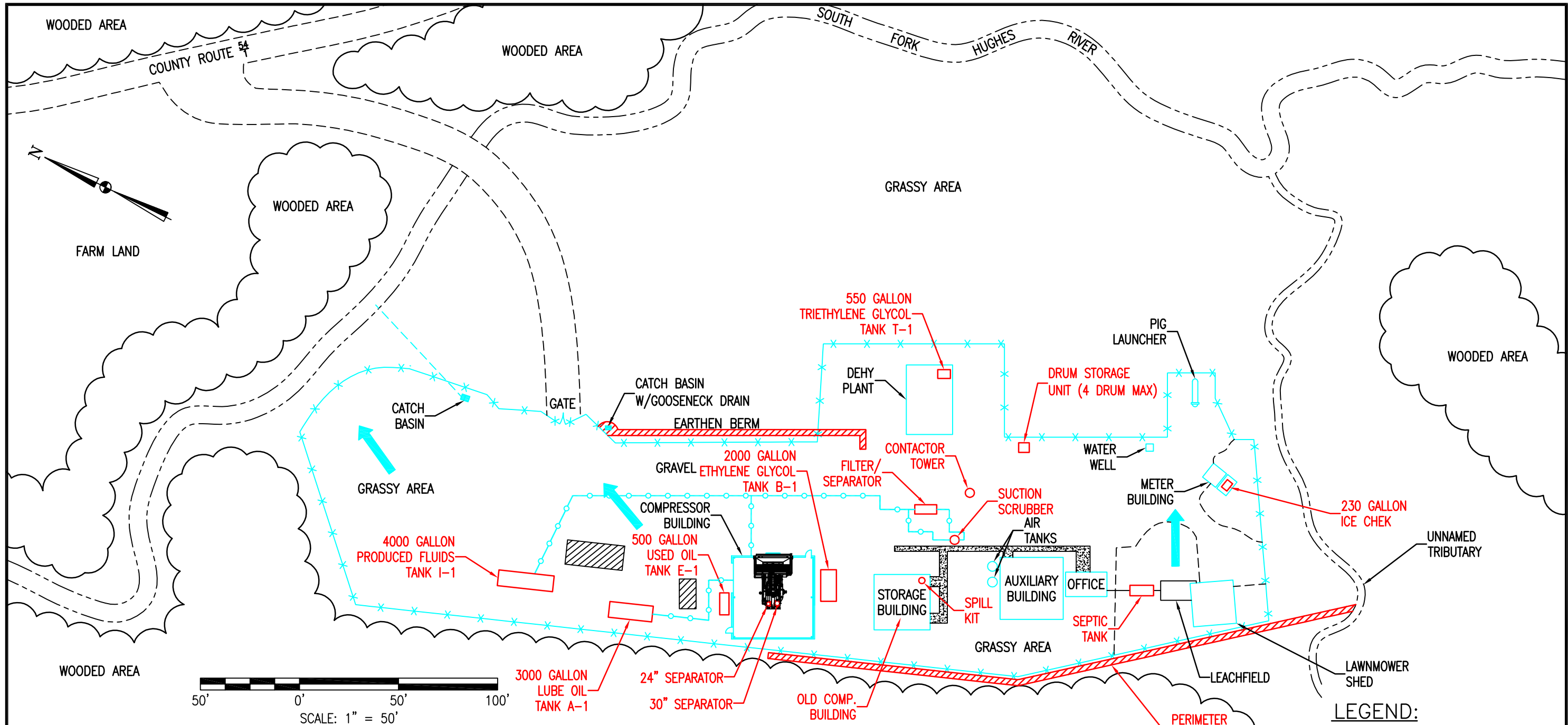
For example: VOC

GLYCalc = 5.0988 tons/yr

PTE Limits = 5.0988 * 2.0 = 10.20 tons VOC/yr

Attachment F

Plot Plan



- LEGEND:**
- ABOVEGROUND OIL CONTAINING PIPE
 - o-o- UNDERGROUND OIL CONTAINING PIPE
 - ➔ FLOW DIRECTION
 - TRUCK LOADING/ UNLOADING

OIL CONTAINING MECHANICAL EQUIPMENT		
QUANTITY	MATERIAL	EQUIPMENT DESCRIPTION
61 GALLONS	PRODUCED FLUIDS	FILTER SEPARATOR VESSEL
529 GALLONS	PRODUCED FLUIDS	SUCTION SCRUBBER
104 GALLONS	PRODUCED FLUIDS	24" ENGINE SEPARATOR (CATERPILLAR 3508)
174 GALLONS	PRODUCED FLUIDS	30" ENGINE SEPARATOR (CATERPILLAR 3508)
59 GALLONS	LUBE OIL	CATERPILLAR 3508 CRANKCASE & LUBE OIL SYSTEM

NOTE: THERE MAY BE A NUMBER OF DRUMS STORED ON SITE DURING THE COURSE OF THE YEAR AND THE NUMBER AND TYPES OF DRUMS AND THE LOCATION ON SITE CAN VARY DEPENDENT ON OPERATIONAL NEEDS.

NOTE: THE OIL PIPING RUNS SHOWN ON THIS DRAWING ARE APPROXIMATE. FOR MORE DETAIL, REFER TO "AS-BUILT" DRAWINGS MAINTAINED IN DTI'S ENGINEERING AND DRAFTING DEPARTMENT.

SYM.	DATE	BY	REVISION DESCRIPTION	PRJ/TSK	APP.	SCALE	DATE
8	12/15/2016	JAR	CHANGED TEXT TO "OLD COMP. BLDG AND REMOVED OIL/JACKET WATER COOLER			1" = 50'	09/14/07
7	03/29/16	TBB	REVISED TANK E-1 & ADDED NEW LOADING/UNLOADING AREA				
6	02/29/16	TBB	UPDATED PER TIM JACKSON'S MARK UPS				
5	07/27/15	TBB	UPDATED PER TIM JACKSON'S MARK UPS				
4	11/05/14	TBB	SCALED, ADDED BAR SCALE, ADDED ADJACENT PROPERTIES, & REVISED NORTH ARROW				

Dominion Transmission, Inc.
925 White Oaks Blvd. Bridgeport, West Virginia 26330 / Phone: (681) 842-3000

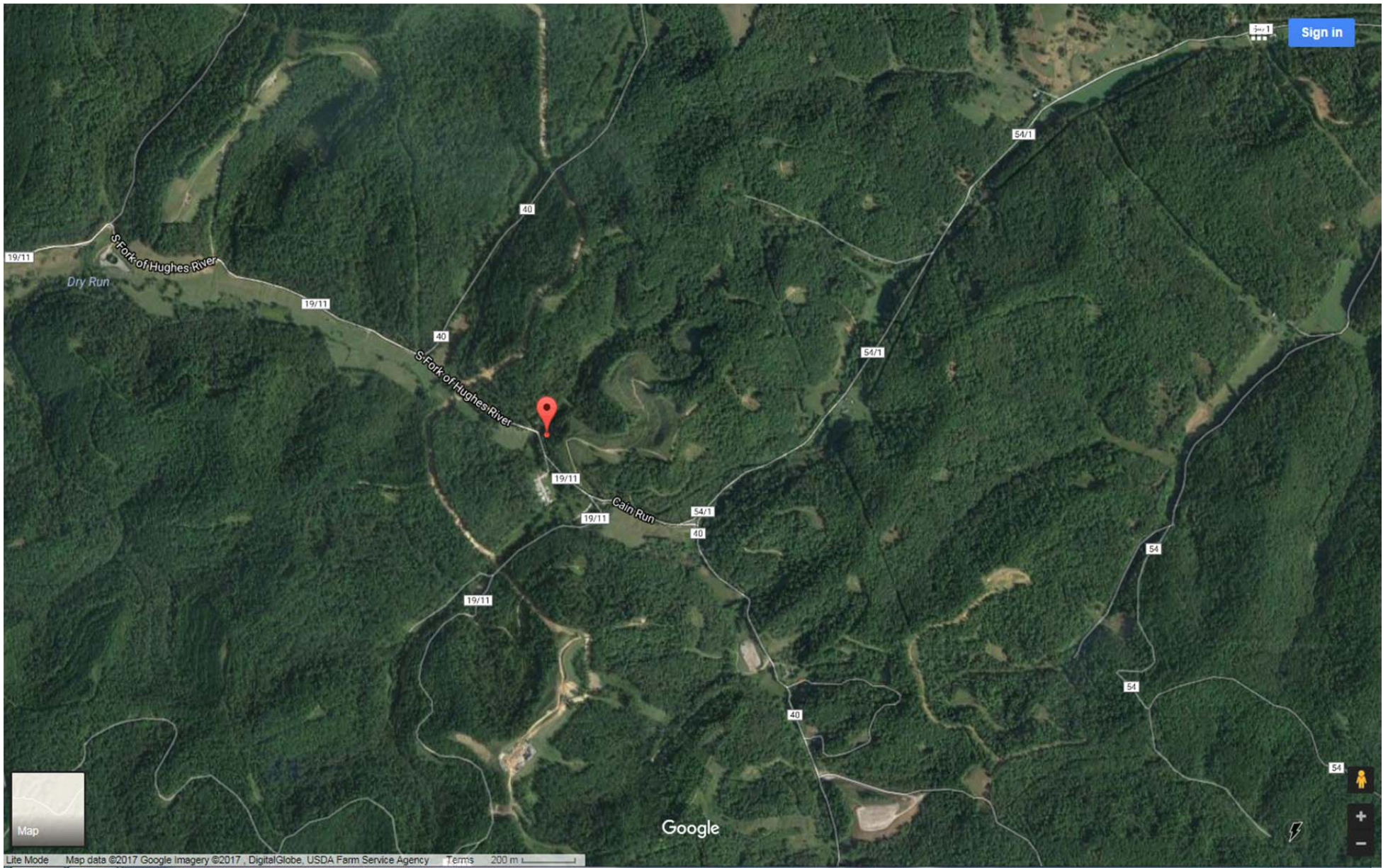
FOR: **MAXWELL COMPRESSOR STATION**

TITLE: **ENVIRONMENTAL EMERGENCY SITE PLAN**

DIR: DOCUMENTUM	GROUP: PD	DWG. NO.: X3201A	REV.: 8
FILE: PRJ/TSK:			

Attachment G

Area Map



Sign in

Google

Map

Lite Mode Map data ©2017 Google Imagery ©2017, DigitalGlobe, USDA Farm Service Agency Terms 200 m

Attachment H

G35-D Section Applicability Form

ATTACHMENT H – G35-D SECTION APPLICABILITY FORM

**General Permit G35-D Registration
Section Applicability Form**

General Permit G35-D was developed to allow qualified applicants to seek registration for a variety of sources. These sources include storage vessels, gas production units, in-line heaters, heater treaters, glycol dehydration units and associated reboilers, pneumatic controllers, centrifugal compressors, reciprocating compressors, reciprocating internal combustion engines (RICEs), tank truck loading, fugitive emissions, completion combustion devices, flares, enclosed combustion devices, and vapor recovery systems. All registered facilities will be subject to Sections 1.0, 2.0, 3.0, and 4.0.

General Permit G35-D allows the registrant to choose which sections of the permit they are seeking registration under. Therefore, please mark which additional sections that you are applying for registration under. If the applicant is seeking registration under multiple sections, please select all that apply. Please keep in mind, that if this registration is approved, the issued registration will state which sections will apply to your affected facility.

GENERAL PERMIT G35-D APPLICABLE SECTIONS	
<input checked="" type="checkbox"/> Section 5.0	Storage Vessels Containing Condensate and/or Produced Water ¹
<input type="checkbox"/> Section 6.0	Storage Vessel Affected Facility (NSPS, Subpart OOOO/OOOOa)
<input checked="" type="checkbox"/> Section 7.0	Control Devices and Emission Reduction Devices not subject to NSPS Subpart OOOO/OOOOa and/or NESHAP Subpart HH
<input checked="" type="checkbox"/> Section 8.0	Small Heaters and Reboilers not subject to 40CFR60 Subpart Dc
<input type="checkbox"/> Section 9.0	Pneumatic Controllers Affected Facility (NSPS, Subpart OOOO/OOOOa)
<input type="checkbox"/> Section 10.0	Centrifugal Compressor Affected Facility (NSPS, Subpart OOOO/OOOOa) ²
<input type="checkbox"/> Section 11.0	Reciprocating Compressor Affected Facility (NSPS, Subpart OOOO/OOOOa) ²
<input checked="" type="checkbox"/> Section 12.0	Reciprocating Internal Combustion Engines, Generator Engines. Microturbine Generators
<input type="checkbox"/> Section 13.0	Tanker Truck Loading ³
<input checked="" type="checkbox"/> Section 14.0	Glycol Dehydration Units ⁴
<input checked="" type="checkbox"/> Section 15.0	Blowdown and Pigging Operations
<input type="checkbox"/> Section 16.0	Fugitive Emission Components (NSPS, Subpart OOOOa)

- 1 Applicants that are subject to Section 5 may also be subject to Section 6 if the applicant is subject to the NSPS, Subpart OOOO/OOOOa control requirements or the applicable control device requirements of Section 7.*
- 2 Applicants that are subject to Section 10 and 11 may also be subject to the applicable RICE requirements of Section 12.*
- 3 Applicants that are subject to Section 13 may also be subject to control device and emission reduction device requirements of Section 7.*
- 4 Applicants that are subject to Section 14 may also be subject to the requirements of Section 8 (reboilers). Applicants that are subject to Section 14 may also be subject to control device and emission reduction device requirements of Section 7.*

Attachment I

Emissions Units/ERD Table

ATTACHMENT I – EMISSION UNITS / EMISSION REDUCTION DEVICES (ERD) TABLE

Include ALL emission units and air pollution control devices/ERDs that will be part of this permit application review. Do not include fugitive emission sources in this table. Deminimis storage tanks shall be listed in the Attachment K table. This information is required for all sources regardless of whether it is a construction, modification, or administrative update.

Emission Unit ID ¹	Emission Point ID ²	Emission Unit Description	Year Installed	Manufac. Date ³	Design Capacity	Type ⁴ and Date of Change	Control Device(s) ⁵	ERD(s) ⁶
CE-2	CE-2	Compressor Engine	2015	9/1/2001	515 hp	Existing	N/A	N/A
EG01	EG01	Auxiliary Generator	2011	6/2011	192.5 hp	Existing	1C – Oxidation Catalyst	N/A
EG02	EG02	Auxiliary Generator	2011	6/2011	192.5 hp	Existing	2C – Oxidation Catalyst	N/A
RBV-1	RBV-1	Dehydration Unit Reboiler	2009	2006	0.3 MMBtu/hr	Existing	N/A	N/A
RSV-1	RSV-1	Dehydration Unit	2009	2006	4.25 MMscf/day	Existing	F-1	N/A
F-1	F-1	Flare	2009	N/A	4.0 MMBtu/hr	Existing	N/A	N/A
TK01	TK01	Tank – Lube Oil	1997	N/A	3,000 gallons	Existing	N/A	N/A
TK02	TK02	Tank – Ethylene Glycol	1993	N/A	2,000 gallons	Existing	N/A	N/A
TK03	TK03	Tank – Ice Chek	2011	N/A	230 gallons	Existing	N/A	N/A
TK04	TK04	Tank – Produced Fluids	1993	N/A	4,000 gallons	Existing	N/A	N/A
TK05	TK05	Tank – Triethylene Glycol	2010	N/A	550 gallons	Existing	N/A	N/A
TK06	TK06	Tank – Used Oil	2015	N/A	500 gallons	Existing	N/A	N/A

**Note: TK03 was previously listed in the permit as a 200 gallon tank, but the correct capacity is 230 gallons.

¹ For Emission Units (or Sources) use the following numbering system: 1S, 2S, 3S,... or other appropriate designation.

² For Emission Points use the following numbering system: 1E, 2E, 3E, ... or other appropriate designation.

³ When required by rule

⁴ New, modification, removal, existing

⁵ For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

⁶ For ERDs use the following numbering system: 1D, 2D, 3D,... or other appropriate designation.

Attachment O

Glycol Dehydration Unit Data Sheets

ATTACHMENT O – GLYCOL DEHYDRATION UNIT DATA SHEET

Complete this data sheet for each Glycol Dehydration Unit, Reboiler, Flash Tank and/or Regenerator at the facility. Include gas sample analysis and GRI- GLYCalc™ input and aggregate report. Use extra pages if necessary.

Manufacturer: NACTO		Model: N/A			
Max. Dry Gas Flow Rate: 4.25 MMscf/day		Reboiler Design Heat Input: 0.3 MMBTU/hr			
Design Type: <input checked="" type="checkbox"/> TEG <input type="checkbox"/> DEG <input type="checkbox"/> EG		Source Status ¹ : ES			
Date Installed/Modified/Removed ² : 2009		Regenerator Still Vent APCD/ERD ³ : FL			
Control Device/ERD ID# ³ : Flare / F-1		Fuel HV (BTU/scf): 1,000			
H ₂ S Content (gr/100 scf): 0.25		Operation (hours/year): 8,760			
Pump Rate (scfm): 2,951 (4.25 MMscf/day)					
Water Content (wt %) in: Wet Gas: Saturated Dry Gas: 7.0 lbs H ₂ O/MMscf					
Is the glycol dehydration unit exempt from 40CFR63 Section 764(d)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No: If Yes, answer the following:					
The actual annual average flowrate of natural gas to the glycol dehydration unit is less than 85 thousand standard cubic meters per day, as determined by the procedures specified in §63.772(b)(1) of this subpart. <input type="checkbox"/> Yes <input type="checkbox"/> No					
The actual average emissions of benzene from the glycol dehydration unit process vent to the atmosphere are less than 0.90 megagram per year (1 ton per year), as determined by the procedures specified in §63.772(b)(2) of this subpart. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No					
Is the glycol dehydration unit located within an Urbanized Area (UA) or Urban Cluster (UC)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
Is a lean glycol pump optimization plan being utilized? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
Recycling the glycol dehydration unit back to the flame zone of the reboiler. <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes: Is the reboiler configured to accept flash drum vapors (straight from the glycol dehydrator)? <input type="checkbox"/> Yes <input type="checkbox"/> No Is the reboiler configured to accept still vent vapors (after a condenser)? <input type="checkbox"/> Yes <input type="checkbox"/> No Is the reboiler configured to accept both in the same operation? <input type="checkbox"/> Yes <input type="checkbox"/> No					
Recycling the glycol dehydration unit back to the flame zone of the reboiler and mixed with fuel. <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
What happens when temperature controller shuts off fuel to the reboiler? <input type="checkbox"/> Still vent emissions to the atmosphere. <input checked="" type="checkbox"/> Still vent emissions to the flare. <input type="checkbox"/> Still vent emissions stopped with valve. <input type="checkbox"/> Still vent emissions to glow plug.					
Please indicate if the following equipment is present. <input checked="" type="checkbox"/> Flash Tank <input type="checkbox"/> Burner management system that continuously burns condenser or flash tank vapors					
Control Device Technical Data					
Pollutants Controlled		Manufacturer's Guaranteed Control Efficiency (%)			
VOC, HAPs		95%			
Emissions Data					
Emission Unit ID / Emission Point ID ⁴	Description	Calculation Methodology ⁵	PTE ⁶	Controlled Maximum Hourly Emissions (lb/hr)	Controlled Maximum Annual Emissions (tpy)
RBV-1	Reboiler Vent	AP	NO _x	0.03	0.13
		AP	CO	0.03	0.11
		AP	VOC	1.65E-03	7.23E-03
		AP	SO ₂	1.80E-04	7.88E-04

		AP	PM ₁₀ (filterable + condensible)	2.28E-03	0.01
		OT	GHG (CO ₂ e)	35.13	153.87
RSV-1	Glycol Regenerator Still Vent **Note: Includes Safety Factor	GRI-GlyCalc™	VOC	2.33	10.20
		GRI-GlyCalc™	Benzene	0.06	0.24
		GRI-GlyCalc™	Toluene	0.12	0.52
		GRI-GlyCalc™	Ethylbenzene	--	--
		GRI-GlyCalc™	Xylenes	0.15	0.63
		GRI-GlyCalc™	n-Hexane	0.06	0.25
GFT-1**	Glycol Flash Tank	GRI-GlyCalc™	VOC	N/A	N/A
		GRI-GlyCalc™	Benzene	N/A	N/A
		GRI-GlyCalc™	Toluene	N/A	N/A
		GRI-GlyCalc™	Ethylbenzene	N/A	N/A
		GRI-GlyCalc™	Xylenes	N/A	N/A
		GRI-GlyCalc™	n-Hexane	N/A	N/A

****Note: The flash tank is recycled/recompressed back into the process. Therefore, there are no emissions to the atmosphere.**

- 1 Enter the Source Status using the following codes:
NS Construction of New Source ES Existing Source
MS Modification of Existing Source
- 2 Enter the date (or anticipated date) of the glycol dehydration unit's installation (construction of source), modification or removal.
- 3 Enter the Air Pollution Control Device (APCD)/Emission Reduction Device (ERD) type designation using the following codes and the device ID number:
NA None CD Condenser FL Flare
CC Condenser/Combustion Combination TO Thermal Oxidizer O Other (please list)
- 4 Enter the appropriate Emission Unit ID Numbers and Emission Point ID Numbers for the glycol dehydration unit reboiler vent and glycol regenerator still vent. The glycol dehydration unit reboiler vent and glycol regenerator still vent should be designated RBV-1 and RSV-1, respectively. If the compressor station incorporates multiple glycol dehydration units, a Glycol Dehydration Emission Unit Data Sheet shall be completed for each, using Source Identification RBV-2 and RSV-2, RBV-3 and RSV-3, etc.
- 5 Enter the Potential Emissions Data Reference designation using the following codes:
MD Manufacturer's Data AP AP-42
GR GRI-GLYCalc™ OT Other 40 CFR Part 98 (please list)
- 6 Enter the Reboiler Vent and Glycol Regenerator Still Vent Potential to Emit (PTE) for the listed regulated pollutants in lbs per hour and tons per year. The Glycol Regenerator Still Vent potential emissions may be determined using the most recent version of the thermodynamic software model GRI-GLYCalc™ (Radian International LLC & Gas Research Institute). **Attach all referenced Potential Emissions Data (or calculations) and the GRI-GLYCalc™ Aggregate Calculations Report (shall include emissions reports, equipment reports, and stream reports) to this Glycol Dehydration Emission Unit Data Sheet(s). Backup pumps do not have to be considered as operating for purposes of PTE.** This PTE data shall be incorporated in the Emissions Summary Sheet.

Table B-1
Section 60.18 Demonstration

Maxwell Station	
Type	Unassisted
Throat Diameter (inches)	18

GLYCalc	1310		scf/h
	INPUT mole	Compound Net Heating Value	Mixture Net Heating Value
Compound	percent	(Btu/scf)	(Btu/scf)
water	64.100	0	0.0
carbon dioxide	0.061	0	0.0
nitrogen	0.373	0	0.0
methane	23.300	913	212.7
ethane	4.370	1641	71.7
propane	2.350	2385	56.0
Isobutane	0.419	3105	13.0
n-butane	0.933	3113	29.0
Isopentane	0.308	3716	11.4
n-pentane	0.309	3709	11.5
cyclopentane	0.000	3516	0.0
n-hexane	0.185	4412	8.2
cyclohexane	0.138	4185	5.8
other hexanes	0.061	4870	3.0
heptane	0.220	4925	10.8
benzene	0.200	3601	7.2
toluene	0.372	4284	15.9
ethylbenzene	0.000	4977	0.0
xylene	0.392	4980	19.5
octane (C8+)	1.610	5804	93.4
hydrogen sulfide	0.000	596	0.0
TOTALS:	100		569.3

Assist gas requirements for nonassisted flare per 40 CFR 60.18(c)(3):

Minimum allowable net heating value	200	Btu/scf
Additional assist gas required	0.0	scfh
Assist (fuel) gas supplied	0.0	scfh
Composite net heating value	581.55	Btu/scf

Maximum allowable flare exit velocity (V_{max}) for nonassisted flare per 40 CFR 60.18(f)(5):

Lower (Net) Heating Value	Btu/scf	MJ/scm
(1000 Btu/scf = 37.3 MJ/scm)	569	21.2
$V_{max} = 10 \sqrt{(LHV+28.2)/31.7}$ for V_{max} in m/sec and LHV in MJ/scm	m/sec	ft/sec
(1 m = 3.28 ft)	37.9	124.2
V_{max} limit based on 40 CFR 60.18(b)(4)(iii)	37.9	124.2

Actual flare exit velocity:

Total volumetric flow (vent gas + assist gas in scfh/3600 sec/hr) =	0.36	scf/sec
Total volumetric flow at 180F & atmospheric pressure =	0.47	cf/sec
Flare exit cross-sectional area based on throat diameter =	1.77	ft ²
Velocity = volumetric flow / cross-sectional area =	0.3	ft/sec

FESCO, Ltd.
104 FESCO Run - Bridgeport, West Virginia 26330

For: Dominion Transmission, Inc.
P. O. Box 2450
Clarksburg, West Virginia 26302

Sample: Maxwell Station
Port ID No. 4646
Spot Gas Sampled @ 17 psig & 82 °F

Date Sampled: 08/30/17

Job Number: 01968.001

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286

COMPONENT	MOL%	GPM
Oxygen	0.008	
Nitrogen	1.228	
Carbon Dioxide	0.101	
Methane	76.672	
Ethane	12.604	3.383
Propane	5.455	1.508
Isobutane	0.803	0.264
n-Butane	1.507	0.477
2-2 Dimethylpropane	0.005	0.002
Isopentane	0.467	0.171
n-Pentane	0.396	0.144
Hexanes	0.384	0.159
Heptanes Plus	<u>0.370</u>	<u>0.161</u>
Totals	100.000	6.269

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity ----- 3.502 (Air=1)
Molecular Weight ----- 101.04
Gross Heating Value ----- 5339 BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity ----- 0.747 (Air=1)
Compressibility (Z) ----- 0.9962
Molecular Weight ----- 21.56
Gross Heating Value
Dry Basis ----- 1291 BTU/CF
Saturated Basis ----- 1269 BTU/CF

Base Conditions: 14.730 PSI & 60 Deg F

Sampled By: Dominion
Analyst: AC
Processor: AC
Cylinder ID: Dominion

Certified: Fesco, Ltd. - Bridgeport, West Virginia

David Dannhaus 361-661-7015

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286
TOTAL REPORT

COMPONENT	MOL %	GPM	WT %
Oxygen	0.008		0.012
Nitrogen	1.228		1.596
Carbon Dioxide	0.101		0.206
Methane	76.672		57.047
Ethane	12.604	3.383	17.578
Propane	5.455	1.508	11.157
Isobutane	0.803	0.264	2.165
n-Butane	1.507	0.477	4.063
2,2 Dimethylpropane	0.005	0.002	0.017
Isopentane	0.467	0.171	1.563
n-Pentane	0.396	0.144	1.325
2,2 Dimethylbutane	0.014	0.006	0.056
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.032	0.013	0.128
2 Methylpentane	0.121	0.050	0.484
3 Methylpentane	0.068	0.028	0.272
n-Hexane	0.149	0.061	0.596
Methylcyclopentane	0.030	0.010	0.117
Benzene	0.006	0.002	0.022
Cyclohexane	0.027	0.009	0.105
2-Methylhexane	0.032	0.015	0.149
3-Methylhexane	0.030	0.014	0.139
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.043	0.019	0.198
n-Heptane	0.051	0.024	0.237
Methylcyclohexane	0.043	0.017	0.196
Toluene	0.008	0.003	0.034
Other C8's	0.052	0.024	0.266
n-Octane	0.017	0.009	0.090
Ethylbenzene	0.000	0.000	0.000
M & P Xylenes	0.004	0.002	0.020
O-Xylene	0.001	0.000	0.005
Other C9's	0.016	0.008	0.094
n-Nonane	0.005	0.003	0.030
Other C10's	0.004	0.002	0.026
n-Decane	0.001	0.001	0.007
Undecanes (11)	<u>0.000</u>	<u>0.000</u>	<u>0.000</u>
Totals	100.000	6.269	100.000

Computed Real Characteristics of Total Sample

Specific Gravity -----	0.747	(Air=1)
Compressibility (Z) -----	0.9962	
Molecular Weight -----	21.56	

Gross Heating Value

Dry Basis -----	1291	BTU/CF
Saturated Basis -----	1269	BTU/CF

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Maxwell Station PTE Emissions

File Name: C:\Users\dani659\Desktop\Maxwell Station PTE Emissions.ddf

Date: November 09, 2017

DESCRIPTION:

Description: Maxwell Station PTE Emissions
 Extended Wet Gas Analysis Sample Date:
 8/30/2017

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 120.00 deg. F
 Pressure: 365.00 psig
 Wet Gas Water Content: Saturated

Component	Conc. (vol %)
-----	-----
Carbon Dioxide	0.1010
Nitrogen	1.2280
Methane	76.6720
Ethane	12.6040
Propane	5.4550
Isobutane	0.8030
n-Butane	1.5070
Isopentane	0.4670
n-Pentane	0.3960
n-Hexane	0.1490
Cyclohexane	0.0270
Other Hexanes	0.0620
Heptanes	0.0940
Methylcyclohexane	0.0430
Benzene	0.0060
Toluene	0.0080
Xylenes	0.0050
C8+ Heavies	0.0950

DRY GAS:

Flow Rate: 4.3 MMSCF/day
 Water Content: 7.0 lbs. H2O/MMSCF

LEAN GLYCOL:

Glycol Type: TEG
 Water Content: 0.9 wt% H2O
 Flow Rate: 3.0 gpm

PUMP:

Glycol Pump Type: Electric/Pneumatic

FLASH TANK:

Flash Control: Recycle/recompression
Temperature: 160.0 deg. F
Pressure: 60.0 psig

STRIPPING GAS:

Source of Gas: Dry Gas
Gas Flow Rate: 6.500 scfm

REGENERATOR OVERHEADS CONTROL DEVICE:

Control Device: Combustion Device
Destruction Efficiency: 95.0 %
Excess Oxygen: 1.0 %
Ambient Air Temperature: 68.0 deg. F

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Maxwell Station PTE Emissions

File Name: C:\Users\dani659\Desktop\Maxwell Station PTE Emissions.ddf

Date: November 09, 2017

DESCRIPTION:

Description: Maxwell Station PTE Emissions
 Extended Wet Gas Analysis Sample Date:
 8/30/2017

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.6463	15.511	2.8308
Ethane	0.2270	5.449	0.9944
Propane	0.1789	4.294	0.7836
Isobutane	0.0421	1.011	0.1844
n-Butane	0.0937	2.249	0.4104
Isopentane	0.0384	0.921	0.1680
n-Pentane	0.0386	0.926	0.1690
n-Hexane	0.0275	0.661	0.1206
Cyclohexane	0.0200	0.481	0.0878
Other Hexanes	0.0091	0.218	0.0397
Heptanes	0.0381	0.914	0.1668
Methylcyclohexane	0.0444	1.065	0.1944
Benzene	0.0271	0.649	0.1185
Toluene	0.0592	1.421	0.2593
Xylenes	0.0719	1.725	0.3147
C8+ Heavies	0.4752	11.406	2.0816
Total Emissions	2.0375	48.899	8.9240
Total Hydrocarbon Emissions	2.0375	48.899	8.9240
Total VOC Emissions	1.1641	27.939	5.0988
Total HAP Emissions	0.1857	4.456	0.8131
Total BTEX Emissions	0.1581	3.795	0.6925

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	12.9262	310.228	56.6166
Ethane	4.5405	108.972	19.8874
Propane	3.5781	85.875	15.6721
Isobutane	0.8422	20.213	3.6888
n-Butane	1.8738	44.971	8.2073
Isopentane	0.7673	18.414	3.3606
n-Pentane	0.7716	18.518	3.3795
n-Hexane	0.5507	13.217	2.4121
Cyclohexane	0.4010	9.623	1.7562
Other Hexanes	0.1813	4.351	0.7941

Heptanes	0.7617	18.281	3.3362
Methylcyclohexane	0.8876	21.301	3.8875
Benzene	0.5411	12.986	2.3700
Toluene	1.1841	28.417	5.1862
Xylenes	1.4371	34.491	6.2946
C8+ Heavies	9.5049	228.118	41.6315

Total Emissions	40.7490	977.977	178.4808

Total Hydrocarbon Emissions	40.7490	977.977	178.4808
Total VOC Emissions	23.2824	558.777	101.9768
Total HAP Emissions	3.7130	89.112	16.2630
Total BTEX Emissions	3.1623	75.895	13.8508

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	1.6178	38.828	7.0862
Ethane	1.3093	31.423	5.7346
Propane	1.1330	27.193	4.9628
Isobutane	0.2649	6.358	1.1603
n-Butane	0.5624	13.497	2.4632
Isopentane	0.2219	5.326	0.9720
n-Pentane	0.2073	4.976	0.9080
n-Hexane	0.1087	2.609	0.4761
Cyclohexane	0.0248	0.595	0.1086
Other Hexanes	0.0420	1.008	0.1840
Heptanes	0.0911	2.186	0.3990
Methylcyclohexane	0.0458	1.098	0.2004
Benzene	0.0059	0.143	0.0260
Toluene	0.0090	0.217	0.0395
Xylenes	0.0048	0.116	0.0211
C8+ Heavies	0.2786	6.687	1.2203

Total Emissions	5.9275	142.259	25.9623

Total Hydrocarbon Emissions	5.9275	142.259	25.9623
Total VOC Emissions	3.0003	72.008	13.1415
Total HAP Emissions	0.1285	3.084	0.5628
Total BTEX Emissions	0.0198	0.475	0.0867

EQUIPMENT REPORTS:

COMBUSTION DEVICE

Ambient Temperature: 68.00 deg. F
Excess Oxygen: 1.00 %
Combustion Efficiency: 95.00 %

Supplemental Fuel Requirement: 1.81e-001 MM BTU/hr

Component	Emitted	Destroyed
Methane	5.00%	95.00%
Ethane	5.00%	95.00%
Propane	5.00%	95.00%
Isobutane	5.00%	95.00%
n-Butane	5.00%	95.00%
Isopentane	5.00%	95.00%
n-Pentane	5.00%	95.00%
n-Hexane	5.00%	95.00%
Cyclohexane	5.00%	95.00%
Other Hexanes	5.00%	95.00%
Heptanes	5.00%	95.00%
Methylcyclohexane	5.00%	95.00%
Benzene	5.00%	95.00%
Toluene	5.00%	95.00%
Xylenes	5.00%	95.00%
C8+ Heavies	5.00%	95.00%

ABSORBER

Calculated Absorber Stages: 1.57
 Specified Dry Gas Dew Point: 7.00 lbs. H2O/MMSCF
 Temperature: 120.0 deg. F
 Pressure: 365.0 psig
 Dry Gas Flow Rate: 4.2500 MMSCF/day
 Glycol Losses with Dry Gas: 0.0752 lb/hr
 Wet Gas Water Content: Saturated
 Calculated Wet Gas Water Content: 231.08 lbs. H2O/MMSCF
 Calculated Lean Glycol Recirc. Ratio: 4.53 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	3.01%	96.99%
Carbon Dioxide	99.62%	0.38%
Nitrogen	99.97%	0.03%
Methane	99.97%	0.03%
Ethane	99.89%	0.11%
Propane	99.80%	0.20%
Isobutane	99.71%	0.29%
n-Butane	99.63%	0.37%
Isopentane	99.59%	0.41%
n-Pentane	99.49%	0.51%
n-Hexane	99.12%	0.88%
Cyclohexane	96.21%	3.79%
Other Hexanes	99.33%	0.67%
Heptanes	98.28%	1.72%
Methylcyclohexane	95.49%	4.51%
Benzene	75.25%	24.75%
Toluene	65.59%	34.41%
Xylenes	42.10%	57.90%
C8+ Heavies	87.28%	12.72%

FLASH TANK

Flash Control: Recycle/recompression
Flash Temperature: 160.0 deg. F
Flash Pressure: 60.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.97%	0.03%
Carbon Dioxide	58.50%	41.50%
Nitrogen	12.71%	87.29%
Methane	13.16%	86.84%
Ethane	32.68%	67.32%
Propane	49.30%	50.70%
Isobutane	57.76%	42.24%
n-Butane	63.39%	36.61%
Isopentane	65.66%	34.34%
n-Pentane	69.92%	30.08%
n-Hexane	79.52%	20.48%
Cyclohexane	94.05%	5.95%
Other Hexanes	75.33%	24.67%
Heptanes	88.03%	11.97%
Methylcyclohexane	95.07%	4.93%
Benzene	98.96%	1.04%
Toluene	99.30%	0.70%
Xylenes	99.71%	0.29%
C8+ Heavies	97.46%	2.54%

REGENERATOR

Regenerator Stripping Gas:
Dry Product Gas
Stripping Gas Flow Rate: 6.5000 scfm

Component	Remaining in Glycol	Distilled Overhead
Water	27.58%	72.42%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.76%	99.24%
n-Pentane	0.71%	99.29%
n-Hexane	0.63%	99.37%
Cyclohexane	3.40%	96.60%
Other Hexanes	1.33%	98.67%
Heptanes	0.57%	99.43%
Methylcyclohexane	4.21%	95.79%
Benzene	5.05%	94.95%
Toluene	7.96%	92.04%
Xylenes	12.95%	87.05%
C8+ Heavies	12.33%	87.67%

STREAM REPORTS:

WET GAS STREAM

 Temperature: 120.00 deg. F
 Pressure: 379.70 psia
 Flow Rate: 1.78e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	4.87e-001	4.12e+001
Carbon Dioxide	1.01e-001	2.08e+001
Nitrogen	1.23e+000	1.61e+002
Methane	7.65e+001	5.76e+003
Ethane	1.26e+001	1.78e+003
Propane	5.44e+000	1.13e+003
Isobutane	8.01e-001	2.19e+002
n-Butane	1.50e+000	4.10e+002
Isopentane	4.66e-001	1.58e+002
n-Pentane	3.95e-001	1.34e+002
n-Hexane	1.49e-001	6.01e+001
Cyclohexane	2.69e-002	1.06e+001
Other Hexanes	6.19e-002	2.50e+001
Heptanes	9.38e-002	4.41e+001
Methylcyclohexane	4.29e-002	1.98e+001
Benzene	5.99e-003	2.20e+000
Toluene	7.98e-003	3.45e+000
Xylenes	4.99e-003	2.49e+000
C8+ Heavies	9.48e-002	7.58e+001

Total Components	100.00	1.01e+004

DRY GAS STREAM

 Temperature: 120.00 deg. F
 Pressure: 379.70 psia
 Flow Rate: 1.77e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.47e-002	1.24e+000
Carbon Dioxide	1.01e-001	2.07e+001
Nitrogen	1.23e+000	1.61e+002
Methane	7.69e+001	5.76e+003
Ethane	1.26e+001	1.77e+003
Propane	5.46e+000	1.12e+003
Isobutane	8.04e-001	2.18e+002
n-Butane	1.51e+000	4.09e+002
Isopentane	4.67e-001	1.57e+002
n-Pentane	3.95e-001	1.33e+002
n-Hexane	1.48e-001	5.96e+001
Cyclohexane	2.61e-002	1.02e+001
Other Hexanes	6.18e-002	2.49e+001
Heptanes	9.27e-002	4.34e+001
Methylcyclohexane	4.12e-002	1.89e+001
Benzene	4.53e-003	1.65e+000
Toluene	5.27e-003	2.26e+000
Xylenes	2.11e-003	1.05e+000
C8+ Heavies	8.32e-002	6.62e+001

 Total Components 100.00 9.98e+003

LEAN GLYCOL STREAM

 Temperature: 120.00 deg. F
 Flow Rate: 3.00e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.90e+001	1.67e+003
Water	9.00e-001	1.52e+001
Carbon Dioxide	4.70e-013	7.93e-012
Nitrogen	3.18e-013	5.36e-012
Methane	3.71e-018	6.26e-017
Ethane	5.44e-008	9.18e-007
Propane	5.39e-009	9.09e-008
Isobutane	1.11e-009	1.88e-008
n-Butane	2.26e-009	3.81e-008
Isopentane	1.91e-004	3.23e-003
n-Pentane	2.04e-004	3.45e-003
n-Hexane	1.57e-004	2.65e-003
Cyclohexane	7.89e-004	1.33e-002
Other Hexanes	1.01e-004	1.70e-003
Heptanes	2.25e-004	3.80e-003
Methylcyclohexane	2.20e-003	3.71e-002
Benzene	1.69e-003	2.86e-002
Toluene	6.04e-003	1.02e-001
Xylenes	1.26e-002	2.13e-001
C8+ Heavies	7.80e-002	1.32e+000
Total Components	100.00	1.69e+003

RICH GLYCOL STREAM

 Temperature: 120.00 deg. F
 Pressure: 379.70 psia
 Flow Rate: 3.13e+000 gpm
 NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.53e+001	1.67e+003
Water	3.14e+000	5.51e+001
Carbon Dioxide	4.52e-003	7.93e-002
Nitrogen	3.06e-003	5.36e-002
Methane	1.06e-001	1.86e+000
Ethane	1.11e-001	1.94e+000
Propane	1.28e-001	2.23e+000
Isobutane	3.58e-002	6.27e-001
n-Butane	8.77e-002	1.54e+000
Isopentane	3.69e-002	6.46e-001
n-Pentane	3.93e-002	6.89e-001
n-Hexane	3.03e-002	5.31e-001
Cyclohexane	2.38e-002	4.17e-001
Other Hexanes	9.72e-003	1.70e-001
Heptanes	4.34e-002	7.61e-001
Methylcyclohexane	5.30e-002	9.29e-001

Benzene	3.26e-002	5.72e-001
Toluene	7.36e-002	1.29e+000
Xylenes	9.43e-002	1.65e+000
C8+ Heavies	6.25e-001	1.10e+001

Total Components	100.00	1.75e+003
------------------	--------	-----------

FLASH TANK OFF GAS STREAM

Temperature: 160.00 deg. F
 Pressure: 74.70 psia
 Flow Rate: 7.55e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	5.11e-001	1.83e-002
Carbon Dioxide	3.76e-001	3.29e-002
Nitrogen	8.40e-001	4.68e-002
Methane	5.07e+001	1.62e+000
Ethane	2.19e+001	1.31e+000
Propane	1.29e+001	1.13e+000
Isobutane	2.29e+000	2.65e-001
n-Butane	4.86e+000	5.62e-001
Isopentane	1.55e+000	2.22e-001
n-Pentane	1.44e+000	2.07e-001
n-Hexane	6.34e-001	1.09e-001
Cyclohexane	1.48e-001	2.48e-002
Other Hexanes	2.45e-001	4.20e-002
Heptanes	4.57e-001	9.11e-002
Methylcyclohexane	2.34e-001	4.58e-002
Benzene	3.83e-002	5.95e-003
Toluene	4.92e-002	9.03e-003
Xylenes	2.28e-002	4.82e-003
C8+ Heavies	8.22e-001	2.79e-001
Total Components	100.00	6.03e+000

FLASH TANK GLYCOL STREAM

Temperature: 160.00 deg. F
 Flow Rate: 3.12e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.56e+001	1.67e+003
Water	3.15e+000	5.51e+001
Carbon Dioxide	2.66e-003	4.64e-002
Nitrogen	3.90e-004	6.82e-003
Methane	1.40e-002	2.45e-001
Ethane	3.64e-002	6.36e-001
Propane	6.31e-002	1.10e+000
Isobutane	2.07e-002	3.62e-001
n-Butane	5.58e-002	9.74e-001
Isopentane	2.43e-002	4.24e-001
n-Pentane	2.76e-002	4.82e-001
n-Hexane	2.42e-002	4.22e-001
Cyclohexane	2.24e-002	3.92e-001
Other Hexanes	7.34e-003	1.28e-001
Heptanes	3.84e-002	6.70e-001

Methylcyclohexane	5.06e-002	8.83e-001
Benzene	3.24e-002	5.66e-001
Toluene	7.33e-002	1.28e+000
Xylenes	9.44e-002	1.65e+000
C8+ Heavies	6.11e-001	1.07e+001

Total Components	100.00	1.75e+003

FLASH GAS EMISSIONS

Control Method: Recycle/recompression
Control Efficiency: 100.00

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

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.31e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)

Water	6.41e+001	3.99e+001
Carbon Dioxide	6.05e-002	9.21e-002
Nitrogen	3.73e-001	3.61e-001
Methane	2.33e+001	1.29e+001
Ethane	4.37e+000	4.54e+000
Propane	2.35e+000	3.58e+000
Isobutane	4.19e-001	8.42e-001
n-Butane	9.33e-001	1.87e+000
Isopentane	3.08e-001	7.67e-001
n-Pentane	3.09e-001	7.72e-001
n-Hexane	1.85e-001	5.51e-001
Cyclohexane	1.38e-001	4.01e-001
Other Hexanes	6.09e-002	1.81e-001
Heptanes	2.20e-001	7.62e-001
Methylcyclohexane	2.62e-001	8.88e-001
Benzene	2.00e-001	5.41e-001
Toluene	3.72e-001	1.18e+000
Xylenes	3.92e-001	1.44e+000
C8+ Heavies	1.61e+000	9.50e+000

Total Components	100.00	8.11e+001

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 2.32e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)

Methane	6.58e+001	6.46e-001
Ethane	1.23e+001	2.27e-001
Propane	6.62e+000	1.79e-001
Isobutane	1.18e+000	4.21e-002

n-Butane	2.63e+000	9.37e-002
Isopentane	8.68e-001	3.84e-002
n-Pentane	8.73e-001	3.86e-002
n-Hexane	5.22e-001	2.75e-002
Cyclohexane	3.89e-001	2.00e-002
Other Hexanes	1.72e-001	9.06e-003
Heptanes	6.20e-001	3.81e-002
Methylcyclohexane	7.38e-001	4.44e-002
Benzene	5.65e-001	2.71e-002
Toluene	1.05e+000	5.92e-002
Xylenes	1.10e+000	7.19e-002
C8+ Heavies	4.55e+000	4.75e-001
-----	-----	-----
Total Components	100.00	2.04e+000

Attachment S

Blowdown and Pigging Operations Data Sheet

**ATTACHMENT S – BLOWDOWN AND PIGGING OPERATIONS
DATA SHEET**

Will there be any blowdown and pigging operations that occur at this facility?

Yes No

Please list:

Type of Event	# of Events (event/yr)	Amount Vented per event (scf/event)	MW of vented gas (lb/lb-mol)	Total Emissions (ton/yr)	VOC weight fraction	VOC emissions (ton/yr)
Compressor Blowdown	5	130,000	378	17.57	20.32%	3.63
Compressor Startup	5	130,000	378	17.57	20.32%	3.63
Plant Shutdown	1	700,000	378	18.92	20.32%	3.91
Low Pressure Pig Venting	52	10,000	378	14.05	20.32%	2.90
High Pressure Pig Venting	0	0	0	0	0	0

Type of Event	# of Events (event/yr)	Amount Vented per event (scf/event)	MW of vented gas (lb/lb-mol)	Total Emissions (ton/yr)	HAP weight fraction	HAP emissions (ton/yr)
Compressor Blowdown						
Compressor Startup						
Plant Shutdown						
Low Pressure Pig Venting						
High Pressure Pig Venting						

Attachment U

Emission Calculations

Input Data:	Caterpillar G3508 LE		
Design Class:	4-stroke lean burn		
Engine Power:	515	bhp	(Manufacturer Specs)
Fuel Consumption:	8,370	Btu/hp-hr	(Manufacturer Specs - Worst Case)
Fuel Input:	4.31	MMBtu/hr	
Maximum Hours of Operation:	8,760	hrs/yr	
Fuel Throughput:	4,311	cf/hr	
	37.8	MMcf/yr	
Heating Value of Natural Gas:	1,000	Btu/cf	

Emission Calculations

Pollutant	Emission Factor		Emissions (8760 hrs/yr)	
			(lb/hr)	(tons/yr)
Criteria Pollutants				
PM (filterable)	7.71E-05	lb/MMBtu	3.32E-04	1.46E-03
PM-10 (filterable)	7.71E-05	lb/MMBtu	3.32E-04	1.46E-03
PM-2.5 (filterable)	7.71E-05	lb/MMBtu	3.32E-04	1.46E-03
PM (condensibles)	9.91E-03	lb/MMBtu	0.04	0.19
SO2	5.88E-04	lb/MMBtu	2.53E-03	1.11E-02
CO	1.50	g/bhp-hr	1.70	7.46
NO _x	2.0	g/bhp-hr	2.27	9.95
VOC	0.37	g/bhp-hr	0.42	1.84
Greenhouse Gases				
CO ₂	117.0	lb/MMBtu	504.24	2208.56
CH ₄	2.20E-03	lb/MMBtu	0.01	0.04
N ₂ O	2.20E-04	lb/MMBtu	9.50E-04	4.16E-03
CO ₂ e	117.1	lb/MMBtu	504.76	2210.84
Hazardous Air Pollutants				
1,1,2,2-Tetrachloroethane	4.00E-05	lb/MMBtu	1.72E-04	7.55E-04
1,1,2-Trichloroethane	3.18E-05	lb/MMBtu	1.37E-04	6.00E-04
1,1-Dichloroethane	2.36E-05	lb/MMBtu	1.02E-04	4.46E-04
1,2-Dichloroethane	2.36E-05	lb/MMBtu	1.02E-04	4.46E-04
1,3-Butadiene	2.67E-04	lb/MMBtu	1.15E-03	5.04E-03
1,3-Dichloropropene	2.64E-05	lb/MMBtu	1.14E-04	4.98E-04
Acetaldehyde	8.36E-03	lb/MMBtu	3.60E-02	0.16
Acrolein	5.14E-03	lb/MMBtu	2.22E-02	9.70E-02
Benzene	4.40E-04	lb/MMBtu	1.90E-03	0.01
Biphenyl	2.12E-04	lb/MMBtu	9.14E-04	4.00E-03
Carbon Tetrachloride	3.67E-05	lb/MMBtu	1.58E-04	6.93E-04
Chlorobenzene	3.04E-05	lb/MMBtu	1.31E-04	5.74E-04
Chloroform	2.85E-05	lb/MMBtu	1.23E-04	5.38E-04
Ethylbenzene	3.97E-05	lb/MMBtu	1.71E-04	7.50E-04
Ethylene Dibromide	4.43E-05	lb/MMBtu	1.91E-04	8.36E-04
Formaldehyde	5.28E-02	lb/MMBtu	0.23	1.00
Hexane	1.11E-03	lb/MMBtu	4.78E-03	2.10E-02
Methanol	2.50E-03	lb/MMBtu	1.08E-02	0.05
Methylene Chloride	2.00E-05	lb/MMBtu	8.62E-05	3.78E-04
Naphthalene (POM)	7.44E-05	lb/MMBtu	3.21E-04	1.40E-03
Phenol	2.40E-05	lb/MMBtu	1.03E-04	4.53E-04
Styrene	2.36E-05	lb/MMBtu	1.02E-04	4.46E-04
Toluene	4.08E-04	lb/MMBtu	1.76E-03	7.70E-03
Vinyl Chloride	1.49E-05	lb/MMBtu	6.42E-05	2.81E-04
Xylene	1.84E-04	lb/MMBtu	7.93E-04	3.47E-03
TOTAL HAP:			0.31	1.36

(1) PM, PM10, PM 2.5, and HAP emission factors from AP-42, Section 3.2, Natural Gas-Fired Reciprocating Engines, Table 3.2-2, 7/00

(2) CO, NO_x, and VOC emission factors from manufacturer specification sheet.

(3) Lb/MMBtu numbers based on 40 CFR Part 98 Tables C-1 and C-2 for natural gas

For example: $CO_2 = (53.06 \text{ kg } CO_2/MMBtu) / (0.453592 \text{ kg/lb}) = 117.0 \text{ lb/MMBtu}$

(4) Global Warming Potentials = 25 for CH₄ and 298 for N₂O (per 40 CFR Part 98 Table A-1 to Subpart A)

For example: $CO_2e = (117.0 \text{ lb/MMBtu}) + (0.0022 \text{ lb/MMBtu} * 25) + (0.00022 \text{ lb/MMBtu} * 298) = 117.1 \text{ lb/MMBtu}$

Input Data: Cummins GGLA-7458069 (Gen)/GM 8.1L (Engine)
 Design Class: 4-stroke rich burn
 Engine Power: 192.5 bhp
 Fuel Input: 1.67 MMBtu/hr
 Natural Gas Consumption: 1,667 scf/hr (manufacturer spec sheet)
 0.83 MMscf/yr
 Maximum Hours of Operation: 500 hrs/yr
 Heating Value of Natural Gas: 1,000 Btu/cf

Emission Calculations

Pollutant	Emission Factor		Potential Emissions	
			(lb/hr)	(tons/yr)
Criteria Pollutants				
PM (filterable)	9.50E-03	lb/MMBtu	0.02	3.96E-03
PM-10 (filterable)	9.50E-03	lb/MMBtu	0.02	3.96E-03
PM-2.5 (filterable)	9.50E-03	lb/MMBtu	0.02	3.96E-03
PM (condensibles)	9.91E-03	lb/MMBtu	0.02	4.13E-03
SO ₂	5.88E-04	lb/MMBtu	9.80E-04	2.45E-04
CO	0.93	g/bhp-hr	0.39	0.10
NO _x	0.07	g/bhp-hr	0.03	0.01
VOC	0.44	g/bhp-hr	0.19	0.05
Greenhouse Gases				
CO ₂	117.0	lb/MMBtu	195.00	48.75
CH ₄	2.20E-03	lb/MMBtu	3.68E-03	9.19E-04
N ₂ O	2.20E-04	lb/MMBtu	3.68E-04	9.19E-05
CO ₂ e	117.1	lb/MMBtu	195.20	48.80
Hazardous Air Pollutants				
1,1,2,2-Tetrachloroethane	2.53E-05	lb/MMBtu	4.22E-05	1.05E-05
1,1,2-Trichloroethane	1.53E-05	lb/MMBtu	2.55E-05	6.38E-06
1,1-Dichloroethane	1.13E-05	lb/MMBtu	1.88E-05	4.71E-06
1,2-Dichloroethane	1.13E-05	lb/MMBtu	1.88E-05	4.71E-06
1,2-Dichloropropane	1.30E-05	lb/MMBtu	2.17E-05	5.42E-06
1,3-Butadiene	6.63E-04	lb/MMBtu	1.11E-03	2.76E-04
1,3-Dichloropropene	1.27E-05	lb/MMBtu	2.12E-05	5.29E-06
Acrolein	2.63E-03	lb/MMBtu	4.38E-03	1.10E-03
Acetaldehyde	2.79E-03	lb/MMBtu	4.65E-03	1.16E-03
Benzene	1.58E-03	lb/MMBtu	2.63E-03	6.58E-04
Carbon Tetrachloride	1.77E-05	lb/MMBtu	2.95E-05	7.38E-06
Chlorobenzene	1.29E-05	lb/MMBtu	2.15E-05	5.38E-06
Chloroform	1.37E-05	lb/MMBtu	2.28E-05	5.71E-06
Ethylbenzene	2.48E-05	lb/MMBtu	4.13E-05	1.03E-05
Ethylene Dibromide	2.13E-05	lb/MMBtu	3.55E-05	8.88E-06
Formaldehyde	2.05E-02	lb/MMBtu	0.034	8.54E-03
Methanol	3.06E-03	lb/MMBtu	5.10E-03	1.28E-03
Methylene Chloride	4.12E-05	lb/MMBtu	6.87E-05	1.72E-05
Naphthalene (POM)	9.71E-05	lb/MMBtu	1.62E-04	4.05E-05
Styrene	1.19E-05	lb/MMBtu	1.98E-05	4.96E-06
Toluene	5.58E-04	lb/MMBtu	9.30E-04	2.33E-04
Vinyl Chloride	7.18E-06	lb/MMBtu	1.20E-05	2.99E-06
Xylene	1.95E-04	lb/MMBtu	3.25E-04	8.13E-05
TOTAL HAP:			0.054	0.013

(1) NO_x, CO, and VOC data taken from engine manufacturer's technical data sheet

(2) PM, SO₂, and HAP emissions calculated from AP-42, Section 3.2, Natural Gas-Fired Reciprocating Engines, Table 3.2-3, 7/00

(3) Lb/MMBtu numbers based on 40 CFR Part 98 Tables C-1 and C-2 for natural gas

For example: $CO_2 = (53.06 \text{ kg } CO_2/MMBtu) / (0.453592 \text{ kg/lb}) = 117.0 \text{ lb/MMBtu}$

(4) Global Warming Potentials = 25 for CH₄ and 298 for N₂O (per 40 CFR Part 98 Table A-1 to Subpart A)

For example: $CO_2e = (117.0 \text{ lb/MMBtu}) + (0.0022 \text{ lb/MMBtu} * 25) + (0.00022 \text{ lb/MMBtu} * 298) = 117.1 \text{ lb/MMBtu}$

Input Data: Cummins GGLA-7458069 (Gen)/GM 8.1L (Engine)
 Design Class: 4-stroke rich burn
 Engine Power: 192.5 bhp
 Fuel Input: 1.67 MMBtu/hr
 Natural Gas Consumption: 1,667 scf/hr (manufacturer spec sheet)
 0.83 MMscf/yr
 Maximum Hours of Operation: 500 hrs/yr
 Heating Value of Natural Gas: 1,000 Btu/cf

Emission Calculations

Pollutant	Emission Factor		Potential Emissions	
			(lb/hr)	(tons/yr)
Criteria Pollutants				
PM (filterable)	9.50E-03	lb/MMBtu	0.02	3.96E-03
PM-10 (filterable)	9.50E-03	lb/MMBtu	0.02	3.96E-03
PM-2.5 (filterable)	9.50E-03	lb/MMBtu	0.02	3.96E-03
PM (condensibles)	9.91E-03	lb/MMBtu	0.02	4.13E-03
SO ₂	5.88E-04	lb/MMBtu	9.80E-04	2.45E-04
CO	0.93	g/bhp-hr	0.39	0.10
NO _x	0.07	g/bhp-hr	0.03	0.01
VOC	0.44	g/bhp-hr	0.19	0.05
Greenhouse Gases				
CO ₂	117.0	lb/MMBtu	195.00	48.75
CH ₄	2.20E-03	lb/MMBtu	3.68E-03	9.19E-04
N ₂ O	2.20E-04	lb/MMBtu	3.68E-04	9.19E-05
CO ₂ e	117.1	lb/MMBtu	195.20	48.80
Hazardous Air Pollutants				
1,1,2,2-Tetrachloroethane	2.53E-05	lb/MMBtu	4.22E-05	1.05E-05
1,1,2-Trichloroethane	1.53E-05	lb/MMBtu	2.55E-05	6.38E-06
1,1-Dichloroethane	1.13E-05	lb/MMBtu	1.88E-05	4.71E-06
1,2-Dichloroethane	1.13E-05	lb/MMBtu	1.88E-05	4.71E-06
1,2-Dichloropropane	1.30E-05	lb/MMBtu	2.17E-05	5.42E-06
1,3-Butadiene	6.63E-04	lb/MMBtu	1.11E-03	2.76E-04
1,3-Dichloropropene	1.27E-05	lb/MMBtu	2.12E-05	5.29E-06
Acrolein	2.63E-03	lb/MMBtu	4.38E-03	1.10E-03
Acetaldehyde	2.79E-03	lb/MMBtu	4.65E-03	1.16E-03
Benzene	1.58E-03	lb/MMBtu	2.63E-03	6.58E-04
Carbon Tetrachloride	1.77E-05	lb/MMBtu	2.95E-05	7.38E-06
Chlorobenzene	1.29E-05	lb/MMBtu	2.15E-05	5.38E-06
Chloroform	1.37E-05	lb/MMBtu	2.28E-05	5.71E-06
Ethylbenzene	2.48E-05	lb/MMBtu	4.13E-05	1.03E-05
Ethylene Dibromide	2.13E-05	lb/MMBtu	3.55E-05	8.88E-06
Formaldehyde	2.05E-02	lb/MMBtu	0.034	8.54E-03
Methanol	3.06E-03	lb/MMBtu	5.10E-03	1.28E-03
Methylene Chloride	4.12E-05	lb/MMBtu	6.87E-05	1.72E-05
Naphthalene (POM)	9.71E-05	lb/MMBtu	1.62E-04	4.05E-05
Styrene	1.19E-05	lb/MMBtu	1.98E-05	4.96E-06
Toluene	5.58E-04	lb/MMBtu	9.30E-04	2.33E-04
Vinyl Chloride	7.18E-06	lb/MMBtu	1.20E-05	2.99E-06
Xylene	1.95E-04	lb/MMBtu	3.25E-04	8.13E-05
TOTAL HAP:			0.054	0.013

(1) NO_x, CO, and VOC data taken from engine manufacturer's technical data sheet

(2) PM, SO₂, and HAP emissions calculated from AP-42, Section 3.2, Natural Gas-Fired Reciprocating Engines, Table 3.2-3, 7/00

(3) Lb/MMBtu numbers based on 40 CFR Part 98 Tables C-1 and C-2 for natural gas

$$\text{For example: } \text{CO}_2 = (53.06 \text{ kg CO}_2/\text{MMBtu}) / (0.453592 \text{ kg/lb}) = 117.0 \text{ lb/MMBtu}$$

(4) Global Warming Potentials = 25 for CH₄ and 298 for N₂O (per 40 CFR Part 98 Table A-1 to Subpart A)

$$\text{For example: } \text{CO}_2\text{e} = (117.0 \text{ lb/MMBtu}) + (0.0022 \text{ lb/MMBtu} * 25) + (0.00022 \text{ lb/MMBtu} * 298) = 117.1 \text{ lb/MMBtu}$$

Reboiler (RBV-1) Potential Emissions
Dominion Energy Transmission, Inc.
Maxwell Compressor Station

Updated: Feb 2018

Input Data: NATCO
 Design Class: Natural Gas-Fired
 Fuel Input: 0.30 MMBtu/hr
 Heating Value of Natural Gas: 1,000 Btu/scf
 Fuel Input: 0.00030 MMscf/hr
 2.63 MMscf/yr
 Maximum Hours of Operation: 8,760 hrs/yr

Emission Calculations

Pollutant	Emission Factor		Potential Emissions	
			(lb/hr)	(tons/yr)
Criteria Pollutants				
PM (filterable)	1.9	lb/MMscf	5.70E-04	2.50E-03
PM-10 (filterable)	1.9	lb/MMscf	5.70E-04	2.50E-03
PM-2.5 (filterable)	1.9	lb/MMscf	5.70E-04	2.50E-03
PM (condensibles)	5.7	lb/MMscf	1.71E-03	0.01
SO ₂	0.6	lb/MMscf	1.80E-04	7.88E-04
CO	84	lb/MMscf	0.03	0.11
NO _x	100	lb/MMscf	0.03	0.13
VOC	5.50	lb/MMscf	1.65E-03	7.23E-03
Greenhouse Gases				
CO ₂	117.0	lb/MMBtu	35.09	153.71
CH ₄	2.20E-03	lb/MMBtu	0.00	0.00
N ₂ O	2.20E-04	lb/MMBtu	0.00	0.00
CO ₂ e	117.1	lb/MMBtu	35.13	153.87
Hazardous Air Pollutants				
Arsenic	2.00E-04	lb/MMscf	6.00E-08	2.63E-07
Benzene	2.10E-03	lb/MMscf	6.30E-07	2.76E-06
Beryllium	1.20E-05	lb/MMscf	3.60E-09	1.58E-08
Cadmium	1.10E-03	lb/MMscf	3.30E-07	1.45E-06
Chromium	1.40E-03	lb/MMscf	4.20E-07	1.84E-06
Cobalt	8.40E-05	lb/MMscf	2.52E-08	1.10E-07
Dichlorobenzene	1.20E-03	lb/MMscf	3.60E-07	1.58E-06
Formaldehyde	7.50E-02	lb/MMscf	2.25E-05	9.86E-05
Hexane	1.80E+00	lb/MMscf	5.40E-04	2.37E-03
Manganese	3.80E-04	lb/MMscf	1.14E-07	4.99E-07
Mercury	2.60E-04	lb/MMscf	7.80E-08	3.42E-07
Naphthalene	6.10E-04	lb/MMscf	1.83E-07	8.02E-07
Nickel	2.10E-03	lb/MMscf	6.30E-07	2.76E-06
Selenium	2.40E-05	lb/MMscf	7.20E-09	3.15E-08
Toluene	3.40E-03	lb/MMscf	1.02E-06	4.47E-06
TOTAL HAP:			5.66E-04	2.48E-03

(1) NO_x and CO emission factors from AP-42, Section 1.4, Natural Gas Combustion, Table 1.4-1, 7/98

(2) PM, PM₁₀, PM_{2.5}, VOC, SO₂ emission factors from AP-42, Section 1.4, Natural Gas Combustion, Table 1.4-2, 7/98

(3) HAP emission factors from AP-42, Section 1.4, Natural Gas Combustion, Tables 1.4-3, 4, 7/98

(4) Lb/MMBtu numbers based on 40 CFR Part 98 Tables C-1 and C-2 for natural gas

$$\text{For example: } \text{CO}_2 = (53.06 \text{ kg CO}_2/\text{MMBtu}) / (0.453592 \text{ kg/lb}) = 117.0 \text{ lb/MMBtu}$$

(5) Global Warming Potentials = 25 for CH₄ and 298 for N₂O (per 40 CFR Part 98 Table A-1 to Subpart A)

$$\text{For example: } \text{CO}_2\text{e} = (117.0 \text{ lb/MMBtu}) + (0.0022 \text{ lb/MMBtu} * 25) + (0.00022 \text{ lb/MMBtu} * 298) \\ = 117.1 \text{ lb/MMBtu}$$

Dehydration Unit Still (RSV-1) Potential Emissions
Dominion Energy Transmission, Inc.
Maxwell Compressor Station

Updated: Feb 2018

Input Data: Cameron (NATCO)
Design Data TEG
Maximum Hours of Operation: 8,760 hrs/yr
Process Throughput Maximum: 4.3 MMscf/day
Wet Gas Temperature 120.00 degree F
Wet Gas Pressure 365.00 psig
Dry Gas Water Content 7.0 lbs H2O/MMscf
Glycol
Lean Glycol Water Content 0.9 % H2O
Recirculation Ratio 3.0 gal/lb H2O
Glycol Pump Type Electric
Flash Tank
Flash Control Recycle/Recompression
Control Efficiency 95 %
Temperature 160 degree F
Pressure 60 psig
Stripping Gas
Source of Gas Dry Gas
Gas Flow Rate 6.500 scfm
Regenerator Overheads Control Device
Control Device Combustion Device
Destruction Efficiency 95 %
Excess Oxygen 1.0 %
Ambient Air Temperature 68.0 degree F

For Application: Wet Gas Composition	
Component	Concentration (vol%)
Carbon Dioxide	0.101
Nitrogen	1.228
Methane	76.672
Ethane	12.604
Propane	5.455
Isobutane	0.803
n-Butane	1.507
Isopentane	0.467
n-Pentane	0.396
n-Hexane	0.149
Cyclohexane	0.027
Other Hexanes	0.062
Heptanes	0.094
Methylcyclohexane	0.043
Benzene	0.006
Toluene	0.008
Xylenes	0.005
C8+ Heavies	0.095

Emission Calculations - GLYCalc

Pollutant	Dehy PTE		Dehy PTE With Safety Factor	
	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)
Methane	0.6463	2.8308	1.2926	5.6616
Ethane	0.2270	0.9944	0.4540	1.9888
Propane	0.1789	0.7836	0.3578	1.5672
Isobutane	0.0421	0.1844	0.0842	0.3688
n-Butane	0.0937	0.4104	0.1874	0.8208
Isopentane	0.0384	0.1680	0.0768	0.3360
n-Pentane	0.0386	0.1690	0.0772	0.3380
n-Hexane	0.0275	0.1206	0.0550	0.2412
Cyclohexane	0.0200	0.0878	0.0400	0.1756
Other Hexanes	0.0091	0.0397	0.0182	0.0794
Heptanes	0.0381	0.1668	0.0762	0.3336
Methylcyclohexane	0.0444	0.1944	0.0888	0.3888
Benzene	0.0271	0.1185	0.0542	0.2370
Toluene	0.0592	0.2593	0.1184	0.5186
Xylenes	0.0719	0.3147	0.1438	0.6294
C8+ Heavies	0.4752	2.0816	0.9504	4.1632
Total VOCs	1.1641	5.0988	2.3282	10.1976
Total HAP	0.1857	0.8131	0.3714	1.6262
Total BTEX	0.1581	0.6925	0.3162	1.3850

- (1) Emission rates for Dehydration Still estimated from GRI-GLYCalc V4.0, with a 95% destruction efficiency of the flare.
(2) Safety factor = 200%

Flare (F-1) Potential Emissions
Dominion Energy Transmission, Inc.
Maxwell Compressor Station

Updated: Feb 2018

Input Data: QTI
 Combustor Rating: 4.0 MMBtu/hr
 Pilot Rating: 0.43 MMBtu/hr
 Higher Heating Value (HHV): 1,000 Btu/scf

Pollutant	Emission Factors ^a (lb/MMBtu)	Emission Factors ^b (lb/MMBtu)	Combustor Potential Emissions		Pilot Potential Emissions		TOTAL Potential Emissions	
			(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
NO _x	1.00E-01	6.80E-02	0.27	1.2	4.30E-02	1.88E-01	0.32	1.38
CO	8.40E-02	3.10E-01	1.24	5.4	3.61E-02	1.58E-01	1.28	5.59
PM/PM ₁₀	7.60E-03	--	3.04E-02	1.33E-01	3.27E-03	1.43E-02	0.03	0.15
SO ₂	6.00E-04	--	2.40E-03	1.05E-02	2.58E-04	1.13E-03	2.66E-03	1.16E-02
Lead	5.00E-07	--	2.00E-06	8.76E-06	2.15E-07	9.42E-07	2.22E-06	9.70E-06

^a Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2. Used for Pilot.

^b Emission factors from AP-42 Section 13.5 "Industrial Flares" Tables 13.5-1, 13.5-2. Used for Combustor.

Gas Analysis

Constituent	MW (g/g mole)	Composition ³ (mole %)	Density of Constituent Gases (g/l)	Contribution to Overall Sample Density by Species (g/l)	Composition (weight %)
Methane	16	77.860%	0.675	0.526	59.72%
Ethane	30	12.708%	1.266	0.161	18.28%
Propane	44	5.067%	1.857	0.094	10.69%
Butane(s)	58	2.138%	2.448	0.052	5.94%
Pentane(s)	72	0.689%	3.039	0.021	2.38%
Hexanes+	86	0.318%	3.630	0.012	1.31%
Nitrogen	28	1.163%	1.182	0.014	1.56%
CO2	44	0.057%	1.857	0.001	0.12%
TOTAL	378	100.000%		0.881	100.000%

3. Gas Analysis Sample #38200 dated 9/15/17 (Maxwell Sta After Dehy)

Gas density 54,975 lb/MMcf
 VOC content 20.32% weight %
 VOC content 11171.80 lb/MMcf
 Methane content 59.72% weight %
 Methane content 32831.13 lb/MMcf
 Total Hydrocarbon content 98.32% weight %
 Total Hydrocarbon content 54050.24 lb/MMcf
 HAP content 1.31% weight %
 HAP content 720.74 lb/MMcf
 (Hexanes+ used as surrogate for HAPs)

Pigging/Blowdown Calculations

	# of Events/yr	Amount Vented per Event (scf/event)	VOC Emissions per Event		VOC Emissions per Year	
			(lbs VOC/event)	(tons VOC/event)	(lbs VOC/yr)	(tons VOC/yr)
Compressor Blowdowns	5	130,000	1452.33	0.73	7261.67	3.63
Compressor Startup	5	130,000	1452.33	0.73	7261.67	3.63
Plant Shutdown	1	700,000	7820.26	3.91	7820.26	3.91
Low Pressure Pig Venting	52	10,000	111.72	0.06	5809.34	2.90
High Pressure Pig Venting	0	0	0.00	0.00	0.00	0.00

Total = 14.08

Total HAP Emissions per Event		Total HAP Emissions per Year	
(lbs HAP/event)	(tons HAP/event)	(lbs HAP/yr)	(tons HAP/yr)
93.70	0.05	468.48	0.23
93.70	0.05	468.48	0.23
504.52	0.25	504.52	0.25
7.21	0.00	374.78	0.19
0.00	0.00	0.00	0.00

Total = 0.91

Total Hydrocarbon Emissions per Event		Total Hydrocarbon Emissions per Year	
(lbs THC/event)	(tons THC/event)	(lbs THC/yr)	(tons THC/yr)
7026.53	3.51	35132.66	17.57
7026.53	3.51	35132.66	17.57
37835.17	18.92	37835.17	18.92
540.50	0.27	28106.13	14.05
0.00	0.00	0.00	0.00

Total = 68.10

Pollutant	Engine CE-2 (tons/yr)	Aux Gen EG01 (tons/yr)	Aux Gen EG02 (tons/yr)	Reboiler RBV-1 (tons/yr)	Dehy Still RSV-1 (tons/yr)	Flare F-1 (tons/yr)	Pigging and Blowdowns (tons/yr)	Facility Wide Totals (tons/yr)
PM-10 (filterable)	1.46E-03	3.96E-03	3.96E-03	2.50E-03	--	0.15	--	0.16
PM-2.5 (filterable)	1.46E-03	3.96E-03	3.96E-03	2.50E-03	--	0.15	--	0.16
PM (total)	0.19	0.01	0.01	9.99E-03	--	0.15	--	0.36
SO ₂	1.11E-02	2.45E-04	2.45E-04	7.88E-04	--	0.01	--	0.02
CO	7.46	0.10	0.10	0.11	--	5.59	--	13.36
NO _x	9.95	0.01	0.01	0.13	--	1.38	--	11.47
VOC	1.84	0.05	0.05	0.01	10.20	--	14.08	26.21
1,1,2,2-Tetrachloroethane	7.55E-04	1.05E-05	1.05E-05	--	--	--	--	7.76E-04
1,1,2-Trichloroethane	6.00E-04	6.38E-06	6.38E-06	--	--	--	--	6.13E-04
1,1-Dichloroethane	4.46E-04	4.71E-06	4.71E-06	--	--	--	--	4.55E-04
1,2-Dichloroethane	4.46E-04	4.71E-06	4.71E-06	--	--	--	--	4.55E-04
1,2-Dichloropropane	--	5.42E-06	5.42E-06	--	--	--	--	1.08E-05
1,3-Butadiene	5.04E-03	2.76E-04	2.76E-04	--	--	--	--	5.59E-03
1,3-Dichloropropene	4.98E-04	5.29E-06	5.29E-06	--	--	--	--	5.09E-04
Acrolein	0.10	1.10E-03	1.10E-03	--	--	--	--	9.92E-02
Acetaldehyde	0.16	1.16E-03	1.16E-03	--	--	--	--	0.16
Arsenic	--	--	--	2.63E-07	--	--	--	2.63E-07
Benzene	8.31E-03	6.58E-04	6.58E-04	2.76E-06	0.24	--	--	0.25
Beryllium	--	--	--	1.58E-08	--	--	--	1.58E-08
Biphenyl	4.00E-03	--	--	--	--	--	--	4.00E-03
Cadmium	--	--	--	1.45E-06	--	--	--	1.45E-06
Carbon Tetrachloride	6.93E-04	7.38E-06	7.38E-06	--	--	--	--	7.08E-04
Chlorobenzene	5.74E-04	5.38E-06	5.38E-06	--	--	--	--	5.85E-04
Chloroform	5.38E-04	5.71E-06	5.71E-06	--	--	--	--	5.50E-04
Chromium	--	--	--	1.84E-06	--	--	--	1.84E-06
Cobalt	--	--	--	1.10E-07	--	--	--	1.10E-07
Dichlorobenzene	--	--	--	1.58E-06	--	--	--	1.58E-06
Ethylbenzene	7.50E-04	1.03E-05	1.03E-05	--	--	--	--	7.70E-04
Ethylene Dibromide	8.36E-04	8.88E-06	8.88E-06	--	--	--	--	8.54E-04
Formaldehyde	1.00	8.54E-03	8.54E-03	9.86E-05	--	--	--	1.01
Hexane	2.10E-02	--	--	2.37E-03	2.41E-01	--	--	0.26
Manganese	--	--	--	4.99E-07	--	--	--	4.99E-07
Mercury	--	--	--	3.42E-07	--	--	--	3.42E-07
Methanol	4.72E-02	1.28E-03	1.28E-03	--	--	--	--	4.98E-02
Methylene Chloride	3.78E-04	1.72E-05	1.72E-05	--	--	--	--	4.12E-04
Naphthalene (POM)	1.40E-03	4.05E-05	4.05E-05	8.02E-07	--	--	--	1.49E-03
Nickel	--	--	--	2.76E-06	--	--	--	2.76E-06
Phenol	4.53E-04	--	--	--	--	--	--	4.53E-04
Selenium	--	--	--	3.15E-08	--	--	--	3.15E-08
Styrene	4.46E-04	4.96E-06	4.96E-06	--	--	--	--	4.55E-04
Toluene	7.70E-03	2.33E-04	2.33E-04	4.47E-06	0.52	--	--	0.53
Vinyl Chloride	2.81E-04	2.99E-06	2.99E-06	--	--	--	--	2.87E-04
Xylene	3.47E-03	8.13E-05	8.13E-05	--	0.63	--	--	0.63
Total HAP							0.91	3.92

Attachment V

Facility Wide Emission Summary Sheets

ATTACHMENT V – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET

List all sources of emissions in this table. Use extra pages if necessary.

Emission Point ID#	NO _x		CO		VOC		SO ₂		PM ₁₀ **		PM _{2.5} **		GHG (CO ₂ e)	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-2	2.27	9.95	1.70	7.46	0.42	1.84	2.53E-03	1.11E-02	0.04	0.19	0.04	0.19	504.76	2210.84
EG01	0.03	0.01	0.39	0.10	0.19	0.05	9.80E-04	2.45E-04	0.03	8.09E-03	0.03	8.09E-03	195.20	48.80
EG02	0.03	0.01	0.39	0.10	0.19	0.05	9.80E-04	2.45E-04	0.03	8.09E-03	0.03	8.09E-03	195.20	48.80
RBV-1	0.03	0.13	0.03	0.11	1.65E-03	7.23E-03	1.80E-04	7.88E-04	2.28E-03	0.01	2.28E-03	2.28E-03	35.13	153.87
RSV-1	--	--	--	--	2.33	10.20	--	--	--	--	--	--	--	--
F-1	0.32	1.38	1.28	5.59	--	--	2.66E-03	1.16E-02	0.03	0.15	0.03	0.15	--	--
Blowdowns/Pigging	--	--	--	--	3.21	14.08	--	--	--	--	--	--	--	--
TOTAL	2.68	11.47	3.79	13.36	6.34	26.21	0.01	0.02	0.13	0.36	0.13	0.36	930.29	2,462.31

****PM10 and PM2.5 = Filterable and Condensable**

Annual emissions shall be based on 8,760 hours per year of operation for all emission units except emergency generators. According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, fugitive emissions shall not be included in the PTE above.

ATTACHMENT V – FACILITY-WIDE HAP CONTROLLED EMISSIONS SUMMARY SHEET

List all sources of emissions in this table. Use extra pages if necessary.

Emission Point ID#	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		Hexane		Total HAPs	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-2	0.23	1.00	1.90E-03	0.01	1.76E-03	7.70E-03	1.71E-04	7.50E-04	7.93E-04	3.47E-03	4.78E-03	2.10E-02	0.31	1.36
EG01	0.03	8.54E-03	2.63E-03	6.58E-04	9.30E-04	2.33E-04	4.13E-05	1.03E-05	3.25E-04	8.13E-05	--	--	0.05	0.01
EG02	0.03	8.54E-03	2.63E-03	6.58E-04	9.30E-04	2.33E-04	4.13E-05	1.03E-05	3.25E-04	8.13E-05	--	--	0.05	0.01
RBV-1	2.25E-05	9.86E-05	6.30E-07	2.76E-06	1.02E-06	4.47E-06	--	--	--	--	5.40E-04	2.37E-03	5.66E-04	2.48E-03
RSV-1	--	--	0.06	0.24	0.12	0.52	--	--	0.15	0.63	0.06	0.25	0.38	1.63
F-1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Blowdowns /Pigging	--	--	--	--	--	--	--	--	--	--	--	--	0.21	0.91
TOTAL	0.29	1.01	0.07	0.25	0.12	0.53	2.54E-04	7.70E-04	0.15	0.63	0.07	0.26	1.00	3.92

Annual emissions shall be based on 8,760 hours per year of operation for all emission units except emergency generators. According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, fugitive emissions shall not be included in the PTE above.

Attachment W

Class I Legal Advertisement

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that Dominion Energy Transmission, Inc. Maxwell Compressor Station has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a G35-D General Permit Class II Administrative Update for a natural gas compressor and dehydration facility located on County Route 19/11 (Porto Rico Road), Porto Rico, Doddridge County, West Virginia. The latitude and longitude coordinates are:

Latitude = 39.18178
Longitude = -80.76227

The applicant estimates the increased potential to discharge the following Regulated Air Pollutants will be:

VOC	-9.59	tons/yr
Benzene	+0.15	tons/yr
Ethylbenzene	-0.14	tons/yr
n-Hexane	+0.01	tons/yr
Toluene	+0.29	tons/yr
Xylene	+0.27	tons/yr

Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1250, during normal business hours.

Dated this the **(Day)** day of **(Month)**, **(Year)**.

By: Dominion Energy Transmission, Inc.
Brian C. Sheppard
VP – Eastern Pipeline Operations
925 White Oaks Blvd.
Bridgeport, WV 26330