global environmental solutions

Hamon Compressor Station

Plant ID No. 005-00083

Sylvester, West Virginia

General Permit Modification Application

SLR Ref: 116.00400.00126

September 2015

September 21, 2015

Mr. William F. Durham
Director
WVDEP, Division of Air Quality
601 – 57th Street
Charleston, West Virginia 25304

Re: G35-A General Permit Modification Application
Hamon Compressor Station
Sylvester, West Virginia

Dear Mr. Durham,

SLR International Corporation has prepared the attached G35-A General Permit Modification Application on behalf of Cranberry Pipeline Corporation for the Hamon Compressor Station located in Sylvester, West Virginia (plant ID No. 005-00083). The facility currently operates under General Permit G35-A047C. SLR is requesting this Modification in order to update the facility registration.

A wet gas analysis from the Hamon Compressor Station taken on May 29, 2014, indicates that a G35-A General Permit Modification is required to reflect the following increases to the facility's current emission limits. These proposed limits do not trigger any additional permit requirements.

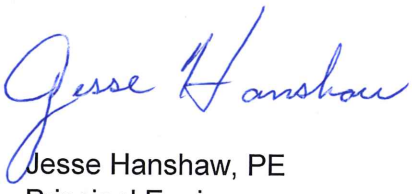
Pollutant	Currently Permitted Emission Limits (tpy)	Proposed Emission Limits (tpy)	Difference between Permitted and Proposed Limits (tpy)
VOC	5.194	55.43	50.236
Benzene	0.562	---	N/a
Ethylbenzene	1.429	---	N/a
Toluene	1.831	---	N/a
Xylene	3.508	9.86	6.352
n-Hexane	0.406	---	N/a

The public notice was delivered to *Coal Valley News* for publication. The legal advertisement will be forwarded to your office as soon as SLR receives the original affidavit from the newspaper.

If any additional information is needed, please contact me by telephone at (681) 205-8949 or by e-mail at jhanshaw@slrconsulting.com.

SLR International Corporation 8 Capitol Street, Suite 300, Charleston, WV 25301
T: (681) 205-8949 **F:** (681) 205-8969 www.slrconsulting.com
Offices throughout USA, UK, Ireland, Canada, Australia, Namibia, and South Africa

Sincerely,
SLR International Corporation



Jesse Hanshaw, PE
Principal Engineer

Cc: Mr. Randy Spencer, Cranberry Pipeline Corporation

General Permit Modification Application G35-A

Hamon Compressor Station, Plant ID No. 005-00083
Sylvester, West Virginia

Prepared for:

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street, East
Suite 1500
Charleston, West Virginia 25301

This document has been prepared by SLR International Corporation. The material and data in this permit application were prepared under the supervision and direction of the undersigned.

Nate Lanham
WV Operations Manager

Jesse Hanshaw, P.E.
Principal Engineer

CONTENTS

APPLICATION FOR PERMIT

ATTACHMENTS

Notes:

ATTACHMENT H No Air Pollution Control Device.
ATTACHMENT M Siting Criteria Waiver not needed due to existing facility.

APPLICATION FOR PERMIT

General Permit Modification Application

Hamon Compressor Station, Plant ID No. 005-00083
Sylvester, West Virginia

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East, Suite 1500
Charleston, West Virginia

September 2015

WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY
601 57th Street, SE
Charleston, WV 25304
Phone: (304) 926-0475 • *www.dep.wv.gov/daq*

APPLICATION FOR GENERAL PERMIT REGISTRATION

CONSTRUCT, MODIFY, RELOCATE OR ADMINISTRATIVELY UPDATE
A STATIONARY SOURCE OF AIR POLLUTANTS

☐CONSTRUCTION X MODIFICATION ☐RELOCATION CLASS I ADMINISTRATIVE UPDATE
☐ CLASS II ADMINISTRATIVE UPDATE

CHECK WHICH TYPE OF GENERAL PERMIT REGISTRATION YOU ARE APPLYING FOR:

- ☐ **G10-D –** Coal Preparation and Handling
- ☐ **G20-B –** Hot Mix Asphalt
- ☐ **G30-D –** Natural Gas Compressor Stations
- ☐ **G33-A –** Spark Ignition Internal Combustion Engines
- X **G35-A –** Natural Gas Compressor Stations (Flare/Glycol Dehydration Unit)
- ☐ **G40-C –** Nonmetallic Minerals Processing
- ☐ **G50-B –** Concrete Batch
- ☐ **G60-C** - Class II Emergency Generator
- ☐ **G65-C –** Class I Emergency Generator
- ☐ **G70-A –** Class II Oil and Natural Gas Production Facility

SECTION I. GENERAL INFORMATION

1. Name of applicant (as registered with the WV Secretary of State's Office):
CRANBERRY PIPELINE CORPORATION

2. Federal Employer ID No. **(FEIN):**
042989934

3. Applicant's mailing address:
900 LEE STREET EAST, SUITE 1500
CHARLESTON WV 25301

4. Applicant's physical address:
102 3RD STREET
GLASGOW WV 25086

5. If applicant is a subsidiary corporation, please provide the name of parent corporation: CABOT OIL & GAS CORPORATION

6. **WV BUSINESS REGISTRATION.** Is the applicant a resident of the State of West Virginia? X **YES** ☐**NO**

- IF **YES,** provide a copy of the Certificate of **Incorporation/ Organization / Limited Partnership** (one page) including any name change amendments or other Business Registration Certificate as **Attachment A**.
- IF **NO,** provide a copy of the **Certificate of Authority / Authority of LLC / Registration** (one page) including any name change amendments or other Business Certificate as **Attachment A**.

SECTION II. FACILITY INFORMATION

7. Type of plant or facility (stationary source) to be constructed, modified, relocated or administratively updated (e.g., coal preparation plant, primary crusher, etc.):
NATURAL GAS COMPRESSOR STATION AND DEHYDRATION UNIT

8a. Standard Industrial Classification (SIC) code:
1311

AND

8b. North American Industry System (NAICS) code:
21111

9. DAQ Plant ID No. (for existing facilities only):
005 – 00083

10. List all current 45CSR13 and other General Permit numbers associated with this process (for existing facilities only):
G35-A047C

A: PRIMARY OPERATING SITE INFORMATION

11A. Facility name of primary operating site:	12A. Address of primary operating site:
HAMON COMPRESSOR STATION	Mailing: 102 3rd ST GLASGOW WV 25086 Physical: HAMON ROAD NEAR SYLVESTER WV

13A. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? X **YES** ☐ **NO**

- IF **YES**, please explain: THE APPLICANT LEASES THE PROPERTY.
- IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

14A.
- For **Modifications or Administrative Updates** at an existing facility, please provide directions to the present location of the facility from the nearest state road;
- For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a **MAP** as **Attachment F**.

HAMON BRANCH COMRESSOR STATION IS SITUATED 1.0 MILE N/E OF SYLVESTER IN BOONE COUNTY WV. FROM SYLVESTER, WV GO NORTH ON SR-3 FOR 4.9 MILES THEN TURN RIGHT ONTO CR-14 (UPPER WHITE OAK ROAD) FOR 3.0 MILES. TURN RIGHT ON LOCAL HAMON ROAD FOR 0.03 MILES.

15A. Nearest city or town:	16A. County:	17A. UTM Coordinates:
SYLVESTER	BOONE	Northing (KM): 4,208,096 Easting (KM): 452,278 Zone: 17

18A. Briefly describe the proposed new operation or change (s) to the facility:	19A. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
See **Attachment B**	Latitude: 38.035942 Longitude: -81.539633

B: 1ST ALTERNATE OPERATING SITE INFORMATION (only available for G20, G40, & G50 General Permits)

11B. Name of 1st alternate operating site:	12B. Address of 1st alternate operating site:
	Mailing: Physical:

13B. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? ☐ **YES** ☐ **NO**

- IF **YES**, please explain:
- IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

14B. – For **Modifications or Administrative Updates** at an existing facility, please provide directions to the present location of the facility from the nearest state road;

– For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a **MAP** as **Attachment F**.

_____

_____

_____

15B. Nearest city or town:	16B. County:	17B. UTM Coordinates: Northing (KM): _____ Easting (KM): _____ Zone: _____
18B. Briefly describe the proposed new operation or change (s) to the facility:		19B. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: _____ Longitude: _____

C: 2ND ALTERNATE OPERATING SITE INFORMATION (only available for G20, G40, & G50 General Permits):

11C. Name of 2nd alternate operating site: _____ _____	12C. Address of 2nd alternate operating site: Mailing:_____ Physical:_____ _____

13C**.** Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? ☐**YES** ☐**NO**

– IF **YES**, please explain: _____

_____

– IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

14C. – For **Modifications or Administrative Updates** at an existing facility, please provide directions to the present location of the facility from the nearest state road;

– For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a **MAP** as **Attachment F**.

_____

_____

_____

15C. Nearest city or town:	16C. County:	17C. UTM Coordinates: Northing (KM): _____ Easting (KM): _____ Zone: _____
18C. Briefly describe the proposed new operation or change (s) to the facility:		19C. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: _____ Longitude: _____

20. Provide the date of anticipated installation or change: _____/_____/_____ X If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: 2011	21. Date of anticipated Start-up if registration is granted: AFTER-THE-FACT

22. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application if other than 8760 hours/year. (Note: anything other than 24/7/52 may result in a restriction to the facility's operation).

Hours per day -- Days per week -- Weeks per year -- Percentage of operation 100

The maximum projected **Operating Schedule** of activitiy/activities outlined in this application is 8760 hours/year.

SECTION III. ATTACHMENTS AND SUPPORTING DOCUMENTS

23. Include a check payable to WVDEP – Division of Air Quality with the appropriate **application fee** (per 45CSR22 and 45CSR13).

24. Include a **Table of Contents** as the first page of your application package.

All of the required forms and additional information can be found under the Permitting Section (General Permits) of DAQ's website, or requested by phone.

25. Please check all attachments included with this permit application. Please refer to the appropriate reference document for an explanation of the attachments listed below.

- X ATTACHMENT A : CURRENT BUSINESS CERTIFICATE
- X ATTACHMENT B: PROCESS DESCRIPTION
- X ATTACHMENT C: DESCRIPTION OF FUGITIVE EMISSIONS
- X ATTACHMENT D: PROCESS FLOW DIAGRAM
- X ATTACHMENT E: PLOT PLAN
- X ATTACHMENT F: AREA MAP
- X ATTACHMENT G: EQUIPMENT DATA SHEETS AND REGISTRATION SECTION APPLICABILITY FORM
- ☐ ATTACHMENT H: AIR POLLUTION CONTROL DEVICE SHEETS
- X ATTACHMENT I: EMISSIONS CALCULATIONS
- X ATTACHMENT J: CLASS I LEGAL ADVERTISEMENT
- X ATTACHMENT K: ELECTRONIC SUBMITTAL
- X ATTACHMENT L: GENERAL PERMIT REGISTRATION APPLICATION FEE
- ☐ ATTACHMENT M: SITING CRITERIA WAIVER
- ☐ ATTACHMENT N: MATERIAL SAFETY DATA SHEETS (MSDS)
- ☐ ATTACHMENT O: EMISSIONS SUMMARY SHEETS
- ☐ OTHER SUPPORTING DOCUMENTATION NOT DESCRIBED ABOVE (Equipment Drawings, Aggregation Discussion, etc.)

Please mail an original and two copies of the complete General Permit Registration Application with the signature(s) to the DAQ Permitting Section, at the address shown on the front page of this application. Please DO NOT fax permit applications. For questions regarding applications or West Virginia Air Pollution Rules and Regulations, please refer to the website shown on the front page of the application or call the phone number also provided on the front page of the application.

SECTION IV. CERTIFICATION OF INFORMATION

This 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 a 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, Emission Inventory, Certified Emission Statement, 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 Registration Application will be returned to the applicant.

FOR A CORPORATION (domestic or foreign)

☐ I certify that I am a President, Vice President, Secretary, Treasurer or in charge of a principal business function of the corporation

FOR A PARTNERSHIP

☐ I certify that I am a General Partner

FOR A LIMITED LIABILITY COMPANY

☐ I certify that I am a General Partner or General Manager

FOR AN ASSOCIATION

☐ I certify that I am the President or a member of the Board of Directors

FOR A JOINT VENTURE

☐ I certify that I am the President, General Partner or General Manager

FOR A SOLE PROPRIETORSHIP

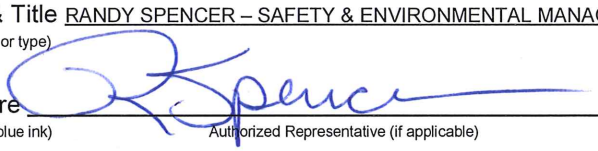
☐ I certify that I am the Owner and Proprietor

X *I hereby certify that* (please print or type) *RANDY SPENCER*
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 Office of Air Quality immediately, and/or,

X *I hereby certify that all information contained in this 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*

Signature SEE ATTACHMENT R
(please use blue ink) Responsible Official Date

Name & Title RANDY SPENCER – SAFETY & ENVIRONMENTAL MANAGER (NORTH)
(please print or type)

Signature 
(please use blue ink) Authorized Representative (if applicable) Date

Applicant's Name CRANBERRY PIPELINE CORPORATION

Phone & Fax 304-347-1642 304-347-1635
Phone Fax

Email randy.spencer@cabotog.com

ATTACHMENT A

BUSINESS CERTIFICATE

General Permit Modification Application

Hamon Compressor Station, Plant ID No. 005-00083
Sylvester, West Virginia

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East, Suite 1500
Charleston, West Virginia

September 2015

WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION
CERTIFICATE

ISSUED TO:
CRANBERRY PIPELINE CORPORATION
900 LEE ST E 1700
CHARLESTON, WV 25301-1741

BUSINESS REGISTRATION ACCOUNT NUMBER: **1006-3673**

This certificate is issued on: **06/1/2011**

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.

atL006 v.4
L1111698560

ATTACHMENT B

PROCESS DESCRIPTION

General Permit Modification Application

Hamon Compressor Station, Plant ID No. 005-00083
Sylvester, West Virginia

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East, Suite 1500
Charleston, West Virginia

September 2015

PROCESS DESCRIPTION

Introduction

The facility currently operates under General Permit G35-A047C. On behalf of Cranberry Pipeline Corporation (Cranberry) SLR is requesting this modification in order to update the facility registration to more accurately reflect the most recent site measurements.

Recent wet gas analyses from the Hamon Compressor Station indicate that a G35-A General Permit Modification is required to reflect the facility's adjusted emission levels from the dehydration unit still vent. The source's Potential to Emit (PTE) has been adjusted and new emission limits are proposed so that the facility remains within permitted throughput constraints. The proposed emission limits will not trigger new permitting program requirements (e.g. Title V Major Source).

Proposed Update

This application involves the following:

- Emission increase from previous Class II G35-A General Permit, due to recent wet gas sampling and analysis.

The new emission estimates show the need to increase the VOC and Xylene levels only. It is proposed to preserve the limits on all other pollutants to account for future variability such as that which the original permit was based. The changes to the emissions were a result of increases to the xylene and C8+ gas fractions measured within the wet gas inlet to the contactor column.

All other operating parameters on the dehydration unit were set to its maximum capacity. The lean TEG is recirculated through the unit by a gas-driven Kimray TEG pump, model 9015 PV. The pump has a maximum pump rate of 1.5 GPM. The gas throughput was modeled to reflect the stations maximum flow of 5 MMscf/d. Additionally, the inlet water content was assumed to be saturated at 350 psig and 100 F. The outlet is assumed to be pipeline quality NG at 7 lb H20/MMscf. This equates to a TEG recirculation ratio of 3.35 gal TEG/lb H20 removed from the wet gas so, this scenario appears to be within the units design specifications and very close to the optimum recycle ratio of 3.

Pipeline liquids and produced water is separated at the station's inlet and dehy separators as well as "compression drip" which is removed in the compression process are all by-products of the Hamon Compressor Station's process and are transferred through various operations to a single above ground storage tank (AST) represented in the equipment table as "Pipeline Liquids Tank", T01. The flashing emissions from the

transfer of “compression drip” in addition to tank working and breathing losses have been included within this application to better represent the storage vessel’s PTE. The emission estimates for the tank are based on direct measurement pressurized liquid testing and E&P Tanks simulation analysis taken at a representative Cranberry Pipeline’s site. The throughput was based on a maximum of 5 bbls/d.

As a result of this proposed permit revision, the tank flashing potential, loading losses and fugitive equipment leaks will be more accurately accounted for along with the new assessment of dehydration emissions based on updated gas measurement.

ATTACHMENT C

DESCRIPTION OF FUGITIVE EMISSIONS

General Permit Modification Application

Hamon Compressor Station, Plant ID No. 005-00083
Sylvester, West Virginia

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East, Suite 1500
Charleston, West Virginia

September 2015

FUGITIVE EMISSIONS

"Fugitive emissions" means those emissions which could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening. Fugitive leaks are leaks from sealed surfaces associated with process equipment. Pollutants of concern include Hazardous Air Pollutants (HAPs), Volatile Organic Compounds (VOCs), and Methane (CH_4) contained in the gas.

Equipment specific to the gas production and processing operations, which result in fugitive emissions includes units such as separators, pipelines, and pumps. Pneumatic devices such as gas actuated pumps and pressure/level controllers also result in fugitive emissions. Fugitive emissions may also result from process upsets such as pressure relief device releases due to over-pressure. Other process-related sources of emissions include fugitive emissions from flanges, valves, connectors, and fittings, and emissions from routine maintenance activities involving equipment depressurization (blowdown) or complete purging and filter replacement.

The amount of gas vented by pressure and level controllers is dependent on the manufacturer, application, age, and orifice size. In general, controllers in liquid service have larger orifices than those in pressure service. Valves in liquid service are designed to quickly open or close to avoid throttling which can erode the valve seat and reduce the life of the valve. Emissions from gas actuated pumps will be impacted by the gas composition, fuel supply pressure, discharge head (pressure), and the flow rate of the liquid pumped, since manufacturer pump curves estimate gas use based on these variables. Factors affecting blowdown emissions include maintenance schedules, line pressures, and the volume of gas relieved. More frequent maintenance results in more frequent gas relief. Also, since emissions are estimated by HAPcalc, the greater the line pressure and the volume of gas to be relieved, the greater the emissions.

Fugitive emissions at the Hamon compressor station may emanate from some or all of the following:

1. Storage tanks
2. Emergency and process vents
3. Gas actuated pumps
4. Loading losses (storage tank to tanker truck)
5. Pneumatic devices
6. Blow down & blowout
7. Equipment leaks (connections, flanges, open ended lines, valves)

ATTACHMENT D

PROCESS FLOW DIAGRAM

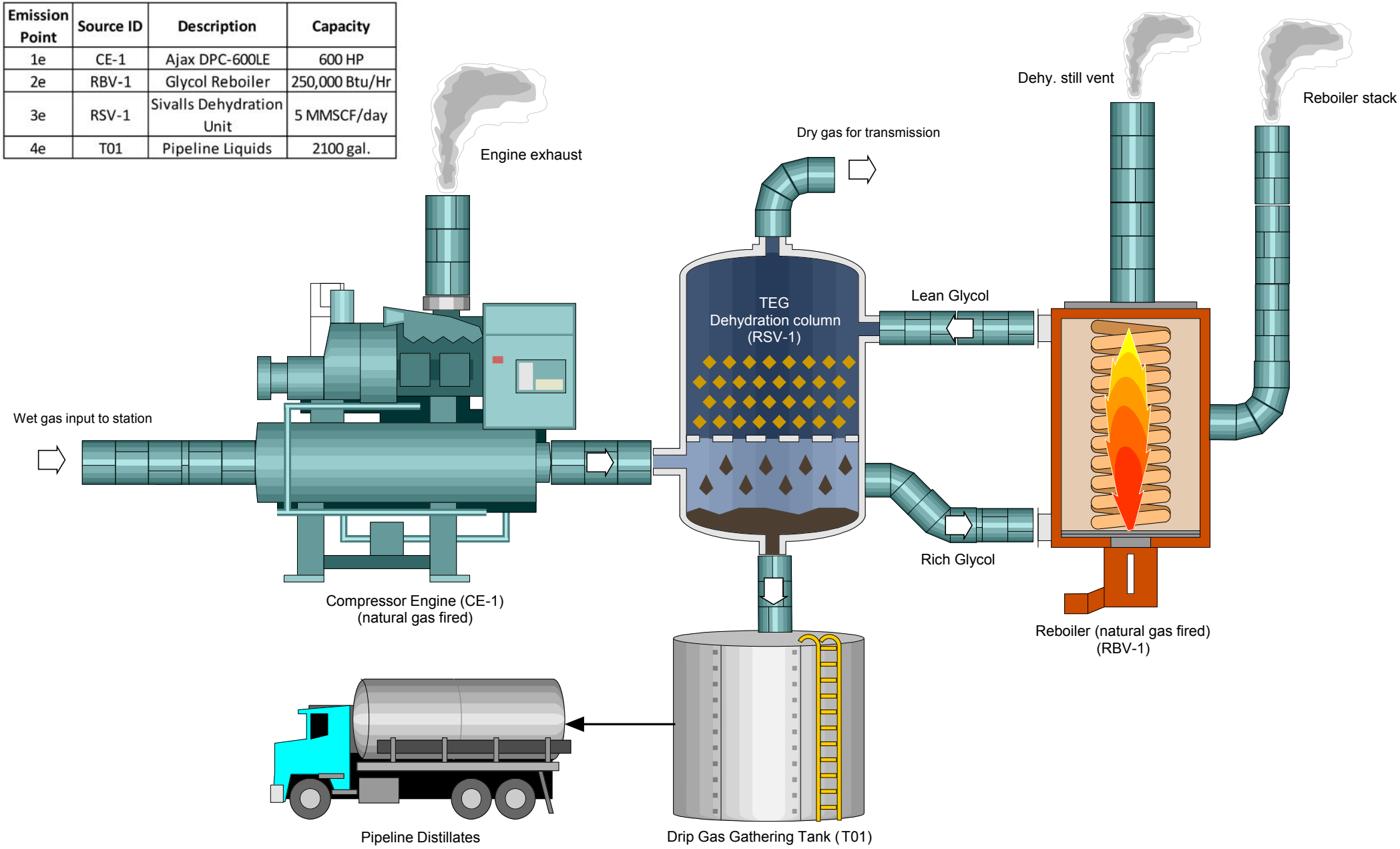
General Permit Modification Application

Hamon Compressor Station, Plant ID No. 005-00083
Sylvester, West Virginia

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East, Suite 1500
Charleston, West Virginia

September 2015

Emission Point	Source ID	Description	Capacity
1e	CE-1	Ajax DPC-600LE	600 HP
2e	RBV-1	Glycol Reboiler	250,000 Btu/Hr
3e	RSV-1	Sivalls Dehydration Unit	5 MMSCF/day
4e	T01	Pipeline Liquids	2100 gal.



SLR	Hamon Compressor Station Cranberry Pipeline Glasgow District, WV
Process Flow Diagram	ID #: 005 00083

09/22/2015

ATTACHMENT E

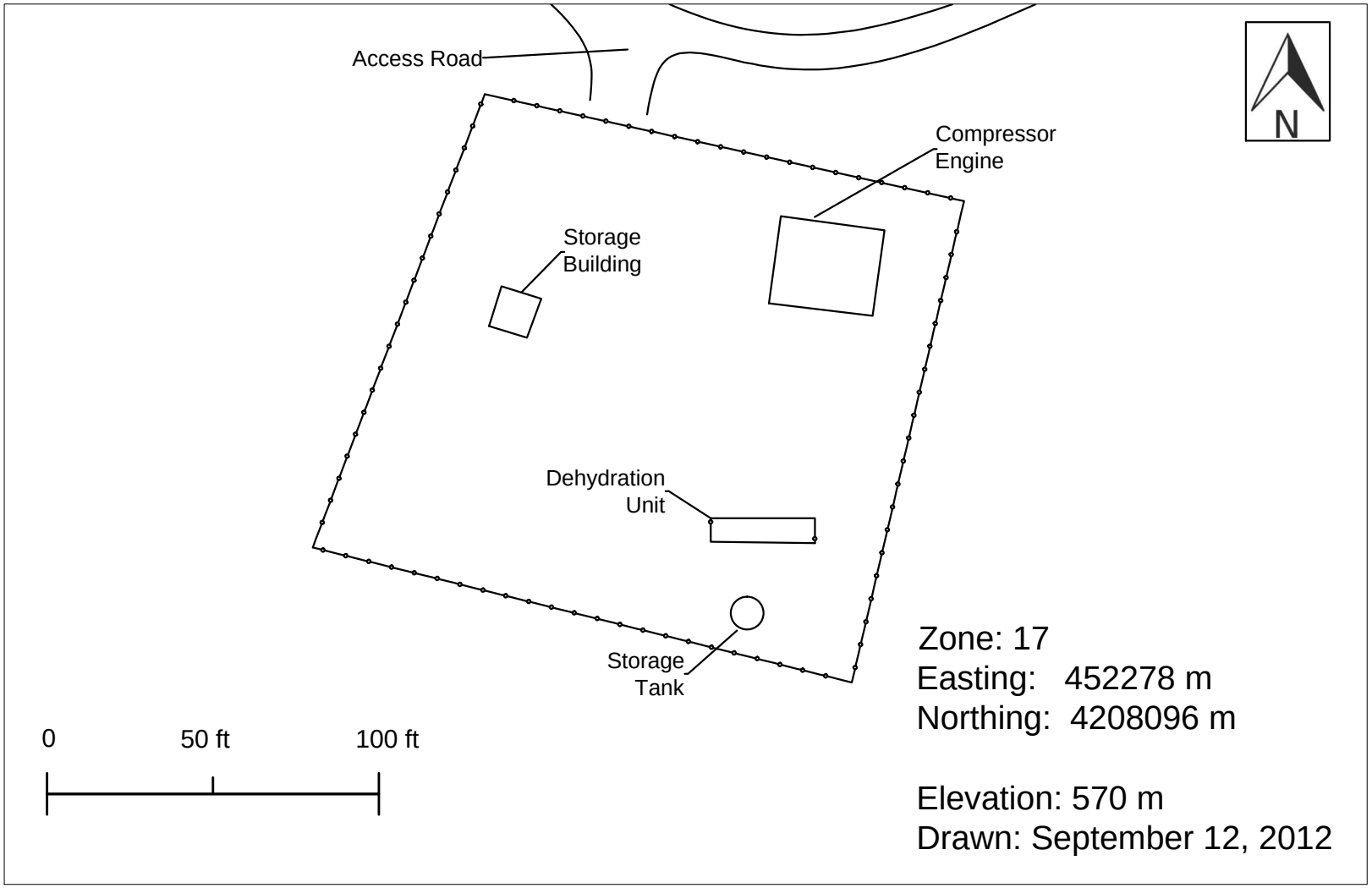
PLOT PLAN

General Permit Modification Application

Hamon Compressor Station, Plant ID No. 005-00083
Sylvester, West Virginia

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East, Suite 1500
Charleston, West Virginia

September 2015



Plot Plan
Cranberry Pipeline Corporation
Hamon Compressor Station - ID# 005-00083
Glasgow District, West Virginia

ATTACHMENT F

AREA MAP

General Permit Modification Application

Hamon Compressor Station, Plant ID No. 005-00083
Sylvester, West Virginia

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East, Suite 1500
Charleston, West Virginia

September 2015


Orgas
Coal River Rd
Hamon Compressor Station
UTM Zone: 17
UTM Northing: 4208.096 km
UTM Easting: 452.278 km
Elevation: 571 m
Sylvester
© 2012 Google
Google earth
8491 ft
Imagery Date: 3/26/2012
1996
38°02'09.39" N 81°32'22.68" W elev 1192 ft
Eye alt 37005 ft

Google earth

miles 100

km 200

ATTACHMENT G

AFFECTED SOURCE SHEETS

General Permit Modification Application

Hamon Compressor Station, Plant ID No. 005-00083
Sylvester, West Virginia

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East, Suite 1500
Charleston, West Virginia

September 2015

General Permit G35-A Registration
Section Applicability Form

General Permit G35-A was developed to allow qualified registrants to seek registration for a variety of sources. These sources include internal combustion engines, boilers, reboilers, line heaters, tanks, emergency generators, dehydration units not subject to MACT standards, dehydration units not subject to MACT standards and being controlled by a flare control device, dehydration units not subject to MACT standards and being controlled by recycling the dehydration unit back to flame zone of reboiler, dehydration units not subject to MACT standards being controlled by a thermal oxidizer, and permit exemptions including the less than 1 ton/year benzene exemption, the 40CFR63 Subpart HH - Annual Average Flow of Gas Exemption (3 mmscf/day), and the 40CFR63 Subpart HHH - Annual Average Flow of Gas Exemption (10 mmscf/day). All registered facilities will be subject to Sections 1.0, 1.1, 2.0, 3.0, and 4.0.

General Permit G35-A allows the registrant to choose which sections of the permit that they wish to seek registration under. Therefore, please mark which sections that you are applying for registration under. Please keep in mind, that if this registration is approved, the issued registration will state which sections will apply to your affected facility.

Section 5	Reciprocating Internal Combustion Engines (R.I.C.E.)*	☒
Section 6	Boilers, Reboilers, and Line Heaters	☒
Section 7	Tanks	☒
Section 8	Emergency Generators	☐
Section 9	Dehydration Units Not Subject to MACT Standards	☒
Section 10	Dehydration Units Not Subject to MACT Standards and being controlled by a flare control device	☐
Section 11	Dehydration Units Not Subject to MACT Standards being controlled by recycling the dehydration unit back to the flame zone of the reboiler	☐
Section 12	Dehydration Units Not Subject to MACT Standards and being controlled by a thermal oxidizer	☐
Section 13	Permit Exemption (Less than 1 ton/year of benzene exemption)	☒
Section 14	Permit Exemption (40CFR63 Subpart HH – Annual average flow of gas exemption (3 mmscf/day))	☐
Section 15	Permit Exemption (40CFR63 Subpart HHH – Annual average flow of gas exemption (10 mmscf/day))	☐
Section 16	Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (40CFR60 Subpart JJJJ)	☐

*** Affected facilities that are subject to Section 5 may also be subject to Section 16. Therefore, if the applicant is seeking registration under both sections, please select both.**

NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

Source Identification Number[1]		CE-1					
Engine Manufacturer and Model		Ajax DPC-600LE					
Manufacturer's Rated bhp/rpm		576					
Source Status[2]		ES					
Date Installed/Modified/Removed[3]		2004					
Engine Manufactured/Reconstruction Date[4]		2003					
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60 Subpart JJJJ? (Yes or No)[5]		NO					
Engine, Fuel and Combustion Data	Engine Type[6]	LB2S					
	APCD Type[7]	A/F					
	Fuel Type[8]	PQ					
	H_2S (gr/100 scf)	0.25					
	Operating bhp/rpm	576/400					
	BSFC (Btu/bhp-hr)	7800					
	Fuel throughput (ft^3/hr)	4584					
	Fuel throughput ($MMft^3$/yr)	40.16					
	Operation (hrs/yr)	8760					
Reference[9]	Potential Emissions[10]	lbs/hr	tons/yr				
MD	NO_X	8.254	36.152				
MD	CO	1.143	5.006				
MD	VOC	1.397	6.118				
AP	SO_2	0.003	0.012				
AP	PM_{10}	0.045	0.195				
MD	Formaldehyde	0.381	1.67				

1. Enter the appropriate Source Identification Number for each natural gas-fueled reciprocating internal combustion compressor/generator engine located at the compressor station. Multiple compressor engines should be designated CE-1, CE-2, CE-3 etc. Generator engines should be designated GE-1, GE-2, GE-3 etc. If more than three (3) engines exist, please use additional sheets.

2. Enter the Source Status using the following codes:

NS	Construction of New Source (installation)	ES	Existing Source
MS	Modification of Existing Source	RS	Removal of Source

3. Enter the date (or anticipated date) of the engine's installation (construction of source), modification or removal.

4. Enter the date that the engine was manufactured, modified or reconstructed.

5. Is the engine a certified stationary spark ignition internal combustion engine according to 40CFR60 Subpart JJJJ. If so, the engine and control device must be operated and maintained in accordance with the manufacturer's emission-related written instructions. You must keep records of conducted maintenance to demonstrate compliance, but no performance testing is required. If the certified engine is not operated and maintained in accordance with the manufacturer's emission-related written instructions, the engine will be considered a non-certified engine and you must demonstrate compliance according to 40CFR§60.4243a(2)(i) through (iii), as appropriate.

   Provide a manufacturer's data sheet for all engines being registered.

6. Enter the Engine Type designation(s) using the following codes:

LB2S	Lean Burn Two Stroke	RB4S	Rich Burn Four Stroke
LB4S	Lean Burn Four Stroke		

7. Enter the Air Pollution Control Device (APCD) type designation(s) using the following codes:

A/F	Air/Fuel Ratio	IR	Ignition Retard
HEIS	High Energy Ignition System	SIPC	Screw-in Precombustion Chambers
PSC	Prestratified Charge	LEC	Low Emission Combustion
NSCR	Rich Burn & Non-Selective Catalytic Reduction	SCR	Lean Burn & Selective Catalytic Reduction

8. Enter the Fuel Type using the following codes:

PQ	Pipeline Quality Natural Gas	RG	Raw Natural Gas

9. Enter the Potential Emissions Data Reference designation using the following codes. Attach all referenced data to this *Compressor/Generator Data Sheet(s)*.

MD	Manufacturer's Data	AP	AP-42	
GR	GRI-HAPCalc™	OT	Other _____	(please list)

10. Enter each engine's Potential to Emit (PTE) for the listed regulated pollutants in pounds per hour and tons per year. PTE shall be calculated at manufacturer's rated brake horsepower and may reflect reduction efficiencies of listed Air Pollution Control Devices. Emergency generator engines may use 500 hours of operation when calculating PTE. PTE data from this data sheet shall be incorporated in the *Emissions Summary Sheet*.

NATURAL GAS FIRED BOILER/LINE HEATER DATA SHEET

Source ID #[1]	Status[2]	Design Heat Input (mmBtu/hr)[3]	Hours of Operation (hrs/yr)[4]	Fuel Heating Value (Btu/scf)[5]	
Reboiler	EXIST	0.25	8760	970	

1. Enter the appropriate Source Identification Numbers (Source ID #) for each boiler or line heater located at the compressor station. Boilers should be designated BLR-1, BLR-2, BLR-3, etc. Heaters or Line Heaters should be designated HTR-1, HTR-2, HTR-3, etc. Enter glycol dehydration unit Reboiler Vent data on the *Glycol Dehydration Unit Data Sheet*.
2. Enter the Status for each boiler or line heater using the following:

   EXIST Existing Equipment NEW Installation of New Equipment
   REM Equipment Removed
3. Enter boiler or line heater design heat input in mmBtu/hr.
4. Enter the annual hours of operation in hours/year for each boiler or line heater.
5. Enter the fuel heating value in Btu/standard cubic foot.

STORAGE TANK DATA SHEET

Source ID #[1]	Status[2]	Content[3]	Volume[4]	Dia[5]	Throughput[6]	Orientation[7]	Liquid Height[8]
Tank 1	EXIST	Pipeline Liquids	2100	7	76,650	VERT	8

1. Enter the appropriate Source Identification Numbers (Source ID #) for each storage tank located at the compressor station. Tanks should be designated T01, T02, T03, etc.
2. Enter storage tank Status using the following:

   EXIST Existing Equipment NEW Installation of New Equipment
   REM Equipment Removed
3. Enter storage tank content such as condensate, pipeline liquids, glycol (DEG or TEG), lube oil, etc.
4. Enter storage tank volume in gallons.
5. Enter storage tank diameter in feet.
6. Enter storage tank throughput in gallons per year.
7. Enter storage tank orientation using the following:

   VERT Vertical Tank HORZ Horizontal Tank
8. Enter storage tank average liquid height in feet.

NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET

General Glycol Dehydration Unit Data		Manufacturer and Model		Sivalls SB12-3	
		Max Dry Gas Flow Rate (mmscf/day)		5	
		Design Heat Input (mmBtu/hr)		0.25	
		Design Type (DEG or TEG)		TEG	
		Source Status[2]		ES	
		Date Installed/Modified/Removed[3]		2004	
		Regenerator Still Vent APCD[4]		NA	
		Fuel HV (Btu/scf)		970.0	
		H_2S Content (gr/100 scf)		0.25	
		Operation (hrs/yr)		8760	
Source ID #[1]	Vent	Reference[5]	Potential Emissions[6]	lbs/hr	tons/yr
RBV-1	Reboiler Vent	AP	NO_X	0.0258	0.1129
		AP	CO	0.0216	0.0948
		AP	VOC	0.0014	0.0062
		AP	SO_2	0.0002	0.0007
		AP	PM_{10}	0.0020	0.0086
RSV-1	Glycol Regenerator Still Vent	GR	VOC	10.2283	44.8000
		GR	Benzene	0.1197	0.5240
		GR	Ethylbenzene	0.3263	1.429
		GR	Toluene	0.4137	1.812
		GR	Xylenes	2.2480	9.8461
		GR	n-Hexanes	0.0927	0.406
		GR	Total HAPs	3.11	14.02

1. Enter the appropriate Source Identification 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 Unit Data Sheet* shall be completed for each, using Source Identification #s RBV-2 and RSV-2, RBV-3 and RSV-3, etc.

2. Enter the Source Status using the following codes:

   NS Construction of New Source
   MS Modification of Existing Source
   ES Existing Source
   RS Removal of Source

3. Enter the date (or anticipated date) of the glycol dehydration unit's installation (construction of source), modification or removal.

4. Enter the Air Pollution Control Device (APCD) type designation using the following codes:

   NA None
   FL Flare
   CD Condenser
   CC Condenser/Combustion Combination

TO Thermal Oxidizer

5. Enter the Potential Emissions Data Reference designation using the following codes:

MD	Manufacturer's Data	AP	AP-42	
GR	GRI-GLYCalc™	OT	Other _____	(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* to this *Glycol Dehydration Unit Data Sheet(s)*. This PTE data shall be incorporated in the *Emissions Summary Sheet*.

Include a copy of the GRI-GLYCalc™ analysis. This includes a printout of the aggregate calculations report, which shall include emissions reports, equipment reports, and stream reports.

***An explanation of input parameters and examples, when using GRI-GLYCalc™ is available on our website.**

West Virginia Department of Environmental Protection

DIVISION OF AIR QUALITY : (304) 926-0475
WEB PAGE: http:\\www.wvdep.org

Division of Air Quality

40 CFR Part 63; Subpart HH & HHH Registration Form

Complete this form for any oil and natural gas production or natural gas transmission and storage facility that uses an affected unit under HH/HHH, whether subject or not.

Section A: Facility Description				
Affected facility actual annual average natural gas throughput (scf/day): 120,000				
Affected facility actual annual average hydrocarbon liquid throughput: (bbl/day): NA				
The affected facility processes, upgrades, or stores hydrocarbon liquids prior to custody transfer.			Yes	**X** No
The affected facility processes, upgrades, or stores natural gas prior to the point at which natural gas (NG) enters the NG transmission and storage source category or is delivered to the end user.			**X** Yes	No
The affected facility is: ☐ prior to a NG processing plant ☐ a NG processing plant ☒ prior to the point of custody transfer and there is no NG processing plant				
The affected facility transports or stores natural gas prior to entering the pipeline to a local distribution company or to a final end user (if there is no local distribution company).			Yes	**X** No
The affected facility exclusively processes, stores, or transfers black oil.			Yes	**X** No
Initial producing gas-to-oil ratio (GOR): _____scf/bbl API gravity: _____degrees				

Section B: Dehydration Unit (if applicable) [1]			
Description: **Manufacture: Sivalls**			
Date of Installation: **2004**	Annual Operating Hours: **8760**	Burner rating (MMbtu/hr): **0.25**	
Exhaust Stack Height (ft): **20**	Stack Diameter (ft): **0.85**	Stack Temp. (°F): **212**	
Glycol Type: ☒ TEG ☐ EG ☐ Other:			
Glycol Pump Type: ☐ Electric ☒ Gas If gas, what is the volume ratio? _ 0.08___ACFM/gpm			
Condenser installed? ☐ Yes ☒ No Exit Temp. _____ °F Condenser Pressure _____psig			
Incinerator/flare installed? ☐ Yes ☒ No Destruction Eff. _____%			
Other controls installed? ☐ Yes ☒ No Describe:			
Wet Gas[2]: Gas Temp.: **_100**____°F Gas Pressure __**350**___ psig			
(Upstream of Contact Tower) Saturated Gas? ☒ Yes ☐ No If no, water content _____ lb/MMSCF			
Dry Gas: Gas Flowrate(MMSCFD) Actual **_0.120_** Design ____**5**___			
(Downstream of Contact Tower) Water Content **_7.0**___ lb/MMSCF			
Lean Glycol: Circulation rate (gpm) Actual[3] _____ Maximum[4] ___**1.5**____			
Pump make/model: **Kimray Model 9015 PV**			
Glycol Flash Tank (if applicable): Temp.: _____°F Pressure _____ psig Vented? Yes ☐ No ☐			
If no, describe vapor control:			
Stripping Gas (if applicable): Source of gas: Rate _____ scfm			

Please attach the following required dehydration unit information:

1. System map indicating the chain of custody information. See Page 43 of this document for an example of a gas flow schematic. It is not intended that the applicant provide this level of detail for all sources. The level of detail that is necessary is to establish where the custody transfer points are located. This can be accomplished by submitting a process flow diagram indicating custody transfer points and the natural gas flow. However, the DAQ reserves the right to request more detailed information in order to make the necessary decisions.
2. Extended gas analysis from the Wet Gas Stream including mole percents of C_1-C_8, benzene, ethylbenzene, toluene, xylene and n-Hexane, using Gas Processors Association (GPA) 2286 (or similar). A sample should be taken from the inlet gas line, downstream from any inlet separator, and using a manifold to remove entrained liquids from the sample and a probe to collect the sample from the center of the gas line. GPA standard 2166 reference method or a modified version of EPA Method TO-14, (or similar) should be used.
3. GRI-GLYCalc Ver. 3.0 aggregate report based on maximum Lean Glycol circulation rate and maximum throughput.
4. Detailed calculations of gas or hydrocarbon flow rate.

Section C: Facility NESHAPS Subpart HH/HHH status

Affected facility status: (choose only one)

- ☐ Subject to Subpart HH
- ☐ Subject to Subpart HHH
- ☒ Not Subject because:
  - ☒ < 10/25 TPY
  - ☐ Affected facility exclusively handles black oil
  - ☐ The facility wide actual annual average NG throughput is < 650 thousand scf/day and facility wide actual annual average hydrocarbon liquid is < 250 bpd
  - ☐ No affected source is present

COMPRESSOR STATION EMISSION SUMMARY SHEET FOR CRITERIA POLLUTANTS

Compressor Station						Registration Number (Agency Use) G35-A				
	Potential Emissions (lbs/hr)					Potential Emissions (tons/yr)				
Source ID No.	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}
See Attachment I										
Total										

General Permit Levels

Construction, Modification, Relocation, Administrative Update

Class II General Permits – G10-C (Coal Preparation and Handling), G20-B (Hot Mix Asphalt), G30-B (Natural Gas Compressor Stations), G35-A (Natural Gas Compressor Stations with Flares/Glycol Dehydration Units), G40-B (Nonmetallic Minerals Processing), G50-B (Concrete Batch Plant), G60-B (Emergency Generators)

Class I General Permit - G65-B(Emergency Generators)

General Permit	Public Notice	Review Period as per 45CSR13	Application Fee	Criteria	Application Type
Class II General Permit (Construction)	30 days (applicant)	90 days	$500 + applicable NSPS fees	6 lb/hr and 10 tpy of any regulated air pollutant OR 144 lb/day of any regulated air pollutant, OR 2 lb/hr of any hazardous air pollutant OR 5 tpy of aggregated HAP OR 45CSR27 TAP (10% increase if above BAT triggers or increase to BAT triggers) or subject to applicable standard or rule, but subject to specific eligibility requirements	Registration Application
Class II General Permit (Modification)	30 days (applicant)	90 days	$500 + applicable NSPS fees	Same as Class II General Permit (Construction) but subject to specific eligibility requirements	Registration Application
Administrative Update (Class I)	None	60 days	None	Decrease in emissions or permanent removal of equipment OR more stringent requirements or change in MRR that is equivalent or superior	Registration Application or Written Request
Administrative Update (Class II)	30 days (applicant)	60 days	$300 + applicable NSPS fees	No change in emissions or an increase less than Class II Modification levels	Registration Application
Relocation	30 days (applicant)	45 days	$500 + applicable NSPS fees	No emissions increase or change in facility design or equipment	Registration Application
Class I General Permit	None	45 days	$250	Same as Class II General Permit (Construction) but subject to specific eligibility requirements	Registration Application

ATTACHMENT H

NO AIR POLLUTION CONTROL DEVICE SHEET
NOT APPLICABLE (SEE NOTE)

Note: No Air Pollution Control Device

General Permit Modification Application

Hamon Compressor Station, Plant ID No. 005-00083
Sylvester, West Virginia

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East, Suite 1500
Charleston, West Virginia

September 2015

ATTACHMENT I

EMISSIONS CALCULATIONS

General Permit Modification Application

Hamon Compressor Station, Plant ID No. 005-00083
Sylvester, West Virginia

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East, Suite 1500
Charleston, West Virginia

September 2015

Table 1. Annual Potential To Emit (PTE)
Cranberry Pipeline Corporation - Hamon Compressor Station

Potential to Emit (PTE)

Source	PM	PM10	PM2.5	SO2	NOx	CO	VOC	HAPs	CO2e
Reboiler Heater	0.0086	0.0086	0.0086	0.0007	0.1129	0.0948	0.0062	0.0021	128.0539
Tanks							0.3194		
Dehydration							44.8000	14.0071	859.6850
Engine	0.1950	0.1950	0.1950	0.0116	36.1524	5.0057	6.1181	2.1350	2304.3641
Fugitive Equipment Leaks							4.0811		94.8851
Fugitive Truck Loading							0.1402		
Total Emissions (ton/yr)	**0.2036**	**0.2036**	**0.2036**	**0.0122**	**36.2653**	**5.1005**	**55.4650**	**16.1442**	**3386.9882**
Total Emissions (lb/day)	1.1156	1.1156	1.1156	0.0671	198.7138	27.9482	303.9178	88.4613	18558.8394
Total Emissions (lb/hr)	0.0465	0.0465	0.0465	0.0028	8.2797	1.1645	12.6632	3.6859	773.2850

PTE Hazardous Air Pollutants

Source	*Benzene	*Ethylbenzene	*Toluene	Xylenes	*n-Hexane	Formaldehyde
Reboiler Heater	0.000	0.000	0.000	0.000	0.000	0.000
Tanks	0.000	0.000	0.000	0.000	0.000	0.000
Dehydration	0.525	1.427	1.813	9.846	0.396	0.000
Engine	0.038	0.000	0.019	0.005	0.000	1.669
Total Emissions (ton/yr)	**0.563**	**1.427**	**1.832**	**9.851**	**0.396**	**1.669**
Total Emissions (lb/day)	3.086	7.820	10.038	53.980	2.170	0.090
Total Emissions (lb/hr)	0.129	0.326	0.418	2.249	0.090	0.004

*Although the new gas analysis shows a decrease in the HAP from the Dehy Still Vent, the operator is requesting the current emission limit be left in-place in anticipation of changing gas concentrations in the future.

Table 2. Heater Rates and VOC/HAP Emissions
Cranberry Pipeline Corporation - Hamon Compressor Station

Pollutant	Emission Factor			Emissions (tons/year)
Criteria Pollutants				
PM/PM10/PM2.5	7.6	lb/MMcf	(1)	**0.00858**
SO_2	0.6	lb/MMcf	(1)	**0.00068**
NOx	100	lb/MMcf	(2)	**0.11289**
CO	84	lb/MMcf	(2)	**0.09482**
VOC	5.5	lb/MMcf	(1)	**0.00621**
Hazardous Air Pollutants				
Arsenic	2.0E-04	lb/MMcf	(3)	0.000
Benzene	2.1E-03	lb/MMcf	(4)	0.000
Beryllium	1.2E-05	lb/MMcf	(3)	0.000
Cadmium	1.1E-03	lb/MMcf	(3)	0.000
Chromium	1.4E-03	lb/MMcf	(3)	0.000
Cobalt	8.4E-05	lb/MMcf	(3)	0.000
Dichlorobenzene	1.2E-03	lb/MMcf	(4)	0.000
Formaldehyde	7.5E-02	lb/MMcf	(4)	0.000
Hexane	1.8E+00	lb/MMcf	(4)	0.002
Lead	5.0E-04	lb/MMcf	(3)	0.000
Manganese	3.8E-04	lb/MMcf	(3)	0.000
Mercury	2.6E-04	lb/MMcf	(3)	0.000
Naphthalene	6.1E-04	lb/MMcf	(4)	0.000
Nickel	2.1E-03	lb/MMcf	(3)	0.000
PAH/POM	1.3E-03	lb/MMcf	(4)	0.000
Selenium	2.4E-05	lb/MMcf	(3)	0.000
Toluene	3.4E-03	lb/MMcf	(4)	0.000
Total HAP	**1.9E+00**	**lb/MMCF**		0.002
Greenhouse Gas Emissions				
CO_2	116.89	lb/MMBtu	(5)	**127.994**
CH_4	2.2E-03	lb/MMBtu	(5)	**0.002**
N_2O	0.0	lb/MMBtu	(5)	**0.000**
CO_2e[(b)]	-	-		**128.054**

Calculations:

(a) Annual emissions (tons/yr) = [Annual Usage (MMBtu/yr or MMCF/yr)]x [Number of Identical Heaters]x [Emission Factor (lb/MMBtu or lb/MMCF)] / [2,000 lb/ton]

Number of Heaters=	1
Fuel Use (MMBtu/hr) =	0.25
Hours of Operation (hr/yr)=	8760
MMBtu/MMcf=	970
PTE Fuel Use (MMcf/yr) =	2.3

(b) CO_2 equivalent = [(CO_2 emissions)*(GWP_{CO2})]+[(CH_4 emissions)*(GWP_{CH4})]+[(N_2O emissions)*(GWP_{N2O})]
Global Warming Potential (GWP)

CO_2	1	(6)
CH_4	25	(6)
N_2O	298	(6)

Notes:

(1) AP-42, Chapter 1.4, Table 1.4-2. Emission Factors For Criteria Pollutants and Greenhouse Gases From Natural Gas Combustion, July 1998.

(2) AP-42, Chapter 1.4, Table 1.4-1. Emission Factors For Nitrogen Oxides (Nox) and Carbon Monoxide(CO) From Natural Gas Combustion, July 1998.

(3) AP-42, Chapter 1.4, Table 1.4-4. Emission Factors For Metals From Natural Gas Combustion, July 1998.

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

(5) Emission factors are from 40 CFR 98, Subpart C, Table C-1 and C-2.

(6) Global Warming Potentials obtained from 40 CFR 98, Subpart A, Table A-1

Table 3. Tank Emissions
Cranberry Pipeline Corporation - Hamon Compressor Station

Emission Unit	Tank Contents	Control Devices	Tank Throughput (bbls/day)	Flashing/Working/Breathing Em. Factor (lbs/bbls)		VOC Emissions (lbs/day)	VOC Emissions (lb/hr)	VOC Emissions (tons/yr)
T01	Pipeline Liquid	None	5	0.350	(1)	1.75	0.07	0.32

Note: This tank is filled by the liquids captured from the dehy and compressor suction pots.

Calculations:

Notes:

(1) Flashing/Working/Breathing losses calculated from pressurized liquid sample taken by FESCO and modeled using E+P Tanks 2.0
The sample was taken from the Putnam B6 site on 4-25-13 and is assumed to be representative worst case with respect to Hamon

Table 4. TEG Dehydration Unit with BTEX Elimination Fuel Gas System
Cranberry Pipeline Corporation - Hamon Compressor Station

Stream	Newly Calculated Emission Limits		Current Emission Limits		Proposed Limits*	
Components	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Methane	7.8510	34.3874	---	---	7.8510	34.387
Ethane	0.9975	4.3689	---	---	0.9975	4.369
Propane	0.4260	1.8658	---	---	0.4260	1.866
n-Hexane*	0.0471	0.2064	0.090	0.396	0.090	0.396
Benzene*	0.0731	0.3200	0.120	0.525	0.120	0.525
Toluene*	0.2550	1.1169	0.414	1.813	0.414	1.813
Ethylbenzene*	0.2192	0.9600	0.326	1.427	0.326	1.427
Xylene	2.2480	9.8461	0.800	3.503	2.248	9.846
VOC	10.2283	44.8000	0.661	2.896	10.228	44.800
Total HAPs	2.8427	12.4509	1.750	7.664	2.843	14.007
CO2e	196	859.6850	---	---	196	859.685

Emission estimates were calculated using GRI-GlyCalc Software. The aggregate emissions report is provided within supporting attachments.

Specs
5 MMscf/d
1.5 gpm TEG max pump rate
Column Pressure 350 psig
Column Temperature 100 F
Wet gas water content - Saturated
Dry gas water content - 7 lb H20/ MMscf

*Although the new gas analysis shows a decrease in the HAP from the Dehy Still Vent, the operator is requesting the current emission limit be left in-place in anticipation of changing gas concentrations in the future.

Table 5. Natural Gas Compressor/Engine Data Sheet
Cranberry Pipeline Corporation - Hamon Compressor Station

Pollutant	Emission Factor			PTE (lb/hr)	PTE[(a)] (tons/yr)
Criteria Pollutants					
PM/PM10/PM2.5	9.91E-03	lb/MMBtu	(1)	0.045	0.195
SO_2	5.88E-04	lb/MMBtu	(1)	0.003	0.012
NOx	6.50	g/hp-hr	(2)	8.254	36.152
CO	0.90	g/hp-hr	(2)	1.143	5.006
VOC	1.10	g/hp-hr	(1)	1.397	6.118
Hazardous Air Pollutants					
1,1,2,2-Tetrachloroethane	6.63E-05	lb/MMBtu	(1)	2.98E-04	1.30E-03
1,1,2-Trichloroethane	5.27E-05	lb/MMBtu	(1)	2.37E-04	1.04E-03
1,3-Butadiene	8.20E-04	lb/MMBtu	(1)	3.68E-03	1.61E-02
1,3-Dichloropropene	4.38E-05	lb/MMBtu	(1)	1.97E-04	8.62E-04
2-Methylnaphthalene	2.14E-05	lb/MMBtu	(1)	9.61E-05	4.21E-04
2,2,4-Trimethylpentane	8.46E-04	lb/MMBtu	(1)	3.80E-03	1.66E-02
Acetaldehyde	7.76E-03	lb/MMBtu	(1)	3.49E-02	1.53E-01
Acrolein	7.80E-03	lb/MMBtu	(1)	3.50E-02	1.53E-01
Benzene	1.94E-03	lb/MMBtu	(1)	8.72E-03	3.82E-02
Carbon Tetrachloride	6.07E-05	lb/MMBtu	(1)	2.73E-04	1.19E-03
Chlorobenzene	4.44E-05	lb/MMBtu	(1)	1.99E-04	8.74E-04
Chloroform	4.71E-05	lb/MMBtu	(1)	2.12E-04	9.27E-04
Ethylbenzene	1.08E-05	lb/MMBtu	(1)	4.85E-05	2.13E-04
Ethylene Dibromide	7.34E-05	lb/MMBtu	(1)	3.30E-04	1.44E-03
Formaldehyde	0.30	g/hp-hr	(2)	3.81E-01	1.67E+00
Methanol	2.48E-03	lb/MMBtu	(1)	1.11E-02	4.88E-02
Methylene Chloride	1.47E-04	lb/MMBtu	(1)	6.60E-04	2.89E-03
Naphthalene	9.63E-05	lb/MMBtu	(1)	4.33E-04	1.90E-03
PAH (POM)	1.34E-04	lb/MMBtu	(1)	6.02E-04	2.64E-03
Styrene	5.48E-07	lb/MMBtu	(1)	2.46E-06	1.08E-05
Toluene	9.63E-04	lb/MMBtu	(1)	4.33E-03	1.90E-02
Vinyl Chloride	2.47E-05	lb/MMBtu	(1)	1.11E-04	4.86E-04
Xylenes	2.68E-04	lb/MMBtu	(1)	1.20E-03	5.27E-03
Total HAP				**0.487**	**2.13**
Greenhouse Gas Emissions					
CO_2	116.98	lb/MMBtu	(3)	525.57	2.30E+03
CH_4	2.2E-03	lb/MMBtu	(3)	9.90E-03	4.34E-02
N_2O	2.2E-04	lb/MMBtu	(3)	9.90E-04	4.34E-03
CO_2e[(b)]	-	-		525.58	2304.36

Calculations:

(a) Annual emissions (tons/yr) = [Emission Factor (lbs/MMBtu)] x [Hours of Operation (hrs/yr)] x [BSFC (cf/hr)] x [1/Heat Content (Btu/scf)] / [1,000,000 (BTU/MMBtu)] / [2,000 lb/ton] x [Number of engines]

Annual emissions (tons/yr) = [Emission Factor (g/kW-hr)]x[Power Output (kW)] x [Hours of Operation (hrs/yr)] x [Number of engines]x[1.10231131x10^-6(ton/gram)]

Engine Power Output (kW) =	429.5	
Engine Power Output (hp) =	576.0	
Number of engines Operating at a Time =	1	
Fuel Throughput (cf/hr) =	4584	
BSFC (Btu/hp-hr) =	7,800	(2)
Heat Content Natural Gas(Btu/scf) =	980.0	(4)
PTE Hours of Operation =	8,760	

(b) CO_2 equivalent = [(CO_2 emissions)*(GWP_{CO2})]+[(CH_4 emissions)*(GWP_{CH4})]+[(N_2O emissions)*(GWP_{N2O})]

Global Warming Potential (GWP)

CO_2	1	(5)
CH_4	25	(5)
N_2O	298	(5)

Notes:

(1) AP-42, Chapter 3.2, Table 3.2-1. *Natural Gas-fired Reciprocating Engines* (7/00). Uncontrolled Emission Factors for 2-Stroke Lean-Burn Engines.

(2) Emission factors from Manufacturer's Estimated Exhaust Emissions spec sheet

(3) Emission factors are from 40 CFR 98, Subpart C, C-2.

(4) Default natural gas heat value

(5) Global Warming Potentials obtained from 40 CFR 98, Subpart A, Table A-1

Table 6. Fugitive Leak Emissions
Cranberry Pipeline Corporation - Hamon Compressor Station

Pollutant	Emission Factor			PTE[(a) Gas Service] (tons/yr)
Valves	9.9E-03	lb/hr/source	(1)	21.72
Low Bleed Pneumatic Valves	9.9E-03	lb/hr/source	(1)	4.34
Flanges	8.6E-04	lb/hr/source	(1)	4.52
Connector	4.4E-04	lb/hr/source	(1)	2.32
Other Points in Gas Service	1.9E-02	lb/hr/source	(1)	37.46
Total Gas Released	-	-		70.36
Total VOC Released (gas service)			(b)	**4.08**
Calculations:			**CO2e**	94.89

(a) Annual emissions (tons/yr) = [Emission Factor (lb/hr/source)] x [Number of Sources] x [Hours of Operation per Year] x [0.0005 tons/ lb]

(b) Gas sample from Hamon gas analysis as worst case at 5.8 wt % VOC

Number of Components in Gas Service

Valves=	500	(2)
Low Bleed Pneumatic Valves=	100	(2)
Connectors=	1,200	(2)
Other Points in Gas Service =	200	(2)
Maximum Hour of Operation =	8,760	

(1) Emission factors from 1995 EPA Protocol for Equipment Leak Emission Estimates, Table 2-4 Oil and Gas Production

Table 7. Truck Loading (TL) VOC Emissions
Cranberry Pipeline Corporation - Hamon Compressor Station

Contents	Volume Transferred [3]	Loading Loss [(a)] (lb VOC/1000gal)	PTE VOC Emissions (lb/hr)	PTE VOC Emissions (ton/yr) [(b)]
Pipeline Liquids	76,650 gal/yr	3.659	0.032	0.140
Total			**0.032**	**0.140**

Calculations:

(a) Loading Loss (lbs/1000 gal) = 12.46x[Saturation Factor] x [True Vapor Pressure of Liquid Loaded (psia)] x[Molecular Weight of Vapors(lbs/lbmole)]/ [Temperature of Bulk Liquid Loaded(°R)]

(b) Annual Emissions(tons/yr) = [Loading Loss (lb VOC/ 1000 gal)]*[Volume Transferred(gal/yr)]/1000/2000

	Pipeline liquids	
Saturation factor	0.60	Note [(1)]
Pvap (psia)	7.70	Note [(2)]
Molecular Weight Vap (lb/lbmol)	33.37	Note [(2)]
Bulk Liquid Tempurature (F)	65.00	Note [(2)]

Notes:

(1) AP-42 Section 5.2

(2) Putnam B6 Compressor Station Pressurized Separator Sampling and Emission Estimation Report, August 2013

(3) Annual rates based on maximum throughput of 5 bbls/d

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Cabot Oil & Gas - Hamon Compressor Station
File Name: N:\West Virginia\Cabot\Projects\2015\Air Permits\General Permits\Hamon Modification Update\2015 General Permit 35-A Application Package\Calcs for Review\Hamon GLYCalc Max.ddf
Date: July 30, 2015

DESCRIPTION:

Description: Hamon - 2015 General Permit Modification - PTE

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 100.00 deg. F
Pressure: 350.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.0780
Nitrogen	0.6420
Methane	92.8200
Ethane	4.6770
Propane	1.0020
Isobutane	0.1820
n-Butane	0.2280
Isopentane	0.1060
n-Pentane	0.0610
Cyclopentane	0.0010
n-Hexane	0.0170
Cyclohexane	0.0050
Other Hexanes	0.0400
Heptanes	0.0480
Methylcyclohexane	0.0010
2,2,4-Trimethylpentane	0.0010
Benzene	0.0010
Toluene	0.0020
Ethylbenzene	0.0010
Xylenes	0.0080
C8+ Heavies	0.0830

DRY GAS:

Flow Rate: 5.0 MMSCF/day
Water Content: 7.0 lbs. H2O/MMSCF

LEAN GLYCOL:

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

PUMP:

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

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Cabot Oil & Gas - Hamon Compressor Station
File Name: N:\West Virginia\Cabot\Projects\2015\Air Permits\General Permits\Hamon Modification Update\2015 General Permit 35-A Application Package\Calcs for Review\Hamon GLYCalc Max.ddf
Date: July 30, 2015

DESCRIPTION:

Description: Hamon - 2015 General Permit Modification - PTE

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	7.8510	188.424	34.3874
Ethane	0.9975	23.939	4.3689
Propane	0.4260	10.223	1.8658
Isobutane	0.1303	3.128	0.5709
n-Butane	0.1978	4.748	0.8665
Isopentane	0.1245	2.988	0.5452
n-Pentane	0.0865	2.076	0.3789
Cyclopentane	0.0047	0.112	0.0204
n-Hexane	0.0471	1.131	0.2064
Cyclohexane	0.0507	1.217	0.2220
Other Hexanes	0.0871	2.090	0.3813
Heptanes	0.2956	7.094	1.2946
Methylcyclohexane	0.0147	0.352	0.0642
2,2,4-Trimethylpentane	0.0035	0.085	0.0155
Benzene	0.0713	1.712	0.3124
Toluene	0.2550	6.120	1.1169
Ethylbenzene	0.2177	5.225	0.9535
Xylenes	2.2480	53.951	9.8461
C8+ Heavies	5.9660	143.184	26.1311
Total Emissions	19.0750	457.799	83.5483
Total Hydrocarbon Emissions	19.0750	457.799	83.5483
Total VOC Emissions	10.2265	245.436	44.7920
Total HAP Emissions	2.8427	68.224	12.4509
Total BTEX Emissions	2.7920	67.008	12.2290

EQUIPMENT REPORTS:

ABSORBER

Calculated Absorber Stages: 1.49
Specified Dry Gas Dew Point: 7.00 lbs. H2O/MMSCF
Temperature: 100.0 deg. F

Pressure:	350.0 psig
Dry Gas Flow Rate:	5.0000 MMSCF/day
Glycol Losses with Dry Gas:	0.0267 lb/hr
Wet Gas Water Content:	Saturated
Calculated Wet Gas Water Content:	135.58 lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	3.35 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	5.15%	94.85%
Carbon Dioxide	99.82%	0.18%
Nitrogen	99.99%	0.01%
Methane	99.99%	0.01%
Ethane	99.95%	0.05%
Propane	99.91%	0.09%
Isobutane	99.86%	0.14%
n-Butane	99.81%	0.19%
Isopentane	99.79%	0.21%
n-Pentane	99.73%	0.27%
Cyclopentane	98.87%	1.13%
n-Hexane	99.50%	0.50%
Cyclohexane	97.89%	2.11%
Other Hexanes	99.62%	0.38%
Heptanes	98.96%	1.04%
Methylcyclohexane	97.36%	2.64%
2,2,4-Trimethylpentane	99.52%	0.48%
Benzene	83.45%	16.55%
Toluene	74.89%	25.11%
Ethylbenzene	62.75%	37.25%
Xylenes	51.89%	48.11%
C8+ Heavies	92.40%	7.60%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	31.98%	68.02%
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	0.36%	99.64%
n-Pentane	0.38%	99.62%
Cyclopentane	0.47%	99.53%
n-Hexane	0.43%	99.57%
Cyclohexane	3.08%	96.92%
Other Hexanes	0.82%	99.18%
Heptanes	0.46%	99.54%
Methylcyclohexane	3.88%	96.12%
2,2,4-Trimethylpentane	1.28%	98.72%
Benzene	4.98%	95.02%
Toluene	7.88%	92.12%
Ethylbenzene	10.38%	89.62%

Xylenes	12.89%	87.11%
C8+ Heavies	11.89%	88.11%

STREAM REPORTS:

WET GAS STREAM

Temperature: 100.00 deg. F
Pressure: 364.70 psia
Flow Rate: 2.09e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	2.86e-001	2.83e+001
Carbon Dioxide	7.78e-002	1.89e+001
Nitrogen	6.40e-001	9.88e+001
Methane	9.26e+001	8.18e+003
Ethane	4.66e+000	7.72e+002
Propane	9.99e-001	2.43e+002
Isobutane	1.81e-001	5.81e+001
n-Butane	2.27e-001	7.28e+001
Isopentane	1.06e-001	4.20e+001
n-Pentane	6.08e-002	2.42e+001
Cyclopentane	9.97e-004	3.85e-001
n-Hexane	1.70e-002	8.05e+000
Cyclohexane	4.99e-003	2.31e+000
Other Hexanes	3.99e-002	1.89e+001
Heptanes	4.79e-002	2.64e+001
Methylcyclohexane	9.97e-004	5.39e-001
2,2,4-Trimethylpentane	9.97e-004	6.27e-001
Benzene	9.97e-004	4.29e-001
Toluene	1.99e-003	1.01e+000
Ethylbenzene	9.97e-004	5.83e-001
Xylenes	7.98e-003	4.66e+000
C8+ Heavies	8.28e-002	7.76e+001
Total Components	100.00	9.68e+003

DRY GAS STREAM

Temperature: 100.00 deg. F
Pressure: 364.70 psia
Flow Rate: 2.08e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.47e-002	1.46e+000
Carbon Dioxide	7.79e-002	1.88e+001
Nitrogen	6.42e-001	9.87e+001
Methane	9.28e+001	8.18e+003
Ethane	4.68e+000	7.72e+002
Propane	1.00e+000	2.42e+002
Isobutane	1.82e-001	5.80e+001
n-Butane	2.28e-001	7.26e+001

Isopentane	1.06e-001	4.19e+001
n-Pentane	6.08e-002	2.41e+001
Cyclopentane	9.89e-004	3.81e-001
n-Hexane	1.69e-002	8.01e+000
Cyclohexane	4.89e-003	2.26e+000
Other Hexanes	3.99e-002	1.89e+001
Heptanes	4.75e-002	2.61e+001
Methylcyclohexane	9.74e-004	5.25e-001
2,2,4-Trimethylpentane	9.95e-004	6.24e-001
Benzene	8.35e-004	3.58e-001
Toluene	1.50e-003	7.58e-001
Ethylbenzene	6.28e-004	3.66e-001
Xylenes	4.15e-003	2.42e+000
C8+ Heavies	7.67e-002	7.17e+001
Total Components	100.00	9.64e+003

LEAN GLYCOL STREAM

Temperature: 100.00 deg. F
Flow Rate: 1.50e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.84e+001	8.29e+002
Water	1.50e+000	1.26e+001
Carbon Dioxide	3.97e-013	3.34e-012
Nitrogen	1.48e-013	1.25e-012
Methane	4.10e-018	3.45e-017
Ethane	1.98e-008	1.67e-007
Propane	1.08e-009	9.09e-009
Isobutane	2.91e-010	2.46e-009
n-Butane	4.03e-010	3.40e-009
Isopentane	5.33e-005	4.49e-004
n-Pentane	3.95e-005	3.33e-004
Cyclopentane	2.59e-006	2.18e-005
n-Hexane	2.41e-005	2.03e-004
Cyclohexane	1.91e-004	1.61e-003
Other Hexanes	8.54e-005	7.20e-004
Heptanes	1.63e-004	1.37e-003
Methylcyclohexane	7.02e-005	5.92e-004
2,2,4-Trimethylpentane	5.44e-006	4.58e-005
Benzene	4.43e-004	3.74e-003
Toluene	2.59e-003	2.18e-002
Ethylbenzene	2.99e-003	2.52e-002
Xylenes	3.95e-002	3.33e-001
C8+ Heavies	9.55e-002	8.05e-001
Total Components	100.00	8.43e+002

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 100.00 deg. F
Pressure: 364.70 psia
Flow Rate: 1.59e+000 gpm
NOTE: Stream has more than one phase.

Component	Conc.	Loading

Component	(wt%)	(lb/hr)
TEG	9.33e+001	8.28e+002
Water	4.45e+000	3.95e+001
Carbon Dioxide	5.53e-003	4.92e-002
Nitrogen	1.07e-002	9.49e-002
Methane	8.84e-001	7.85e+000
Ethane	1.12e-001	9.97e-001
Propane	4.79e-002	4.26e-001
Isobutane	1.47e-002	1.30e-001
n-Butane	2.23e-002	1.98e-001
Isopentane	1.41e-002	1.25e-001
n-Pentane	9.77e-003	8.68e-002
Cyclopentane	5.27e-004	4.69e-003
n-Hexane	5.33e-003	4.73e-002
Cyclohexane	5.89e-003	5.23e-002
Other Hexanes	9.88e-003	8.78e-002
Heptanes	3.34e-002	2.97e-001
Methylcyclohexane	1.72e-003	1.53e-002
2,2,4-Trimethylpentane	4.03e-004	3.58e-003
Benzene	8.45e-003	7.51e-002
Toluene	3.12e-002	2.77e-001
Ethylbenzene	2.73e-002	2.43e-001
Xylenes	2.90e-001	2.58e+000
C8+ Heavies	7.62e-001	6.77e+000
Total Components	100.00	8.88e+002

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 7.99e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.09e+001	2.69e+001
Carbon Dioxide	5.30e-002	4.92e-002
Nitrogen	1.61e-001	9.49e-002
Methane	2.32e+001	7.85e+000
Ethane	1.57e+000	9.97e-001
Propane	4.59e-001	4.26e-001
Isobutane	1.06e-001	1.30e-001
n-Butane	1.62e-001	1.98e-001
Isopentane	8.19e-002	1.24e-001
n-Pentane	5.69e-002	8.65e-002
Cyclopentane	3.16e-003	4.66e-003
n-Hexane	2.60e-002	4.71e-002
Cyclohexane	2.86e-002	5.07e-002
Other Hexanes	4.80e-002	8.71e-002
Heptanes	1.40e-001	2.96e-001
Methylcyclohexane	7.09e-003	1.47e-002
2,2,4-Trimethylpentane	1.47e-003	3.53e-003
Benzene	4.34e-002	7.13e-002
Toluene	1.31e-001	2.55e-001
Ethylbenzene	9.73e-002	2.18e-001
Xylenes	1.01e+000	2.25e+000
C8+ Heavies	1.66e+000	5.97e+000

Total Components	100.00	4.61e+001

Certificate of Analysis

Number: 1030-14060180-001A

Houston Laboratories
8820 Interchange Drive
Houston, TX 77054
Phone 713-660-0901

June 06, 2014

Nathaniel Lanham
SLR- International
8 Capitol Street
Suite 300
Charleston, WV 25301

Station Name: Hamon
Method: GPA 2286
Cylinder No: Glasgow145
Analyzed: 06/05/2014 13:05:33

Sampled By: JS
Sample Of: Gas Spot
Sample Date: 05/29/2014 11:30
Sample Conditions:

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.696 psia
Nitrogen	0.642	1.026	
Carbon Dioxide	0.078	0.196	
Methane	92.820	84.962	
Ethane	4.677	8.024	1.251
Propane	1.002	2.521	0.276
Iso-butane	0.182	0.604	0.060
n-Butane	0.228	0.756	0.072
Iso-pentane	0.106	0.436	0.039
n-Pentane	0.061	0.251	0.022
Hexanes Plus	0.204	1.224	0.094
	100.000	100.000	1.814

GPM TOTAL C2+	1.814
GPM TOTAL C3+	0.563
GPM TOTAL iC5+	0.155

Physical Properties	Total	C6+
Relative Density Real Gas	0.6064	3.6514
Calculated Molecular Weight	17.53	105.75
Compressibility Factor	0.9976	
GPA 2172-09 Calculation:		
Calculated Gross BTU per ft³ @ 14.696 psia & 60°F		
Real Gas Dry BTU	1080	5691
Water Sat. Gas Base BTU	1061	5592

Comments: H2O Mol% : 1.744 ; Wt% : 1.792

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.

Certificate of Analysis

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Sample Conditions:

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.696 psia
Nitrogen	0.642	1.026	
Carbon Dioxide	0.078	0.196	
Hydrogen Sulfide	NIL	NIL	
Methane	92.820	84.962	
Ethane	4.677	8.024	1.251
Propane	1.002	2.521	0.276
Iso-Butane	0.182	0.604	0.060
n-Butane	0.228	0.756	0.072
Iso-Pentane	0.106	0.436	0.039
n-Pentane	0.061	0.251	0.022
Hexanes	0.057	0.262	0.022
Heptanes Plus	0.147	0.962	0.072
	100.000	100.000	1.814

GPM TOTAL C2+	1.814
GPM TOTAL C3+	0.563
GPM TOTAL iC5+	0.155

Physical Properties	Total	C7+
Relative Density Real Gas	0.6064	3.9036
Calculated Molecular Weight	17.53	113.06
Compressibility Factor	0.9976	
GPA 2172-09 Calculation:		
Calculated Gross BTU per ft³ @ 14.696 psia & 60°F		
Real Gas Dry BTU	1080	6047
Water Sat. Gas Base BTU	1061	5942

Comments: H2O Mol% : 1.744 ; Wt% : 1.792

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.

Certificate of Analysis

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Cylinder No: Glasgow145
Analyzed: 06/05/2014 13:05:33

Sampled By: JS
Sample Of: Gas Spot
Sample Date: 05/29/2014 11:30
Sample Conditions:

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.696 psia
Nitrogen	0.642	1.026	
Methane	92.820	84.962	
Carbon Dioxide	0.078	0.196	
Hydrogen Sulfide	NIL	NIL	
Ethane	4.677	8.024	1.251
Propane	1.002	2.521	0.276
Iso-Butane	0.182	0.604	0.060
n-Butane	0.228	0.756	0.072
Iso-Pentane	0.106	0.436	0.039
n-Pentane	0.061	0.251	0.022
i-Hexanes	0.040	0.181	0.015
n-Hexane	0.017	0.081	0.007
Benzene	0.001	0.005	NIL
Cyclohexane	0.005	0.021	0.002
i-Heptanes	0.035	0.184	0.015
n-Heptane	0.013	0.069	0.006
Toluene	0.002	0.010	0.001
i-Octanes	0.037	0.228	0.017
n-Octane	0.008	0.054	0.004
Ethylbenzene	NIL	NIL	NIL
Xylenes	0.008	0.053	0.003
i-Nonanes	0.013	0.102	0.007
n-Nonane	0.006	0.040	0.003
i-Decanes	0.009	0.098	0.007
n-Decane	0.003	0.025	0.002
Undecanes	0.004	0.042	0.003
Dodecanes	0.001	0.014	0.001
Tridecanes	NIL	NIL	NIL
Tetradecanes Plus	0.002	0.017	0.001
	100.000	100.000	1.814

GPM TOTAL C2+ 1.814

Certificate of Analysis

Number: 1030-14060180-001A

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Station Name: Hamon
Method: GPA 2286
Cylinder No: Glasgow145
Analyzed: 06/05/2014 13:05:33

Sampled By: JS
Sample Of: Gas Spot
Sample Date: 05/29/2014 11:30
Sample Conditions:

Physical Properties	**Total**	**C14+**
Calculated Molecular Weight	17.526	198.413
GPA 2172-09 Calculation:		
Calculated Gross BTU per ft³ @ 14.696 psia & 60°F		
Real Gas Dry BTU	1079.7	10728.8
Water Sat. Gas Base BTU	1061	10541.6
Relative Density Real Gas	0.6064	6.8500
Compressibility Factor	0.9976	

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.

ATTACHMENT J

CLASS I LEGAL ADVERTISEMENT

General Permit Modification Application

Hamon Compressor Station, Plant ID No. 005-00083
Sylvester, West Virginia

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East, Suite 1500
Charleston, West Virginia

September 2015

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that Cranberry Pipeline Corporation has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Modification Permit, for a Natural Gas Compression & Dehydration Station located on Hamon Rd off of U.S. Co. Hwy 14/03, near Sylvester, Boone County, West Virginia. The latitude and longitude coordinates are: 38.0359° and -81.5396°.

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

Pollutant	Increased Potential (ton/yr)
VOC	50.24
Xylene	6.35

The modification of operation will take place upon issuance of permit. 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 23 day of September 2015.

By: Cranberry Pipeline Corporation
Randy Spencer
Environmental Health & Safety Manager
900 Lee St. E Suite 1500
Charleston, WV 25301

ATTACHMENT K

ELECTRONIC SUBMITTAL CDS

General Permit Modification Application

Hamon Compressor Station, Plant ID No. 005-00083
Sylvester, West Virginia

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East, Suite 1500
Charleston, West Virginia

September 2015

ATTACHMENT L

GENERAL PERMIT REGISTRATION APPLICATION FEE

General Permit Modification Application

Hamon Compressor Station, Plant ID No. 005-00083
Sylvester, West Virginia

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East, Suite 1500
Charleston, West Virginia

September 2015

CRANBERRY PIPELINE CORPORATION

62332 WVDEP - OFFICE OF AIR QUALITY

CHECK NO. 2900221628

ACCT MO/YR	VOUCHER NUMBER	INVOICE DATE	INVOICE NUMBER	GROSS AMOUNT	DISCOUNT	NET AMOUNT
08/15	414676	08/11/15	08/11/15 062332C	3000.00	.00	3000.00

DESCRIPTION: SND CK TO PGH-SHERRY KLIBER

TOTAL FOR CHECK 3000.00

Please Address Inquiries Regarding This Payment To: Accounts Payable, Cranberry Pipeline Corp., P.O. Box 4544, Houston, TX 77210-4544
Or Call: 1.800.434.3985

SIGN UP TO RECEIVE YOUR FUNDS ELECTRONICALLY and DETAIL VIA EMAILED PDF!
Go to http://www.cabotog.com and CLICK ON VENDOR INFO, VENDOR EFT (DIRECT DEPOSIT) and follow the instructions on the form

THIS DOCUMENT HAS A COLORED BACKGROUND AND MICROPRINTING IN THE SIGNATURE LINE, MAGNIFY TO VERIFY ORIGINAL CHECK.

CRANBERRY PIPELINE CORPORATION
PO BOX 4544, Houston, TX 77210-4544

Check Number **2900221628** 56-1544/441 633681747

Check Date 8/11/15

JPMorgan Chase Bank, N.A.
Columbus, Ohio 43271

********3,000 DOLLARS ***00 CENTS

*****3,000.00
THREE COMMA ZERO ZERO ZERO PERIOD ZERO ZERO

TO THE ORDER OF

WVDEP - OFFICE OF AIR QUALITY 62332
601 57TH ST SE
CHARLESTON WV 25304 2345

CRANBERRY PIPELINE CORPORATION

Scott C Schroeder

AUTHORIZED REPRESENTATIVE

ACCOUNTS PAYABLE

VOID AFTER 90 DAYS

THIS DOCUMENT CONTAINS A TRUE WATERMARK AND VISIBLE FIBERS

⑈2900221628⑈ ⑆044116543⑆ 63368174⑈

ATTACHMENT M

SITING CRITERIA WAIVER
NOT APPLICABLE (SEE NOTE)

Note: Siting Criteria Waiver not needed due to existing facility

General Permit Modification Application

Hamon Compressor Station, Plant ID No. 005-00083
Sylvester, West Virginia

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East, Suite 1500
Charleston, West Virginia

September 2015

ATTACHMENT R

CERTIFICATION OF AUTHORITY

General Permit Modification Application

Hamon Compressor Station, Plant ID No. 005-00083
Sylvester, West Virginia

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East, Suite 1500
Charleston, West Virginia

September 2015

Attachment R
AUTHORITY OF CORPORATION
OR OTHER BUSINESS ENTITY (DOMESTIC OR FOREIGN)

TO: The West Virginia Department of Environmental Protection, Division of Air Quality

DATE: **July 19, 2010** , **2010**

ATTN.: Director

Corporation's / other business entity's Federal Employer I.D. Number **042989934**

The undersigned hereby files with the West Virginia Department of Environmental Protection, Division of Air Quality, a permit application and hereby certifies that the said name is a trade name which is used in the conduct of an incorporated business or other business entity.

Further, the corporation or the business entity certifies as follows:

(1) **RANDY SPENCER** (is/are) the authorized representative(s) and in that capacity may represent the interest of the corporation or the business entity and may obligate and legally bind the corporation or the business entity.

(2) The corporation or the business entity is authorized to do business in the State of West Virginia.

(3) If the corporation or the business entity changes its authorized representative(s), the corporation or the business entity shall notify the Director of the West Virginia Department of Environmental Protection, Division of Air Quality, immediately upon such change.

Dan O. Dinges - President, Chief Executive Officer
President or Other Authorized Officer
(Vice President, Secretary, Treasurer or other official in charge of a principal business function of the corporation or the business entity)
(If not the President, then the corporation or the business entity must submit certified minutes or bylaws stating legal authority of other authorized officer to bind the corporation or the business entity).

Secretary

CABOT OIL & GAS CORPORATION
CRANBERRY PIPELINE CORPORATION
Name of Corporation or business entity

Revision 03/2007

ATTACHMENT S

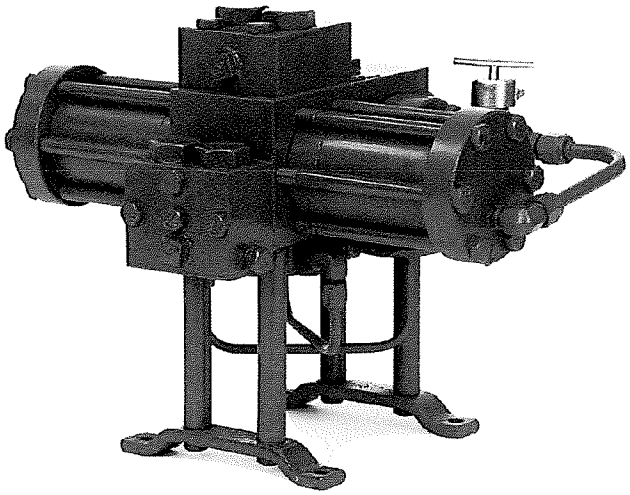
ADDITIONAL INFORMATION

General Permit Modification Application

Hamon Compressor Station, Plant ID No. 005-00083
Sylvester, West Virginia

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East, Suite 1500
Charleston, West Virginia

September 2015



Glycol Pump

INTRODUCTION:

The PV Series (Pressure Volume) Pump transfers the energy available from the wet glycol, at absorber pressure, to an "equivalent" volume of dry glycol at reboiler pressure. In order to circulate the glycol, additional energy is needed to overcome friction losses within the pump and connecting piping. This additional energy is supplied by gas at absorber pressure.

The pump was designed as double acting with a maximum working pressure of 1500 psig (103 bar) with a factor of safety of ten. Corrosion and wear dictated use of the best materials available. These materials include stainless steel, hard chrome plating, nylon, Teflon, stellite, and "O"-rings specially compounded for glycol service. The pump contains two basic moving parts, a Piston-Rod Assembly, and a Pilot Piston. Each actuates a three-way D-slide.

PRINCIPLE OF OPERATION:

Actions of each of the two basic parts of the pump are completely dependent upon the other. The pilot D-slide actuated by the pilot piston alternately feeds and exhausts absorber pressure to the power cylinders at opposite ends of the piston-rod assembly. Likewise, the pump D-slide actuated by the piston-rod assembly alternately feeds and exhausts absorber pressure to opposite ends of the pilot piston.

The force to circulate glycol within the dehydration system is supplied by absorber pressure acting on the area of the piston rod at its O-ring seals. The area of the piston rod is approximately 20 percent of that of the piston. Neglecting pump friction and line losses, the resultant force is sufficient to produce a theoretical discharge pressure 25 percent greater than absorber pressure. The theoretical discharge pressure, for example, at 300 psig (20.7 bar) absorber pressure would be 375 lbs. (25.9 bar), and at 1500 psig (103.4 bar) absorber pressure would be 1875 psig (129.3 bar). This theoretical "over-pressure" would develop against a blocked discharge line but is not sufficient to cause damage or create a hazard.

Approximately 25 to 30 psig (1.7 to 2.0 bar) pressure is required to overcome pump friction leaving the additional "over pressure" for line losses and circulation. It is recommended that these losses be held to approximately 10 percent of the absorber pressure or as noted in System Operations Parameters, pages 7 - 10.

Two speed control valves are provided to regulate the flow of wet glycol and gas to and from the power cylinders. Reversing the direction of flow through the speed control valves provides a flushing action which cleans the valve orifices.

If the wet glycol, returning to the pump from the absorber were to completely fill the cylinder, no additional gas would be needed. However, the wet glycol will only occupy approximately 65 percent of the total volume of the cylinder and connecting tubing leaving 35 percent to be filled by gas from the absorber. This gas volume amounts to 1.7 S.C.F. per gallon (.013 cu. meters per liter) of dry glycol at 300 psig (20.7 bar) absorber pressure and 8.3S.C.F. (.062 cu. meters per liter) at 1500 psig (103.4 bar) and may be considered as continuing power cost for pump operation. This gas can be utilized in the regeneration process of the dehydrator for "rolling" and or "stripping" purposes. It may also be recovered in a low pressure glycol gas separator and used to fire the reboiler.

By supplying some absorber gas to the cylinders, the wet glycol level is maintained at the wet glycol outlet connection on the absorber and eliminates the need of a liquid level controller and its attendant problems. Excess liquids such as hydrocarbons are removed from the absorber at approximately 55 percent of the pump rate, reducing the hazard of dumping a large volume of hydrocarbons into the reboiler as would be the case with a liquid level controller.

APPLICATIONS:

Circulating pump for gas glycol dehydrators
Circulating pump for gas amine desulphurizers

FEATURES:

Eliminates absorber liquid level controls
No auxiliary power supply required
Low gas consumption
No springs or toggles, only two moving assemblies
Hydraulic "cushioned" check valves with removable seats

PUMPS AVAILABLE:

"PV" SERIES GLYCOL PUMPS						
Model Number	Capacity Gal. / Hr. (Liters / Hr.)		Rate Strokes / Minute		Working Pressure psig (bar)	
	Min.	Max.*	Min.	Max.	Min.	Max.
4015PV	12 (45.4)	40 (151)	12	40	300 (20.7)	1500 (103)
9015PV	27 (102)	90 (340)	12	40	300 (20.7)	1500 (103)
21015PV	66 (250)	210 (795)	10	32	400 (27.6)	1500 (103)
45015PV	166 (628)	450 (1700)	10	28	400 (27.6)	1500 (103)

"SC" SERIES GLYCOL PUMPS						
Model Number	Capacity Gal. / Hr.		Rate Strokes / Minute		Working Pressure	
	Min.	Max.*	Min.	Max.	Min.	Max.
2015SC	8 (30.3)	20 (75.7)	5	55	100 (6.9)	500 (34.5)
5015SC	12 (45.4)	50 (189)	10	50	100 (6.9)	500 (34.5)
10015SC	22 (83.3)	100 (379)	10	48	100 (6.9)	500 (34.5)
20015SC	60 (227)	200 (757)	10	40	100 (6.9)	500 (34.5)

*Maximum output is affected by system pressure drops. See system operation parameter to maximum output curves.

Construction Materials:

BODY	Ductile Iron, ASTM A536
SUCTION BLOCK	Ductile Iron, ASTM A536
DISCHARGE BLOCK	Ductile Iron, ASTM A536
MAIN VALVE HOUSING	Steel
PILOT VALVE HOUSING	Steel
PORT PLATES	Stellite 3
CYLINDER HEADS	Ductile Iron, ASTM A536
PILOT PISTON CAPS	Ductile Iron, ASTM A536
CYLINDERS	Stainless steel, chrome plated steel
PISTONS	Steel
PILOT PISTONS	17-4 PH stainless steel
PISTON ROD	17-4 PH stainless steel
PISTON ROD GLANDS	Ductile Iron, ASTM A536
FITTINGS	Steel
TUBING	304 stainless steel
O-RINGS	Nitrile
BACK UPS	Glass filled Teflon

BEFORE INSTALLATION:

Be sure you fully understand the application, operation and connection of the device before installing.

WARNING:

Only trained personnel should install or service a glycol pump. Glycol pumps should be installed, operated, and maintained in accordance with international codes and regulations, manufacturer's instructions, and proven best practices.

Personal injury, equipment damage, property damage, leakage or bursting of pressure-containing parts may result if the pump is overpressured or installed where service conditions could exceed the limits given in the SPECIFICATIONS section.

To avoid injury or damage, install pressure-relieving or pressure limiting devices to prevent service conditions from exceeding those limits. Consult the appropriate code, regulations, or standards.

If a glycol pump is used in a hazardous or flammable fluid service, personal injury and property damage could occur due to fire or explosion of vented fluid that may have accumulated. To prevent such injury or damage, install piping or tubing to vent the fluid to a safe, well-ventilated area or containment vessel. When venting a hazardous fluid, the piping or tubing should be located far enough away from any buildings or windows so as not to create further hazard.

Consideration should be given to the potential risk of injury or property damage due to escaping fluid. To avoid such risks, install the pump in a safe location.

INSTALLATION:

Inspect the openings in the pump for foreign material and clean the pipe lines to remove scale, chips and debris.

A number of considerations should be made with regard to pump installation since it is the "heart" of a dehydration system. It is a moving mechanical device subject to wear and will ultimately need repair. Location of the pump is very important. Easy access to the pump for repair or exchange can save time and trouble.

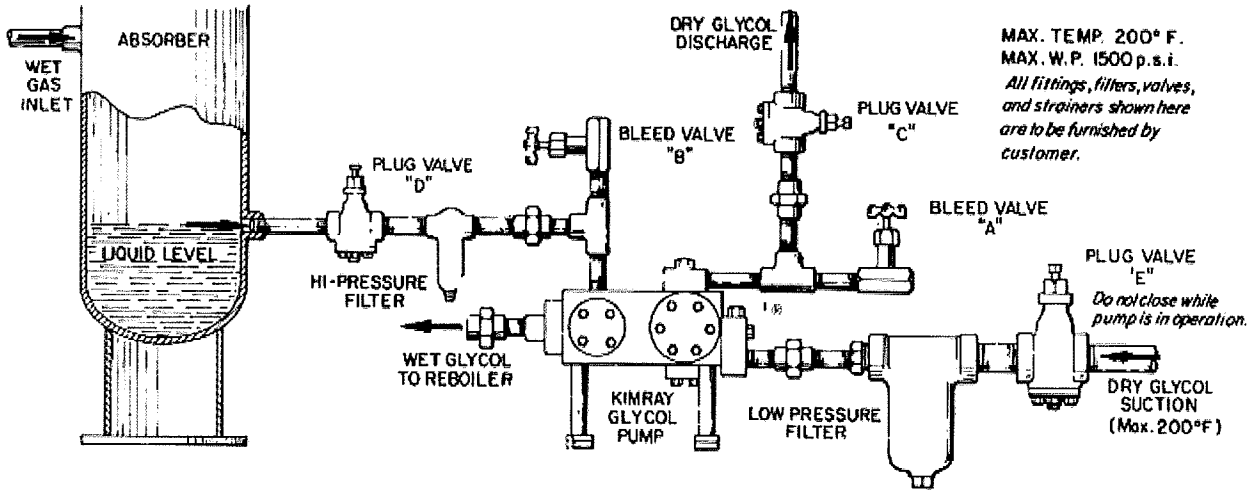
Test connections (1/4" NPT with valve) located on the piping to and from the pump permit a fast means of trouble shooting pipe restrictions or blockage.

Filters, which are discussed later, should always be installed in the wet glycol piping between the absorber and pump and in the suction line to the pump, with provisions made for maintenance of the filters.

Suction piping should preferably be large enough to permit a positive feed to the pump. Feed pressure must be more than 4 or 5 inches of Hg vacuum to prevent pump cavitation.

Where two or more pumps are manifolded together, the total capacity must be considered in the piping design. Also, a manifold should be designed to provide each pump with its appropriate share of the wet glycol from the absorber. It is not necessary that the proportion be exact.

Pumps with lower "pumping ratios" are available to provide additional energy for pressures below 300 psig (20.7 bar); but is it better not to use these pumps at pressures above 400 (27.6 bar) or 500 psig (34.5 bar) because of excess gas consumption. Conversion kits are available to change standard pumps to "SC" pumps with declining field pressures.



FILTER & STRAINER CONNECTIONS:
The following filter and strainer line sizes are recommended minimum.

4015PV & 2015SC.....1/2" NPT
9015PV & 5015SC.....3/4" NPT
21015PV & 10015SC.....1" NPT
45015PV & 20015SC.....1-1/2" NPT

HEAT EXCHANGERS:
Sufficient heat exchange is necessary to reduce dry glycol suction temperature to at least 200°F (93°C), preferably to 150°F (65°C).

VITON "O" RINGS:
Viton "O" rings for all moving seals in th Kimray Glycol Pumps are available. Viton repair kits can be ordered for pumps already in operation or new pumps can be ordered with viton "O" rings at additional cost.

Viton "O" rings are recommended for use when liquid hydrocarbons are found in the gas, for CO2 service or for elevated operating temperatures. Under normal conditions (without the above problems) viton "O" rings will not give as long of a service life in the pump as standard Buna-N "O" rings.

OPERATING PROCEDURE:
1. Close both speed control valves, bleed valves "A", "B" and plug valve "C".
2. Open plug valves "D" and "E".
3. Pressure absorber to about 300 psig (20.7 bar).
4. With plug valve "C" closed, open bleed valve "A".
5. Slowly open both speed control valves until pump is running about 1/3 rated max. strokes per minute. Count one stroke for each DISCHARGE of PUMP. When dry glycol discharges from valve "A" on each stroke, the pump is primed. Close valve "A" and open valve "C". Readjust speed control valves to 1/3 rated max. strokes per minute and continue operating pump until wet glycol returns from the absorber to the pump. This will be evidenced when the pump tries to meter liquid through the speed control valves instead of gas and causes the pump to slow down. Close both speed control valves.
6. Bring absorber to full operating pressure.
7. Adjust speed control valves for desired rate (see capacity chart).
8. Inspect and clean filters and strainers periodically.
9. For preventive maintenance, "O" Rings should be replaced annually. To check "O" Ring seal, close valve "C". If pump continues to run, seals should be replaced.

SYSTEM SHUTDOWN:
1. Close plug valve "D" Allow pump to stop running
2. Close plug valve "C" and "E"
3. Bleed pressure from bleed valve "A" and "C"

SYSTEM PRESSURE DROPS:
The Kimray Glycol Pumps are designed to operate by using the energy from the wet glycol and some additional energy in the form of gas at absorber pressure. Excessive pressure drops in the lines connecting the pump to the system can cause the pump to run erratically or stall. The following conditions should be designed into the system to assure proper pump performance:

DRY GLYCOL SUCTION LINE: Size the suction line, low pressure filter and heat exchanger such that the pump will have a positive pressure at the suction inlet when running at the maximum rated speed. This line may need to be larger than the pipe fitting on the suction check valve block.

WET GLYCOL POWER LINE: Recommended line size is the same as the size of the pipe connection for the given pump. The pressure drop across the high pressure filter is a factor in co sidering the total system pressure drop.

DRY GLYCOL DISCHARGE LINE: Recommended line size is the same as the size of the pipe connections for the given pump and the absorber should be full opening to the recommended line size.

WET GLYCOL DISCHARGE LINE: Recommended line size is the same as the size of the pipe connection for the given pump. If a glycol gas separator is used, the pressure maintained on the separator must be considered in the total system pressure drop. Also, heat exchanger coils in accumulator tanks also add to this pressure drop.

ISOLATING VALVES: All plug, gate, or blocking valves should be full opening to the recommended line size of the given pump. If a positive feed is supplied to the pump at the dry suction inlet, the total system pressure drop will be the sum of the following pressure drops:

1. The pressure drop between the absorber and the pump in the wet glycol line.

2. The pressure drop between the pump and the absorber in the dry glycol discharge line including any pressure required to open and establish full flow in any check valves.

3. The pressure drop between the pump and the reboiler (at atmospheric pressure) in the wet glycol discharge line. This includes the liquid head to the reboiler, heat exchanger coil, and/or the pressure maintained on a glycol separators.

The sum of these pressure drops gives the total "system pressure drop". The graphs on pages 7 - 10 give the maximum total system pressures and their effect on pump output. Exceeding the total allowable system pressure drop will cause the pump to run erratically or to stall.

To determine if a problem exists in an operating dehydration system, slowly open the speed control valves on the pump until it runs at the maximum recommended pump speed. (See graph page 6) If the pump cavitates before reaching the maximum pump speed, the suction line is restricted. If the pump will not run at the maximum rated speed, then there are probably restrictions in one or more of the other three connecting lines.

FILTERS:

Filters should be used on every dehydrator for protection of both the pump and reboiler. Many pumps are severely damaged in the first minutes or days of operation from flow line and vessel debris. Reboilers have been known to be filled with sand which had to first pass through the pump.

Filters should give protection from 25 to 150 micron particle sizes depending on the specific condition. The disc type, micron type, and sock type have all proven very satisfactory if they are properly maintained. Some metal filters are equipped with a cleaning device which should be operated daily or at least every few days as experience may dictate. Sock filters must be replaced at regular intervals. Preventative maintenance on these filters will save many dollars in major pump and reboiler repairs plus the reduction of costly down time.

A spring loaded by-pass on the filter is not recommended. It is better for the pump to stall due to lack of power than be exposed to dirt and grit from an open by-pass. Always install a high pressure filter between the absorber and the pump. A filter on the wet glycol discharge of the pump will protect the reboiler but does nothing for the pump. A low pressure filter on the pump suction protects against metallic particles from a new reboiler and its connecting piping. Filters will also keep the glycol free of heavy tars and residue from evaporated hydrocarbons and resinous compounds caused by polymerization of the glycol. Sock type filters are probably best for this type of filtration but should be changed rather frequently.

In addition to using filters it is often necessary to make a chemical analysis of the glycol, not only for pump protection but for better dehydration. Organic acids in glycol are produced from oxidation, thermal decomposition, and acid gases from the gas stream. These acids cause corrosion in the system, and dissolve the plating on pump parts in a short time. Glycol acidity should be maintained between a pH of 7 to 9. Alkaline amines are usually recommended to control the pH value because they will neutralize any acid gases present and are easily regenerated.

Another glycol contaminate which causes pump problems is salt. Salt water which continues to enter a dehydration system soon produces a super saturated condition in the reboiler. This results in salt deposits in the lines and in the pump as the hot glycol is cooled. A complete cleaning and washing of the entire system is required to remove the salt.

OPERATION:

A new pump or new dehydrator should be put into operation by first bringing the glycol circulation and operating temperature to an equilibrium condition by using 300 psig (20.7 bar) to 400 psig (27.6 bar) absorber pressure. This can be done with or without gas flow. If it is easier to start up under a no-flow condition, only enough gas need be supplied the absorber to maintain the pressure. In most instances the pump will pick up its prime without help and should do so in a few strokes. If the pump does not prime immediately, the dry glycol discharge should be opened to atmosphere until glycol discharges from both cylinders.

When equilibrium has been established, the pump should be stopped an the absorber pressure increased for operation. Pump speed can then be reestablished to the desired rate.

The maximum operating temperature of the pump is limited by the moving "O"-ring seals and nylon D-slides. A maximum of 200°F (93°C) is recommended. Packing life will be extended considerably at 150°F (65°C).

Always stop the pump when the pump when the main gas flow is turned off. A pump which continues to circulate with no gas flow elevates the complete dehydrator temperature, and in time to reboiler temperature.

If a pump has been deactivated for several months, the check valves should be removed and inspected before attempting to operate the pump. The pump startup should be similar to that of a new pump by first bringing the system to equilibrium.

TROUBLE SHOOTING:

If a glycol pump has been operating in a clean system it is very likely that no major service will be required for several years. Only a yearly replacement of packing will be required. Normally the pump will not stop pumping unless some internal part has been bent, worn, or broken, or some foreign object has fouled the pump, or the system has lost its glycol.

A pump which has been running without glycol for some time should be checked before returning to normal service. Probably the pump will need at least new "O"-rings. The cylinders and piston rods may also have been scored from the "dry run."

Following are some typical symptoms and causes. These are presented to assist in an accurate diagnosis of trouble.

SYMPTOM	POSSIBLE CAUSE
Pump will not operate.	One or more of the flow lines to the pump are blocked or the system pressure is too low for standard pumps (below 300 psig) use "SC" pumps below 300 psig.
Pump will start and run until the glycol returns from the absorber. The pump then stops or slows appreciably and will not run at its rated speed.	The wet glycol discharge line to the reboiler is restricted. A pressure gauge installed on the line will show the restriction immediately.
Pump operates until the system temperature is normal then the pump speeds up and cavitates.	The suction line is too small and increase in temperature and pumping rate cavitates the pump.
Pump lopes or pumps on one side only.	A leaky check valve, a foreign object lodged under check valve, or a leaky piston seal.
Pump stops and leaks excessive gas from wet glycol discharge.	Look for metal chips or shavings under the pump D-slides.
Erratic pump speed. Pump changes speed frequently.	Traps in the wet glycol power piping sends alternate slugs of glycol and gas to the pump.
Broken Pilot Piston.	Insufficient glycol to the main piston D-slide ports. Elevate the control valve end of the pump.

WARNING:

Before performing any service be sure that the pump is fully isolated and that all pressure upstream and downstream has been relieved. Use bypass valves or fully shut off the process.

Be sure that any operating or instrument gas lines have been disconnected.

Never assume that a check valve is fully blocking the downstream line.

Never tighten any fitting or the main connections to the valve while there is pressure on the line.

NOTE:

When a gasket or O-ring seal is disturbed during disassembly a new gasket should be installed during reassembly to ensure proper sealing.

MAINTENANCE:

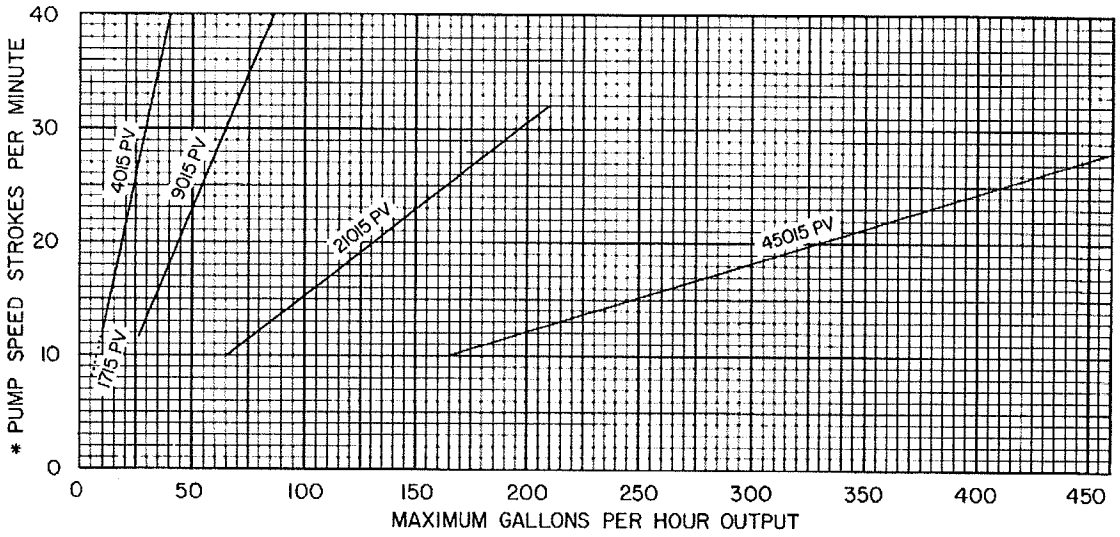
Maintenance should be performed on a regular basis. An initial inspection interval of 12 months is recommended. Depending on the service conditions and the condition of the pump, the inspection interval may be decreased or increased.

Warning: If the pump leaks fluid, it indicates that service is required. Failure to take the pump out of service immediately may create a hazardous condition.

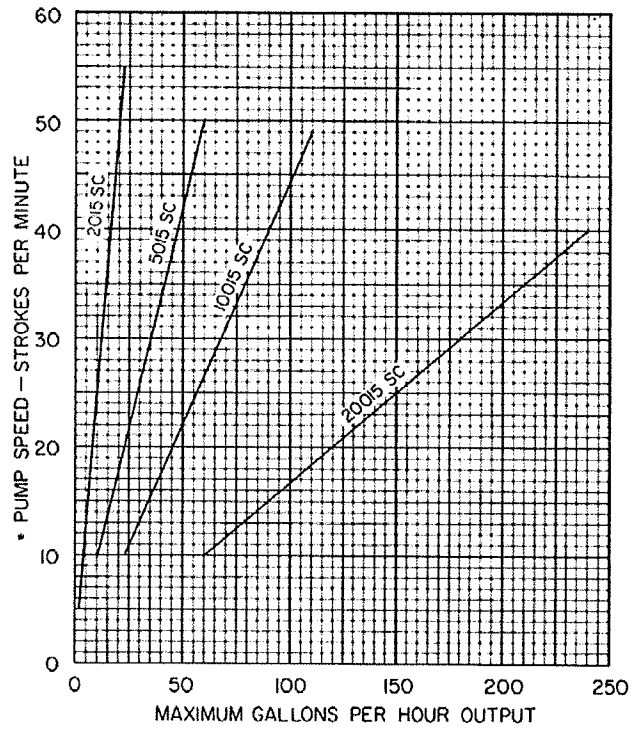
Detailed repair instructions are available for your pump.

Repair Kits are available. Consult the Kimray Catalog, Section G, or the packing slip which is enclosed with each valve for the correct Repair Kit number.

CIRCULATION RATE GRAPH "PV" SERIES PUMP

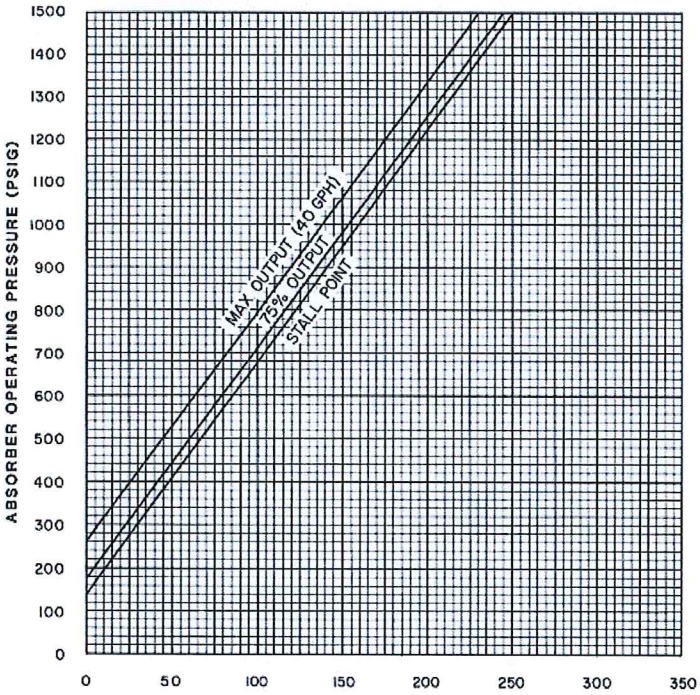


CIRCULATION RATE GRAPH "SC" SERIES PUMP

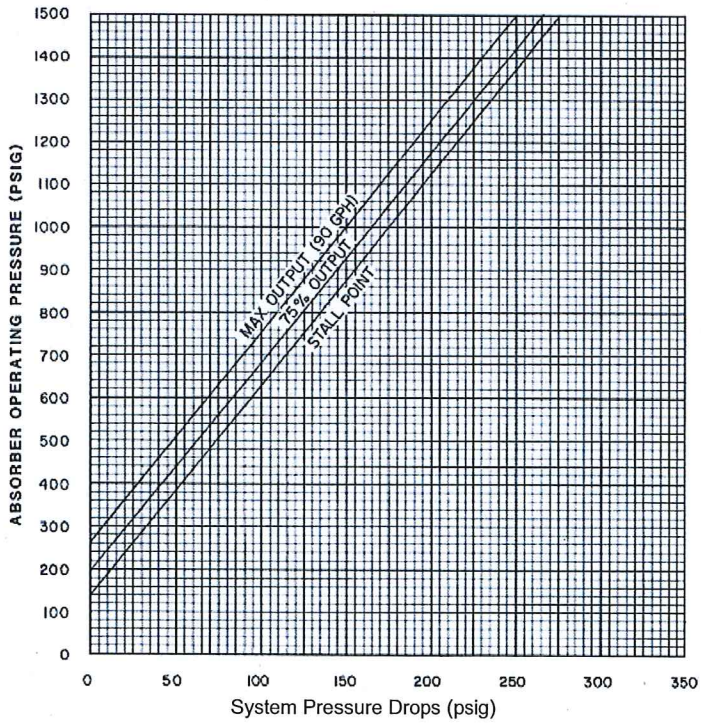


The "SC" (small cylinder) Series glycol pump was designed to extend the lower operating pressure of the "PV" Series pump downward from 300 psig (20.7 bar) to 100 psig (6.9 bar). Due to increased gas consumption it is recommended to use the "PV" Series pumps at pressures greater than 400 psig (27.6 bar).

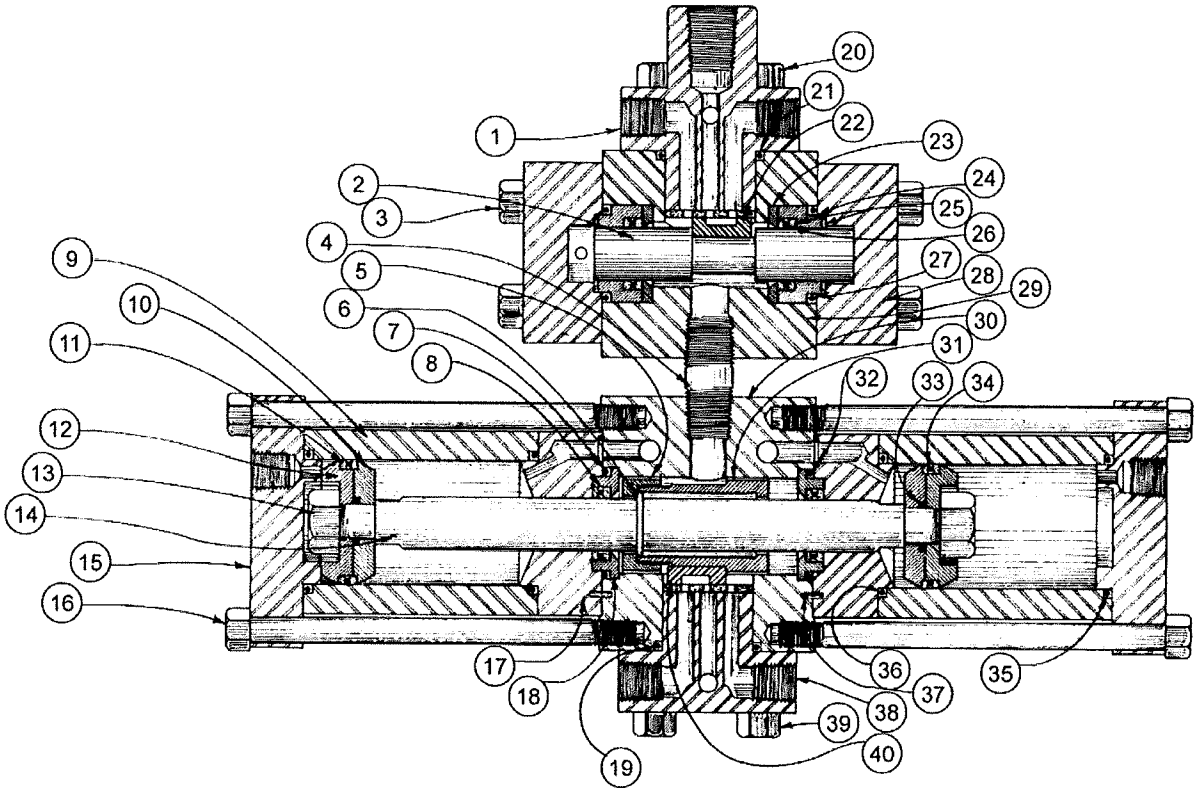
* It is not recommended to attempt to run pumps at speeds less or greater than those indicated in the above graphs.



4015 PV Strokes/Minute 12 - 40



9015 PV Strokes/Minute 12 - 40



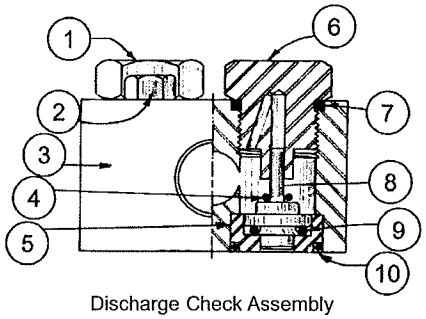
This is a general representation of a Glycol Pump model PV & SC.
For specific parts and their orientation refer to the Kimray Catalog or the packing slip which is enclosed with each pump.

Check Valve Assemblies and Tubing are located on the next page.

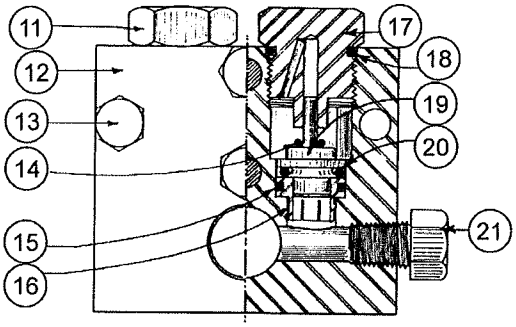
Key	Description
1	Pilot Piston Valve Housing, steel
2	Pilot Piston, stainless steel
3	Screw, plated steel
4	Nipple, plated steel
5	Actuator Cap, steel
6	Snap Ring, stainless steel
7	O-Ring, nitrile
8	O-Ring & Back Up, nitrile & teflon
9	Cylinder, PV - stainless steel SC - chrome plated steel
10	Piston Seal Retainer, steel
11	Back Up, teflon
12	Piston, steel
13	Nut, plated steel

Key	Description
14	Piston Rod, stainless steel
15	Cyinder Head, ductile iron
16	Screw, plated steel
17	Piston Rod Gland, ductile iron
18	Piston Rod Seal Retainer, steel
19	O-Ring, nitrile
20	Screw, plated steel
21	O-Ring, nitrile
22	"D" Slide, nylon
23	Pilot Piston Seal Retainer, steel
24	Pilot Piston Bearing, steel
25	Back Up, teflon
26	O-Ring, nitrile
27	O-Ring, nitrile

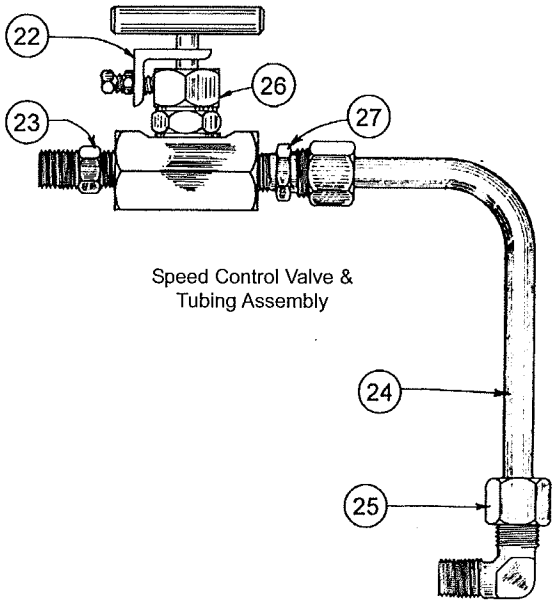
Key	Description
28	Pilot Piston Cap, ductile iron
29	Body (Pilot Piston), ductile iron
30	Body (Main Piston), ductile iron
31	"D" Slide Actuator, steel
32	O-Ring, nitrile
33	O-Ring, nitrile
34	O-Ring, nitrile
35	O-Ring, nitrile
36	O-Ring, nitrile
37	Index Pin, stainless steel
38	Main Piston Valve Housing, steel
39	Screw, plated steel
40	"D" Slide, nylon



Discharge Check Assembly



Suction Check Assembly



Speed Control Valve &
Tubing Assembly

This is a general representation of the check valve assemblies and tubing for Glycol Pump model PV & SC.
For specific parts and their orientation refer to the Kimray Catalog or the packing slip which is enclosed with each pump.

Key	Description
1	Check Valve Cap, steel
2	Screw, plated steel
3	Check Valve Block, ductile iron
4	O-Ring, nitrile
5	Removable Seat, tool steel
6	Check Valve Cap, steel
7	O-Ring, nitrile
8	Check Valve Dart, stainless steel
9	O-Ring, nitrile
10	O-Ring, nitrile
11	Check Valve Cap, steel
12	Check Valve Block, ductile iron
13	Screw, plated steel
14	O-Ring, nitrile
15	O-Ring, nitrile
16	Removable Seat, tool steel
17	Check Valve Cap, steel
18	O-Ring, nitrile
19	Check Valve Dart, stainless steel
20	O-Ring, nitrile
21	Plug, plated steel
22	Stem Lock Assembly, aluminum
23	Nipple, plated steel
24	Tubing, stainless steel
25	Ell, forged plated steel
26	Needle Valve, steel
27	Connector, plated steel

Estimated Exhaust Emissions Based On PLQNG, 1500 FASL Elevation and an average Ambient Temperature of 65 Degrees F

For Emissions Permits, please contact Ajax for emissions data based on specific site conditions

Ajax Engine Model	Emissions (Gm / Bhph)					BSFC	RPM	BHP	BMEP	Exhaust Stack						No. Of Cyl's	Bore	Stroke
	NOx	CO	HCT	NMHC	CH2O					Dia. (in.)	Height (in.)	Temp (Deg.F)	Flow (acfm)	Flow (lb/m)	Velocity (ft/m)			
DPC-230	4.4	2.4	12.7	1.8	0.3	8700	360	221	55.0	12	190	440	1730	71	2203	2	13.25	16
DPC-230 LE	2.0	2.2	7.7	1.3	0.3	8100	360	221	55.0	12	190	400	1670	72	2126	2	13.25	16
DPC-280	11.4	1.3	6.8	1.2	0.3	8200	400	269	60.3	12	190	470	2030	80	2585	2	13.25	16
DPC-280 LE	2.0	1.4	5.5	1.1	0.3	7800	400	269	60.3	12	190	450	1990	81	2534	2	13.25	16
DPC-300	4.1	1.9	16.0	2.2	0.3	8700	360	288	56.0	13.25	260	435	2210	91	2308	2	15	16
DPC-300 LE	2.0	1.6	8.8	1.4	0.3	8200	360	288	56.0	13.25	260	435	2230	92	2329	2	15	16
DPC-360	6.3	1.4	14.6	2.1	0.3	8400	400	346	60.5	13.25	260	480	2630	103	2747	2	15	16
DPC-360 LE	2.0	1.1	6.4	1.2	0.3	7900	400	346	60.5	13.25	260	480	2690	105	2809	2	15	16
DPC-450 LE	2.7	1.2	6.0	1.1	0.3	7800	400	432	64.6	17.25	190	500	3220	124	1984	3	13.25	16
DPC-540	8.6	1.3	12.3	1.4	0.3	8300	400	540	63.0	17.25	303	465	3890	155	2397	3	15	16
DPC-540 LE	2.0	1.0	6.0	1.1	0.3	7800	400	540	63.0	17.25	303	465	3970	158	2446	3	15	16
DPC-600	13.0	1.2	8.5	1.6	0.3	8200	400	576	67.2	17.25	303	515	4110	155	2532	3	15	16
DPC-600 LE	6.5	0.9	5.9	1.1	0.3	7800	400	576	67.2	17.25	303	515	4190	158	2582	3	15	16
DPC-720	9.5	1.3	9.0	1.8	0.3	8300	400	720	63.0	17.25	241	465	5190	207	3198	4	15	16
DPC-720 LE	2.0	1.0	6.0	1.1	0.3	7800	400	720	63.0	17.25	241	465	5300	211	3266	4	15	16
DPC-800	13.0	1.2	8.5	1.8	0.3	8200	400	768	67.2	17.25	241	515	5480	207	3377	4	15	16
DPC-800 LE	6.5	1.0	5.9	1.1	0.3	7800	400	768	67.2	17.25	241	515	5590	211	3444	4	15	16
DPC-2201	10.0	1.3	5.5	1.1	0.3	8000	440	148	60.4	12	190	490	1160	45	1477	1	13.25	16
DPC-2201 LE	2.0	1.4	5.4	1.2	0.3	7800	440	148	60.4	12	190	490	1200	47	1528	1	13.25	16
DPC-2202	10.0	1.3	5.5	1.1	0.3	8000	440	296	60.4	12	190	470	2280	90	2903	2	13.25	16
DPC-2202 LE	2.0	1.4	5.4	1.2	0.3	7800	440	296	60.4	12	190	470	2350	93	2992	2	13.25	16
DPC-2801	5.5	1.4	10.5	1.7	0.3	8200	440	192	61.1	13.25	256	460	1450	58	1514	1	15	16
DPC-2801 LE	2.0	1.2	6.1	1.2	0.3	7800	440	192	61.1	13.25	256	460	1490	60	1556	1	15	16
DPC-2802	5.5	1.3	10.5	1.7	0.3	8200	440	422	70.1	13.25	260	465	2910	116	3039	2	15	16
DPC-2802 LE	2.0	1.2	6.1	1.2	0.3	7800	440	384	61.1	13.25	260	465	3000	119	3133	2	15	16
DPC-2802 LE*	2.0	1.2	6.1	1.2	0.3	7800	440	384	61.1	14.13	260	465	3000	119	2757	2	15	16
DPC-2803	12.0	1.2	9.9	1.6	0.3	8000	440	634	67.3	17.25	303	465	4380	174	2699	3	15	16
DPC-2803 LE	2.0	1.2	6.1	1.2	0.3	7800	440	600	63.7	17.25	241	515	4740	179	2921	3	15	16
DPC-2804	12.0	1.2	9.9	1.6	0.3	8000	440	845	67.2	17.25	241	465	5840	233	3598	4	15	16
DPC-2804 LE	2.0	1.2	6.1	1.2	0.3	7800	440	800	63.7	17.25	241	515	6320	239	3894	4	15	16

Site Altitude = 0 - 1500 FASL Date: August 2004

Site Fuel Composition = Pipeline Quality Natural Gas (PLQNG)

Ambient Temp For Defining Maximum Load = 100 Deg F

Ambient Temp For Defining Exhaust Emissions = 65 Deg F

NOx = Nitrogen Oxide

CO = Carbon Monoxide

HCT = Total Unburned Hydrocarbons

NMHC= Non-Methane Hydrocarbons

CH2O = Formaldehyde

FASL = Feet Above Sea Level

ACFM = Actual Cubic Feet Per Minute

BMEP = Brake Mean Effective Pressure

BSFC = Brake Specific Fuel Consumption

The above emissions and performance data is contingent on:

1.) Engine must be maintained in good working order.

2.) Engine modifications or upgrades from the original factory configuration must meet Ajax specifications and installation guidelines.

3.) Engine operating parameters must be consistent with those specified in the Ajax manual.

* = DPC-2802LE Tilt Muffler Package

Fuel Composition (PLQNG):

Compound	Formula	% Volume
Nitrogen	N2	0.72
Carbon Dioxide	CO2	1.14
Methane	CH4	92.84
Ethane	C2H6	4.10
Propane	C3H8	1.20
	Total Volume % =	100.00

Prepared By: Bruce Chrisman, (405) 619-5058

Email: chrismanb@ccc-ces.com

global environmental solutions

Putnam B6 Compressor Station

Cranberry Pipeline Corporation

Glasgow District, West Virginia

Pressurized Separator Sampling and Emissions Estimation Report

SLR Ref: 116.00400.00064

August 2013

Pressurized Separator Sampling and Emissions Estimation Report

Prepared for:

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East
Suite 1500
Charleston, West Virginia 25301

This document has been prepared by SLR International Corporation. The material and data in this report were prepared under the supervision and direction of the undersigned.

Nathaniel Lanham
Senior Environmental Specialist

Fuad Wadud, P.E.
Senior Engineer

CONTENTS

1. INTRODUCTION

On April 25, 2013 SLR International Corporation (SLR) oversaw Fesco Petroleum Engineers (Fesco) perform pressurized tank sampling per GPA-2186 methodology at Putnam B6 to collect samples which could be analyzed to estimate emissions for Volatile Organic Compounds (VOCs) and Hazardous Air Pollutants (HAPs) being emitted from liquid hydrocarbon storage vessels. The analysis of information gathered was performed by Fesco per GPA Method 2286-95. Liquid hydrocarbon samples are taken from the last pressurized vessel prior to atmospheric storage vessels to determine the concentrations of dissolved volatile gases which will flash off the liquid and be emitted from the hydrocarbon storage vessel. The storage vessel's emissions are estimated using the American Petroleum Institute model E&P TANK 3.0, which incorporates specific input parameters for storage vessels and pressurized liquid analysis results. This report provides a summary that demonstrates compliance or applicability with 40 CFR 60 Subpart OOOO.

1.1 APPLICABILITY AND DESIGNATION OF AFFECTED SOURCE

A pressurized liquid sample was taken from the Pre-Dehy Separator (SP-1) to model flash emissions from Drip Tank (T-01) at Putnam B6 Compressor Station for determination of emissions under 40 CFR 60 Subpart OOOO.

40 CFR 60 Subpart OOOO

New, re-constructed, and/or modified hydrocarbon storage vessels installed after August 23, 2011 at oil and natural gas production, natural gas processing, or natural gas transmission and storage facilities, with actual emissions of 6 tons per year (tpy) or greater of VOC emissions, are subject to the Subpart OOOO, *Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution.*

Drip Tank T-01 was installed before the applicability date of this regulation. However, this tank was pre-selected to evaluate the VOC emissions and compare the emissions with the applicability threshold. The standard of storage vessel applicable to this subpart is provided below.

> *40CFR§6.5395(a)(1) and (2)*
> *For each storage vessel affected facility emitting more than 6 tpy VOC, you must reduce emissions by 95 percent or greater.*

1.2 SAMPLE COLLECTION & ANALYSIS FREQUENCY

The pressurized hydrocarbon liquid sample was taken from Pre-Dehy Separator (SP-1) on April 25, 2013 by Fesco. Nathaniel Lanham from SLR oversaw the sample collection. The sample lab analysis report provided by Fesco is included in Appendix A.

The West Virginia Department of Environment Protection (WVDEP) – Division of Air Quality (DAQ) defines a representative pressurized separator sample to be one that is characteristic of the average liquid composition found in the annual throughout. If an isolated sample is not indicative of the annual average composition, then a company may opt to produce a weighted average based on throughput between multiple sampling events, which can be used to define a more representative average annual liquid composition profile.

For Drip Tank (T-01) at Putnam B6 Compressor Station, a one-time sample collection and modeling determination is sufficient for the tank emission modeling because the hydrocarbon production stream parameters do not vary greatly on a short-term basis. Re-analysis would be recommended should there be a major event which may change the characterization of the production stream.

2. PARAMETERS

The following input parameters were obtained from the Fesco laboratory report and used in the E&P TANK model run:

1. Days of operation per year; 365
2. Separator temperature; 60.00 °F
3. Separator pressure; 28.00 PSIG
4. Ambient temperature; 70.00 °F
5. Ambient pressure; 14.65 PSIG
6. API Gravity of Sample; 33.29
7. Bulk Tank Temperature; 60.00 °F
8. No control device

The following input parameters were provided by Cabot Oil & Gas Corporation:

- Worst Case Production Rate of Tank Volume/Throughput; 5.0 Barrels per day

Supporting documentation provided by Cabot Oil & Gas Corporation is included in Appendix B.

The following default assumptions were made:

- Reid Vapor Pressure is 7.70 psia

3. CALCULATION OF EMISSIONS

Emissions from the Putnam B6 Compressor Station were derived using a software based program called E&P TANK 3.0. The parameters outlined in Section 2 along with laboratory results from the separator sample taken on April 25, 2013 are entered into the program and the software calculates the estimated flash gas emission rates. The E&P TANK output file for the Drip Tank (T0-1) is included in Appendix C.

Listed below, in Table 3.1, are actual emissions as calculated by E&P TANK 3.0.

Table 3.1. Actual Emissions for Drip Tank T0-1

POLLUTANT	EMISSION RATE (LB/HR)	EMISSION RATE (TPY)
VOC	0.194	0.852
Benzene	0.000	0.000
Hexane	0.001	0.004
Toluene	0.000	0.000
Xylenes	0.000	0.000
Ethylbenzene	0.000	0.000
Total HAPs	0.000	0.000

4. COMPARISON TO EMISSION LIMIT AND THRESHOLD

The attached E&P TANK 3.0 Report was calculated using recorded and client-supplied operating parameters. Tank T-01 does not emit VOCs equal to or in excess of 6TPY; therefore, 40CFR 60 Subpart OOOO does not apply to this hydrocarbon liquid vessel. The following table, Table 4.1, shows the comparison of generated VOCs to the VOC threshold as defined in 40 CFR 60.5415. The generated rate falls within the designated threshold.

Table 4.1. VOC Emissions Comparison

POLLUTANT	EMISSION RATE (TPY)	EMISSION THRESHOLD (TPY)
VOC	0.852	6.0

APPENDIX A

GPA METHOD 2286 LABORATORY RESULTS

Pressurized Separator Sampling and Emissions Estimation Report

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East
Suite 1500
Charleston, West Virginia 25301

August 2013

May 22, 2013

FESCO, Ltd.
1100 FESCO Avenue - Alice, Texas 78332

For: SLR International Corporation
900 Lee Street, Suite 200
Charleston, West Virginia 25301

Sample: Cabot Oil & Gas - Puttman B6
Separator Hydrocarbon Liquid
Sampled @ 28 psig & 60 °F

Date Sampled: 04/25/13 Job Number: 33213.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.019	0.002	0.002
Carbon Dioxide	0.044	0.007	0.007
Methane	1.228	0.194	0.068
Ethane	1.343	0.335	0.139
Propane	1.724	0.443	0.262
Isobutane	0.292	0.089	0.058
n-Butane	1.395	0.410	0.279
2,2 Dimethylpropane	0.048	0.017	0.012
Isopentane	0.610	0.208	0.151
n-Pentane	0.932	0.315	0.231
2,2 Dimethylbutane	0.012	0.005	0.003
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.120	0.046	0.036
2 Methylpentane	0.457	0.177	0.136
3 Methylpentane	0.283	0.108	0.084
n-Hexane	0.940	0.360	0.279
Heptanes Plus	90.554	97.285	98.254
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity	0.8672	(Water=1)
°API Gravity	31.66	@ 60°F
Molecular Weight	315.3	
Vapor Volume	8.73	CF/Gal
Weight	7.23	Lbs/Gal

Characteristics of Total Sample:

Specific Gravity	0.8587	(Water=1)
°API Gravity	33.29	@ 60°F
Molecular Weight	290.6	
Vapor Volume	9.38	CF/Gal
Weight	7.15	Lbs/Gal

Base Conditions: 14.650 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: JCM
Processor: Aldjv
Cylinder ID: W-1109

David Dannhaus 361-661-7015

TOTAL EXTENDED REPORT

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.019	0.002	0.002
Carbon Dioxide	0.044	0.007	0.007
Methane	1.228	0.194	0.068
Ethane	1.343	0.335	0.139
Propane	1.724	0.443	0.262
Isobutane	0.292	0.089	0.058
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2,2 Dimethylpropane	0.048	0.017	0.012
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Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.120	0.046	0.036
2 Methylpentane	0.457	0.177	0.136
3 Methylpentane	0.283	0.108	0.084
n-Hexane	0.940	0.360	0.279
Methylcyclopentane	0.528	0.174	0.153
Benzene	0.054	0.014	0.015
Cyclohexane	0.519	0.165	0.150
2-Methylhexane	0.418	0.181	0.144
3-Methylhexane	0.379	0.162	0.131
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	0.550	0.226	0.188
n-Heptane	1.093	0.470	0.377
Methylcyclohexane	1.528	0.573	0.516
Toluene	0.251	0.079	0.080
Other C-8's	2.887	1.279	1.095
n-Octane	1.425	0.681	0.560
E-Benzene	0.220	0.079	0.080
M & P Xylenes	0.586	0.212	0.214
O-Xylene	0.471	0.167	0.172
Other C-9's	2.953	1.461	1.283
n-Nonane	1.635	0.858	0.722
Other C-10's	4.741	2.578	2.305
n-decane	1.254	0.718	0.614
Undecanes(11)	5.356	2.989	2.710
Dodecanes(12)	5.045	3.041	2.795
Tridecanes(13)	4.918	3.178	2.962
Tetradecanes(14)	4.334	3.000	2.834
Pentadecanes(15)	3.784	2.806	2.682
Hexadecanes(16)	3.075	2.437	2.350
Heptadecanes(17)	2.764	2.316	2.254
Octadecanes(18)	2.683	2.367	2.317
Nonadecanes(19)	2.474	2.274	2.239
Eicosanes(20)	2.166	2.069	2.050
Heneicosanes(21)	1.881	1.891	1.884
Docosanes(22)	1.954	2.047	2.051
Tricosanes(23)	1.593	1.729	1.743
Tetracosanes(24)	1.905	2.143	2.170
Pentacosanes(25)	1.406	1.641	1.669
Hexacosanes(26)	1.487	1.799	1.838
Heptacosanes(27)	1.631	2.046	2.099
Octacosanes(28)	1.481	1.920	1.977
Nonacosanes(29)	1.181	1.581	1.634
Triacontanes(30)	1.004	1.386	1.437
Hentriacontanes Plus(31+)	16.940	42.546	45.761
Total	100.000	100.000	100.000

Cabot Oil & Gas - Poca Coal No. 6 Condensate Tank -T-001.

Component	Carbon Numer	*Results (Mol%)*	Inputs to E&P Tanks
CO2		0.0440	**0.0440**
O2		0.0000	**0.0000**
H2S		0.0000	**0.0000**
Nitrogen		0.0190	**0.0190**
Methane	C1	1.2280	**1.2280**
Ethane	C2	1.3430	**1.3430**
Propane	C3	1.7240	**1.7240**
iso-Butane	C4H10	0.2920	**0.2920**
n-Butane	C4H10	1.3950	**1.3950**
Iso-Pentane	C5H12	0.6100	**0.6100**
n-Pentane	C5H12	0.9320	**0.9320**
n-Hexane	C6H14	**0.9400**	**0.9400**
Cyclohexane	C6H12	0.5190	**1.9190**
Hexanes	C6H14	**1.4000**	
Heptanes	C7H16	2.4400	**3.9680**
Methylcyclohexane	C7H14	1.5280	
2,2,4- Trimethylpentane	C8H18	0.0000	**0.0000**
Benzene	C6H6	**0.0540**	**0.0540**
Toluene	C7H8	**0.2510**	**0.2510**
Ethylbenzene	C8H10	**0.2200**	**0.2200**
Xylenes (listed below)	C8H10	**1.0570**	**1.0570**
m/p- Xylene	C8H10	0.5860	
o- Xylene	C8H10	0.4710	
C8 Heavies (listed below)		4.3120	**4.3120**
Octanes	C8H18	1.4250	
Other C-8's	C8	2.8870	
C9 Heavies (listed below)		4.5880	**4.5880**
Nonanes		1.6350	
Other C-9's	C9	2.9530	
Sum Total (C1 through C9)		24.8960	
All Other components	C+10	75.1040	75.1040
	TOTAL	100.0000	100.0000

Hexanes	Liq. Vol/ %
2, 2 Dimethylbutane	**0.012**
2, 3 Dimethylbutane	**0.12**
2 Methylpentane	**0.457**
3 Methylpentane	**0.283**
Methylcyclopentane	**0.528**

Heptanes	Liq. Vol/ %
2-methylhexane	0.418
3-methylhexane	0.379
n-Heptane	1.093
Other C-7's	0.55

APPENDIX B

OPERATIONAL DATA AND SUPPORTING DOCUMENTS

(Tank throughput not provided)

Pressurized Separator Sampling and Emissions Estimation Report

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East
Suite 1500
Charleston, West Virginia 25301

August 2013

APPENDIX C

E&P TANKS VERSION 3.0 EMISSION ESTIMATE

Pressurized Separator Sampling and Emissions Estimation Report

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation
900 Lee Street East
Suite 1500
Charleston, West Virginia 25301

August 2013

```
*****************************************************************************************
******
*     Project Setup Information
    *
*****************************************************************************************
******
Project File              : N:\West Virginia\Cabot\Projects\2013\Testing
Sampling\Tank Sampling\April 2013\Poca Coal No. 6  4-25-13 - Tanks Sampling\APPENDIX
C - Poca Coal 6.ept
Flowsheet Selection       : Oil Tank with Separator
Calculation Method        : AP42
Control Efficiency        : 100.0%
Known Separator Stream    : Low Pressure Oil
Entering Air Composition  : No

Date                      : 2013.07.23


*****************************************************************************************
******
*     Data Input
    *
*****************************************************************************************
******

Separator Pressure        : 28.00[psig]
Separator Temperature     : 60.00[F]
Ambient Pressure          : 14.70[psia]
Ambient Temperature       : 70.00[F]
C10+ SG                   : 0.8672
C10+ MW                   : 315.30

-- Low Pressure Oil
-------------------------------------------------------------------------
   No.    Component            mol %
   1      H2S                  0.0000
   2      O2                   0.0000
   3      CO2                  0.0440
   4      N2                   0.0190
   5      C1                   1.2280
   6      C2                   1.3430
   7      C3                   1.7240
   8      i-C4                 0.2920
   9      n-C4                 1.3950
   10     i-C5                 0.6100
   11     n-C5                 0.9800
   12     C6                   1.9190
   13     C7                   3.9680
   14     C8                   4.3120
   15     C9                   4.5880
   16     C10+                75.0560
   17     Benzene              0.0540
   18     Toluene              0.2510
   19     E-Benzene            0.2200
   20     Xylenes              1.0570
   21     n-C6                 0.9400
   22     224Trimethylp        0.0000

-- Sales Oil
-------------------------------------------------------------------------
Production Rate           : 5[bbl/day]
Days of Annual Operation  : 365 [days/year]
```

API Gravity : 33.29
Reid Vapor Pressure : 7.70[psia]
Bulk Temperature : 60.00[F]

-- Tank and Shell Data

Diameter : 6.00[ft]
Shell Height : 11.50[ft]
Cone Roof Slope : 0.06
Average Liquid Height : 8.00[ft]
Vent Pressure Range : 0.06[psi]
Solar Absorbance : 0.17

-- Meteorological Data

City : Charleston, WV
Page 1---------- E&P TANK

Ambient Pressure : 14.70[psia]
Ambient Temperature : 70.00[F]
Min Ambient Temperature : 44.00[F]
Max Ambient Temperature : 65.50[F]
Total Solar Insolation : 1123.00[Btu/ft^2*day]

****
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* Calculation Results
*
****
******

-- Emission Summary

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
Total HAPs	0.000	0.000
Total HC	0.717	0.164
VOCs, C2+	0.536	0.122
VOCs, C3+	0.316	0.072

Uncontrolled Recovery Info.

Vapor	52.5300 x1E-3	[MSCFD]
HC Vapor	51.5000 x1E-3	[MSCFD]
GOR	10.51	[SCF/bbl]

-- Emission Composition

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
1	H2S	0.000	0.000
2	O2	0.000	0.000
3	CO2	0.014	0.003
4	N2	0.005	0.001
5	C1	0.181	0.041
6	C2	0.220	0.050
7	C3	0.182	0.042
8	i-C4	0.018	0.004
9	n-C4	0.062	0.014
10	i-C5	0.013	0.003
11	n-C5	0.015	0.003
12	C6	0.009	0.002

13	C7	0.007	0.002
14	C8	0.003	0.001
15	C9	0.001	0.000
16	C10+	0.000	0.000
17	Benzene	0.000	0.000
18	Toluene	0.000	0.000
19	E-Benzene	0.000	0.000
20	Xylenes	0.000	0.000
21	n-C6	0.004	0.001
22	224Trimethylp	0.000	0.000
	Total	0.734	0.168

-- Stream Data

No.	Component	MW	LP Oil	Flash Oil	Sale Oil	Flash Gas	W&S Gas	Total Emissions
			mol %	mol %	mol %	mol %	mol %	mol %
1	H2S	34.80	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	O2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	CO2	44.01	0.0440	0.0187	0.0123	1.1961	1.3910	1.2143
4	N2	28.01	0.0190	0.0014	0.0000	0.8212	0.0005	0.7447
5	C1	16.04	1.2280	0.2362	0.0545	46.3174	29.1183	44.7149
6	C2	30.07	1.3430	0.7543	0.5963	28.1077	36.5488	28.8942
7	C3	44.10	1.7240	1.4153	1.3282	15.7583	22.1847	16.3571
8	i-C4	58.12	0.2920	0.2727	0.2671	1.1707	1.6499	1.2154
9	n-C4	58.12	1.3950	1.3365	1.3192	4.0547	5.6824	4.2063
10	i-C5	72.15	0.6100	0.6084	0.6075	0.6818	0.9360	0.7054
11	n-C5	72.15	0.9800	0.9835	0.9837	0.8200	1.1143	0.8474
12	C6	86.16	1.9190	1.9517	1.9589	0.4339	0.5689	0.4464
13	C7	100.20	3.9680	4.0488	4.0671	0.2966	0.3757	0.3040
14	C8	114.23	4.3120	4.4046	4.4258	0.1008	0.1231	0.1029

15	C9	128.28	4.5880	4.6881	4.7110	0.0367	0.0433	0.0373
16	C10+	315.30	75.0560	76.7069	77.0841	0.0000	0.0000	0.0000
17	Benzene	78.11	0.0540	0.0550	0.0552	0.0091	0.0119	0.0094
18	Toluene	92.13	0.2510	0.2563	0.2575	0.0118	0.0149	0.0121
19	E-Benzene	106.17	0.2200	0.2248	0.2259	0.0034	0.0041	0.0034
20	Xylenes	106.17	1.0570	1.0799	1.0852	0.0141	0.0170	0.0143
21	n-C6	86.18	0.9400	0.9570	0.9608	0.1658	0.2153	0.1704
22	224Trimethylp	114.24	0.0000	0.0000	0.0000	0.0000	0.0000	

0.0000						
MW		258.27	263.32	263.94	28.70	33.06
29.10						
Stream Mole Ratio		1.0000	0.9785	0.9763	0.0215	0.0022
0.0237						
Heating Value	[BTU/SCF]				1647.41	1890.56
1670.06						
Gas Gravity	[Gas/Air]				0.99	1.14
1.00						
Bubble Pt. @ 100F	[psia]	57.57	18.33	10.94		
RVP @ 100F	[psia]	65.45	37.28	30.77		
Spec. Gravity @ 100F		0.721	0.722	0.722		