EXCO Resources (PA), LLC

G35-C General Permit
Application for Permit to Construct
Green Hills Compressor Station

Ravenswood, West Virginia

Prepared By:

ENVIRONMENTAL RESOURCES MANAGEMENT, Inc.
Hurricane, West Virginia

September 2016

EXCO Resources (PA), LLC
260 Executive Drive, Suite 100, Cranberry Township, PA 16066
Phone: (724) 720-2500

EXCO Resources (PA), LLC

September 26, 2016

Mr. William F. Durham, Director
West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street, SE
Charleston, West Virginia, 25304

RE: G35-C General Permit Registration Application
EXCO Resources (PA) LLC
Green Hills Compressor Station

Dear Director Durham:

Enclosed are one (1) original hard copy and two (2) complete PDFs included on CD-ROM of a G35-C General Permit Registration Application for the Green Hills Compressor Station. A legal advertisement will be published in the next few days and proof of publication will be forwarded as soon as it is received. Please contact me for payment of the application fee by credit card.

If you have any questions concerning this permit application, please contact me at (972) 201 - 0658 or by email at ccannon@EXCOResources.com.

Sincerely,

Cary Cannon, P.E., CSP
Regulatory and Environmental Affairs Director

Enclosures

INTRODUCTION

EXCO Resources (PA), LLC (EXCO) submits this application for registration under the G35-C General Permit to the West Virginia Department of Air Quality for the Green Hills Compressor Station located in Jackson County, West Virginia.

The facility currently operates under general permit registration G35-A008A, issued in November of 2012. In 2012, EXCO filed for a G35-A permit registration update to authorize the construction of a CAT 3508LE compressor engine. At that time, the WVDAQ reviewed and issued the general permit, G35-A008A. Prior to the 2012 submittal, EXCO had the authority to operate the CAT3508TALE compressor engine under G35-A008.

Based upon a change in market conditions, EXCO decided not to execute the capital expenditure project that included the installation of the CAT 3508LE. For this reason, the current registration under G35-A008A reflects the operation of a unit that did not commence construction.

EXCO submits this application for registration to update the compressor engine currently included in the G35-A008A registration. Also included with this submittal is an update to the capacity of the dehydration unit. Since the G35-C is now the appropriate general permit for this facility, EXCO understands that WVDAQ will replace the existing permit registration with a new registration consistent with G35-C. Therefore, for completeness, appropriate details are being provided in this application for all the emissions sources at the site.

FACILITY DESCRIPTION

The Green Hills Compressor Station (Station) qualifies as a production compression facility. The facility receives gas from nearby well sites and provides compression and dehydration of the gas.

The Green Hills Compressor Station has the authority to operate the following equipment under G35-A008A:

- One (1) CAT G3508LE Compressor Engine;
- One (1) 4.0 MMSCFD Exterran Glycol Dehydration Still Vent;
- One (1) 0.5 MMBTU/hr Hanover Glycol Dehydration Unit Reboiler;
- Two (2) 8,519 gallon Condensate Storage Tanks;
- One (1) 4,033 gallon Process Liquids Tank; and
- One (1) 500 gallon Lube Oil Storage Tank.

The proposed modification updates the manufacturer make and model of the compressor engine operated at the Green Hills Compressor Station and the sizing of the dehydration unit. EXCO is seeking an update to the registration to reflect the operation of the following:

- One (1) CAT 3508TALE Compressor Engine; and
- One (1) 3.0 MMSCFD Exterran Glycol Dehydration Still Vent.

A process flow diagram is included in this application in Attachment D.

SOURCE AGGREGATION

The Green Hills Compressor Station is located in Jackson County, WV and operated by EXCO Resources (PA), LLC. Stationary sources of air pollutants may require aggregation of total emission levels if these sources share the same industrial grouping, are operating under common control, and are classified as contiguous or adjacent properties. EXCO operates Green Hills with the same industrial grouping as nearby facilities, and some of these facilities are under common control. EXCO, however, is not subject to the aggregation of stationary emission sources because these sites do not meet the definition of contiguous or adjacent facilities.

The Green Hills Station will operate under SIC code 1311 (Crude Petroleum and Natural Gas Extraction). There are surrounding wells and compressor stations operated by EXCO that share the same two-digit major SIC code of 13 for Crude Petroleum and Natural Gas Extraction. Therefore, the Green Hills Station does share the same SIC codes as the surrounding wells and compressor stations.

EXCO is the sole operator of the Green Hills Station. EXCO is also the sole operator of other production sites and compressor stations in the area. Therefore, EXCO does qualify as having nearby operations under common control.

There are no EXCO owned or operated sites within a 1/4 mile radius of the Green Hills Station. Nearby sites do not meet the definition of contiguous or adjacent properties since they are not in contact and do not share a common boundary. Operations conducted at the Green Hills Station do not rely on or interact with other sites. Furthermore, operations separated by this distance do not meet the common sense notion of a "plant."

On June 3, 2016 the EPA Administrator published the *Source Determination for Certain Emission Units in the Oil and Natural Gas Sector*. This notice clarifies how properties in the oil and natural gas sector are determined to be adjacent in order to assist permitting authorities and permit applicants in making consistent

source determinations. The following regulatory text defines "adjacent" for the oil and gas sector in terms of proximity.

> *Pollutant emitting activities shall be considered adjacent if they are located on the same surface site, or on surface sites that are located within ¼ mile of one another.*

Nearby EXCO facilities are located on surface sites located greater than EPA's ¼ mile ruling.

Based on the above reasoning, EXCO is not subject to the aggregation of stationary emission sources since the stationary sources are not considered contiguous or adjacent facilities.

REGULATORY DISCUSSION

This section outlines the State air quality regulations that could be reasonably expected to apply to the Green Hills Compressor Station and makes an applicability determination for each regulation based on activities conducted at the Station and the emissions of regulated air pollutants associated with this project. This review is presented to supplement and/or add clarification to the information provided in the WVDAQ permit modification forms.

The West Virginia State Regulations address federal regulations, including Prevention of Significant Deterioration permitting, Title V permitting, New Source Performance Standards, and National Emission Standards for Hazardous Air Pollutants. The regulatory requirements in reference to the Green Hills Compressor Station are described in detail in the below section.

WEST VIRGINIA STATE AIR REGULATIONS

45 CSR 02 – To Prevent and Control Particulate Air Pollution From Combustion of Fuel in Indirect Heat Exchangers

The reboiler proposed in this application is an indirect heat exchanger that combusts natural gas. However, it is exempt from this regulation since the heat input capacity is less than 10 MMBtu/hr.

45 CSR 04 – To Prevent and Control the Discharge of Air Pollutants into the Air Which Causes or Contributes to an Objectionable Odor

Operations conducted at the Green Hills Compressor Station are subject to this requirement. Based on the nature of the process at the compressor station, the

presence of objectionable odors is unlikely and this project is not expected to impact the ability to comply with 45 CSR 04.

45 CSR 06 – Control of Air Pollution from the Combustion of Refuse

EXCO does not operate any equipment that combusts refuse and therefore is not subject to the requirements of this Rule.

45 CSR 10 – To Prevent and Control Air Pollution From the Emission of Sulfur Oxides

The reboiler is an indirect heat exchanger that combusts natural gas but is exempt from this regulation since the heat input capacity is less than 10 MMBtu/hr.

45 CSR 13 – Permits for Construction, Modification, Relocation And Operation of Stationary Sources of Air Pollutants

EXCO submits this application for a general permit registration to the WVDAQ to seek authorization for the operation of equipment at the Green Hills Compressor Station.

45 CSR 14 – Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration

The G35-C applicability criterion excludes facilities that meet the definition of a major source as defined in 45 CSR 19 for being eligible for the general permit.

45 CSR 16 - Standards of Performance for New Stationary Sources (NSPS)

45 CSR 16 applies to all registrants that are subject to any of the NSPS requirements codified in 40 CFR 60. A discussion of NSPS that could be reasonably anticipated to apply at the Station is provided in the Federal Regulatory Discussion.

45 CSR 19 – Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution which Cause or Contributed to Non-attainment

The G35-C applicability criterion excludes facilities that meet the definition of a major source as defined in 45 CSR 19 for being eligible for the general permit.

45 CSR 25 – Control of Air Pollution from Hazardous Waste Treatment, Storage, and Disposal Facilities

This Site does not qualify as a waste treatment, storage, and disposal facility and no hazardous waste will be burned at this Site; therefore, it is not subject to this hazardous waste rule.

45 CSR 30 – Requirements for Operating Permits

45 CSR 30 applies to the requirements of the federal Title V operating permit program (40 CFR 70). The major source thresholds with respect to the West Virginia Title V operating permit program regulations are 10 tons per year (tpy) of a single HAP, 25 tpy of combined HAPs, and 100 tpy of other regulated pollutants.

The potential emissions of regulated pollutants are below the corresponding threshold(s) at this facility after the proposed project. Therefore, the Station is not a major source for Title V purposes.

45 CSR 34 – National Emission Standards for Hazardous Air Pollutants (NESHAP)

45 CSR 34 applies to all registrants that are subject to any of the NESHAP requirements. A discussion of NESHAP that could be reasonably anticipated to apply to the Green Hills Compressor Station are provided in the Federal Regulatory Discussion.

FEDERAL REGULATIONS

40 CFR 60 Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines).

The New Source Performance Standards (NSPS) for spark ignition reciprocating internal combustion engines (RICE) are codified in 40 CFR 60 Subpart JJJJ. Four stroke lean burn engines that were manufactured after January 1, 2008 are subject to the standards of this Rule. With a manufacturer date of March 2007, the CAT G3508TALE (CE-1) does not qualify as a new source that would be subject to 40 CFR 60 Subpart JJJJ.

40 CFR 60, Subpart OOOO and 40 CFR 60, Subpart OOOOa (Standards of Performance for Crude oil and Natural Gas Production, Transmission and Distribution)

Subpart OOOO establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide (SO_2) emissions from certain affected facilities that commence construction, modification or reconstruction between August 23, 2011 and September 17, 2015. Subpart OOOOa establishes emission standards and compliance schedules for the control of VOCs and Greenhouse Gases (GHGs) from certain affected facilities that commence construction, modification, or reconstruction after September 18, 2015.

The CAT G3508TALE Compressor Engine included within this application for registration is an existing unit currently operating at the Green Hills Compressor Station and commenced construction prior to August 23, 2011. Green Hills does

not qualify as a reciprocating engine affected facility under NSPS Subpart OOOO. The Green Hills Compressor Station could become subject to NSPS OOOOa if the existing compressor engine were replaced with a unit that resulted in an increase to the total bhp of compression at the Site. NSPS OOOOa is not applicable to Green Hills since the installation occurred prior to the applicability date of the Rule.

40 CFR 63 Subpart HH (National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities).

An area source of HAPs is defined as a facility that has a PTE of less than 10 tons per year of any single HAP, and less than 25 tpy of aggregate HAPs. The Green Hills Compressor Station has been determined to be an area source of HAPs, based upon the current permit and an evaluation of site-wide PTEs. For this reason, the Green Hills Compressor Station qualifies as an area source facility that operates a 40 CFR 63 Section HH affected source, the dehydration unit.

The sizing of the dehydration unit has been updated with this submittal to 3.0 MMSCFD based upon the maximum natural gas throughput of the Green Hills facility. §63.764(e)(1)(i) states that dehydration units with an actual annual average flowrate of natural gas less than 85 thousand standard cubic meters per day are exempt from the requirements of the Rule, except for tracking the actual annual natural gas throughput to demonstrate qualification for the exemption. Green Hills satisfies this exemption since 85 thousand standard cubic meters is greater than the site capacity of 3.0 MMSCFD. Furthermore, based upon facility records and expected volume of compression, the actual throughput that the exemption is based upon will be well below the maximum allowable throughput of 3.0 MMSCFD. Records of actual natural gas throughput will be kept pursuant to §63.774(d)(1).

40CFR63 Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines)

The National Emission Standards for Hazardous Air Pollutants (NESHAP) for RICE engines are codified in 40 CFR 63 Subpart ZZZZ. NESHAP ZZZZ classifies engines as "new" and "existing" engines. Under this Rule, engines that were manufactured or modified/reconstructed prior to June 6, 2012 qualify as existing engines. Engines constructed or modified/reconstructed after this date qualify as new stationary engines. New stationary engines comply with the requirements of the NESHAP Rule by complying with the requirements of the applicable NSPS Rule (40 CFR §63.6590(c)).

The CAT 3508TALE compressor engine was manufactured on March 7, 2007 and has not been modified or reconstructed. This engine qualifies as a new stationary RICE under 40 CFR 63 ZZZZ, since it was manufactured after June 6, 2012 and has not been modified or reconstructed.

In an October 19, 2010 memo from Melanie King of the USEPA Office of Air Quality Planning and Standards Energy Strategies Group, Ms. King states that there are some engines that fall into a window where they would not have any requirements under either 40CFR60 Subpart JJJJ or 40CFR63 Subpart ZZZZ. The CAT 3508TALE qualifies as one of these engines, since it qualifies as a new engine under the NESHAP Rule but does not meet the applicability criteria for the NSPS Rule.

west virginia department of environmental protection

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

G35-C GENERAL PERMIT REGISTRATION APPLICATION

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

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

SECTION 1. GENERAL INFORMATION

Name of Applicant (as registered with the WV Secretary of State's Office): **EXCO Resources (PA), LLC**

Federal Employer ID No. (FEIN): **03-54-03500047**

Applicant's Mailing Address: **260 Executive Drive, Suite 100**

City: **Cranberry Township**	State: **PA**	ZIP Code: **16066**

Facility Name: **Green Hills Compressor Station**

Operating Site Physical Address:
If none available, list road, city or town and zip of facility.

City: **Ravenswood**	Zip Code: **26164**	County: **Jackson**

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Latitude: **38.91695**
Longitude: **-81.69417**

SIC Code: **1311** NAICS Code: **211111**	DAQ Facility ID No. (For existing facilities) **035-00047**

CERTIFICATION OF INFORMATION

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

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

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

Responsible Official Signature: _____
Name and Title: Phone: Fax:
Email: Date:

If applicable:
Authorized Representative Signature: _____
Name and Title: **Cary Cannon, Environmental Affairs Director** Phone: **(972) 201 - 0658** Fax:
Email: **ccannon@excoresources.com** Date: 9-26-16

If applicable:
Environmental Contact: **ERM**
Name and Title: **Grant Morgan** Phone: **(304) 755-4777** Fax: **(304) 757-4799**
Email: **grant.morgan@erm.com** Date:

OPERATING SITE INFORMATION
Briefly describe the proposed new operation and/or any change(s) to the facility: **EXCO Resources (PA), LLC files this application for registration under the G35-C General Permit to authorize the operation of an existing compressor station. The Greenhills Compressor Station is currently permitted under G35-A008A. This permit application addresses the update of the compressor engine utilized for the compression of raw production gas.**
Directions to the facility: **From I-77 South, take Exit 146 to Route 56 East. Follow Route 56 East for approximately 2 miles. Turn left onto gravel road, veer to the left. Follow lease road 0.4 miles to the site.**

ATTACHMENTS AND SUPPORTING DOCUMENTS	
I have enclosed the following required documents:	
Check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR13 and 45CSR22). ☐ Check attached to front of application. ☐ I wish to pay by electronic transfer. Contact for payment (incl. name and email address): ☒ I wish to pay by credit card. Contact for payment (incl. name and email address): Cary Cannon – ccannon@excoresources.com ☒$500 (Construction, Modification, and Relocation) ☐$300 (Class II Administrative Update) ☐$1,000 NSPS fee for 40 CFR60, Subpart IIII, JJJJ and/or OOOO [1] ☒$2,500 NESHAP fee for 40 CFR63, Subpart ZZZZ and/or HH [2] [1] Only one NSPS fee will apply. [2] Only one NESHAP fee will apply. The Subpart ZZZZ NESHAP fee will be waived for new engines that satisfy requirements by complying with NSPS, Subparts IIII and/or JJJJ. *NSPS and NESHAP fees apply to new construction or if the source is being modified.*	
☒ Responsible Official or Authorized Representative Signature (if applicable)	
☒ Single Source Determination Form **(must be completed in its entirety)** – Attachment A	
☐ Siting Criteria Waiver (if applicable) – Attachment B	☒ Current Business Certificate – Attachment C
☒ Process Flow Diagram – Attachment D	☒ Process Description – Attachment E
☒ Plot Plan – Attachment F	☒ Area Map – Attachment G
☒ G35-C Section Applicability Form – Attachment H	☒ Emission Units/ERD Table – Attachment I
☒ Fugitive Emissions Summary Sheet – Attachment J	
☒ Storage Vessel(s) Data Sheet (include gas sample data, USEPA Tanks, simulation software (e.g. ProMax, E&P Tanks, HYSYS, etc.), etc. where applicable) – Attachment K	
☐ Natural Gas Fired Fuel Burning Unit(s) Data Sheet (GPUs, Heater Treaters, In-Line Heaters if applicable) – Attachment L	
☒ Internal Combustion Engine Data Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment M	
☒ Tanker Truck Loading Data Sheet (if applicable) – Attachment N	
☒ Glycol Dehydration Unit Data Sheet(s) (include wet gas analysis, GRI- GLYCalc™ input and output reports and information on reboiler if applicable) – Attachment O	
☒ Pneumatic Controllers Data Sheet – Attachment P	
☐ Air Pollution Control Device/Emission Reduction Device(s) Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment Q	
☒ Emission Calculations (please be specific and include all calculation methodologies used) – Attachment R	
☒ Facility-wide Emission Summary Sheet(s) – Attachment S	
☒ Class I Legal Advertisement – Attachment T	
☒ One (1) paper copy and two (2) copies of CD or DVD with pdf copy of application and attachments	

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

Table of Contents

Attachment A

SINGLE SOURCE DETERMINATION FORM

ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM

Classifying multiple facilities as one "stationary source" under 45CSR13, 45CSR14, and 45CSR19 is based on the definition of Building, structure, facility, or installation as given in §45-14-2.13 and §45-19-2.12. The definition states:

"Building, Structure, Facility, or Installation" means all of the pollutant-emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control). Pollutant-emitting activities are a part of the same industrial grouping if they belong to the same "Major Group" (i.e., which have the same two (2)-digit code) as described in the Standard Industrial Classification Manual, 1987 (United States Government Printing Office stock number GPO 1987 0-185-718:QL 3).

Single Source Determination

Is there a facility owned by or associated with the natural gas industry located within one (1) mile of the proposed facility? Yes □ No ☒

If Yes, please complete the questionnaire on the following page (Attachment A).

Please provide a source aggregation analysis for the proposed facility below:

Attachment B

SITING CRITERIA WAIVER

Attachment B – Siting Criteria Waiver

The facility is not within 300’ of any dwelling. Therefore, no Siting Criteria Waiver is required with this submission.

Attachment C

BUSINESS CERTIFICATE

State of West Virginia

Certificate

I, Natalie E. Tennant, Secretary of State of the State of West Virginia, hereby certify that

EXCO RESOURCES (PA), INC.
(*A Delaware Corporation*)

filed Articles of Conversion in my office as required by the provisions of the West Virginia Code and was found to conform to law.

Therefore, I issue this

CERTIFICATE OF CONVERSION

Converting the corporation to:

EXCO RESOURCES (PA), LLC
(*A Delaware Limited Liability Company*)

Given under my hand and the Great Seal of the State of West Virginia on

July 1, 2010

Natalie E Tennant

Secretary of State

Delaware

The First State

I, JEFFREY W. BULLOCK, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY THE ATTACHED IS A TRUE AND CORRECT COPY OF THE CERTIFICATE OF CONVERSION OF "EXCO RESOURCES (PA), INC.", FILED IN THIS OFFICE ON THE TWENTY-SEVENTH DAY OF MAY, A.D. 2010, AT 1:32 O'CLOCK P.M.

AND I DO HEREBY FURTHER CERTIFY THAT THE EFFECTIVE DATE OF THE AFORESAID CERTIFICATE OF CONVERSION IS THE TWENTY-EIGHTH DAY OF MAY, A.D. 2010, AT 1:01 O'CLOCK P.M.

A FILED COPY OF THIS CERTIFICATE HAS BEEN FORWARDED TO THE NEW CASTLE COUNTY RECORDER OF DEEDS.

AND I DO HEREBY FURTHER CERTIFY THAT THE CORPORATION HAS FILED ALL DOCUMENTS AND PAID ALL FEES REQUIRED, AND THEREUPON THE CORPORATION SHALL CEASE TO EXIST AS A CORPORATION OF THE STATE OF DELAWARE.

FILED

JUL 01 2010

IN THE OFFICE OF
SECRETARY OF STATE

Jeffrey W. Bullock, Secretary of State

2170990 0265C

100591725

AUTHENTICATION: 8023179

DATE: 05-27-10

You may verify this certificate online at corp.delaware.gov/authver.shtml

State of Delaware
Secretary of State
Division of Corporations
Delivered 02:08 PM 05/27/2010
FILED 01:32 PM 05/27/2010
SRV 100591725 - 2170990 FILE

STATE OF DELAWARE
CERTIFICATE OF CONVERSION
FROM A DELAWARE CORPORATION
TO A TEXAS LIMITED LIABILITY COMPANY
PURSUANT TO SECTION 266 OF
THE GENERAL CORPORATION LAW

Pursuant to the provisions of Section 266 of the Delaware General Corporation Law, EXCO Resources (PA), Inc., a Delaware corporation (the "***Corporation***"), hereby executes this Certificate of Conversion (this "***Certificate***") for the purpose of converting (the "***Conversion***") the Corporation to a non-Delaware limited liability company (the "***Limited Liability Company***") and, in connection therewith, certifies as follows:

1. The name of the Corporation is EXCO Resources (PA), Inc.

2. The name under which the Corporation's certificate of incorporation was originally filed was North Coast Energy, Inc.

3. The date of filing of the Corporation's original certificate of incorporation with the Secretary of State was August 30, 1988.

4. The jurisdiction to which the Corporation shall convert is the State of Texas and the name under which the Limited Liability Company shall be known is EXCO Resources (PA), LLC.

5. The Conversion has been approved in accordance with this section.

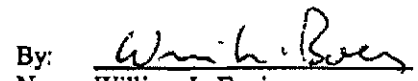
6. The Corporation may be served with process in the State of Delaware in any action, suit or proceeding for enforcement of any obligation of the Corporation arising while it was a corporation of the State of Delaware, and it irrevocably appoints the Secretary of State as its agent to accept service of process in any such action, suit or proceeding.

7. The address to which a copy of the process shall be mailed by the Secretary of State is 12377 Merit Drive, Suite 1700, Dallas, Texas 75251.

8. This Certificate becomes effective on May 28, 2010 at 1:01 p.m. eastern standard time.

IN WITNESS WHEREOF, the undersigned has executed this Certificate on the 26th day of May, 2010.

EXCO RESOURCES (PA), INC.

By: 
Name: William L. Boeing
Title: Vice President and Secretary

Delaware

The First State

I, JEFFREY W. BULLOCK, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY "EXCO RESOURCES (PA), LLC" IS DULY FORMED UNDER THE LAWS OF THE STATE OF DELAWARE AND IS IN GOOD STANDING AND HAS A LEGAL EXISTENCE SO FAR AS THE RECORDS OF THIS OFFICE SHOW, AS OF THE TWENTY-THIRD DAY OF JUNE, A.D. 2010.

AND I DO HEREBY FURTHER CERTIFY THAT THE ANNUAL TAXES HAVE NOT BEEN ASSESSED TO DATE.

Jeffrey W. Bullock, Secretary of State

4830041 8300

100683567

AUTHENTICATION: 8073179

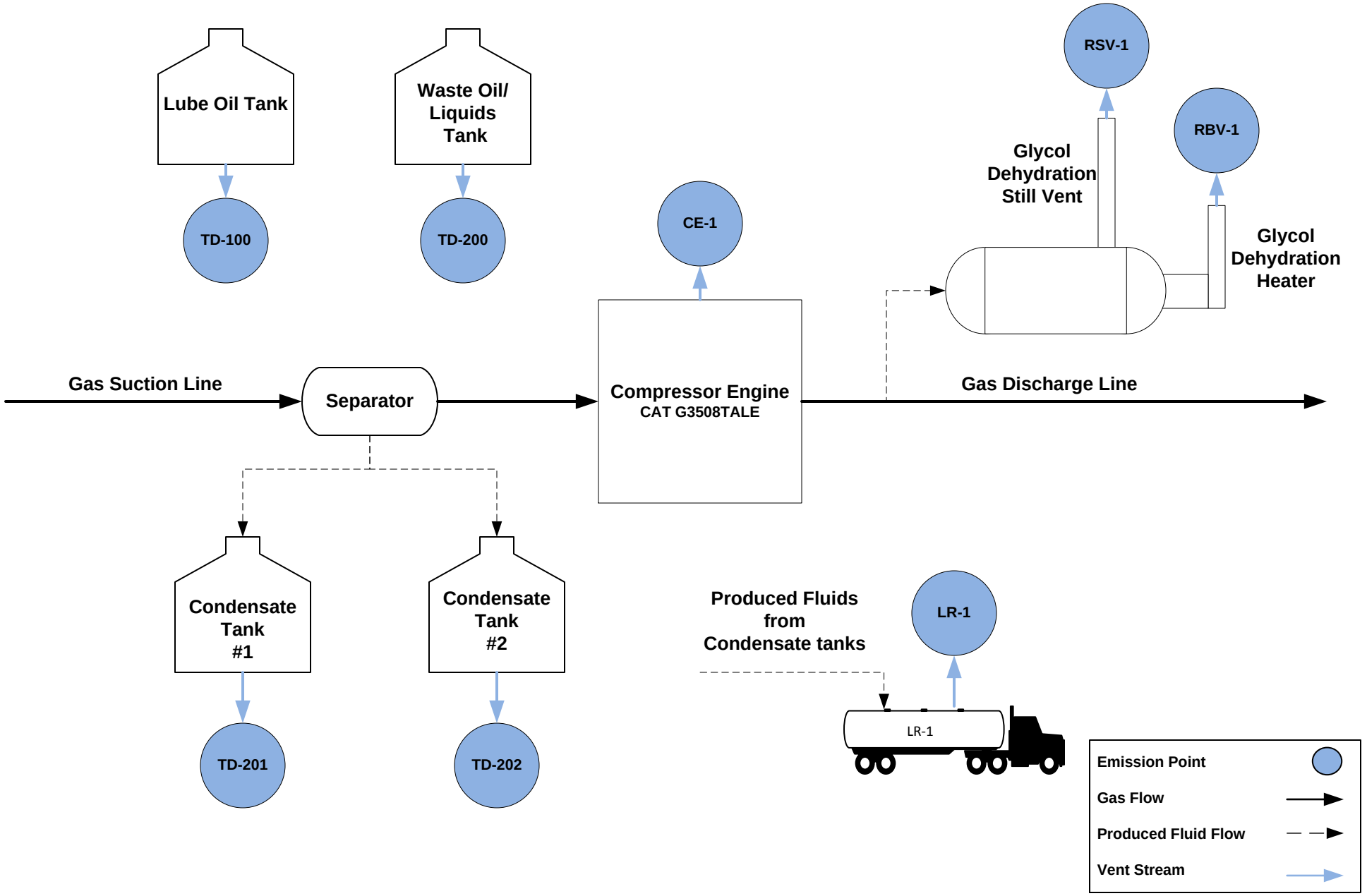
DATE: 06-23-10

You may verify this certificate online at corp.delaware.gov/authver.shtml

Attachment D

PROCESS FLOW DIAGRAM

Attachment D - Process Flow Diagram
EXCO Resources (PA), LLC – Green Hills Compressor Station



Attachment E

PROCESS DESCRIPTION

Attachment E

Process Description

Natural gas is produced from surrounding gas wells and routed to the EXCO Resources (PA) LLC, Green Hills Compressor Station. The pipeline gas suction line feeds into a separator that removes the produced liquids from the natural gas and stores the liquid in one (1) of two (2) 8,519 gallons condensate tanks. From the phase separators, the natural gas is then compressed to a higher pressure and discharged downstream by using a Caterpillar 3508TALE natural gas fueled internal combustion engine with a design capacity of 630 brake horsepower. The natural gas stream then flows through a triethylene (TEG) glycol dehydration unit, where any fluids still entrained within the gas are removed prior to the gas entering the downstream sales pipeline. On-site lubricating oil is stored in a 500 gallon storage tank and the waste oil/liquid is stored in a 4,033 gallon storage tank. Condensate is removed from the site on an as needed basis via tank truck.

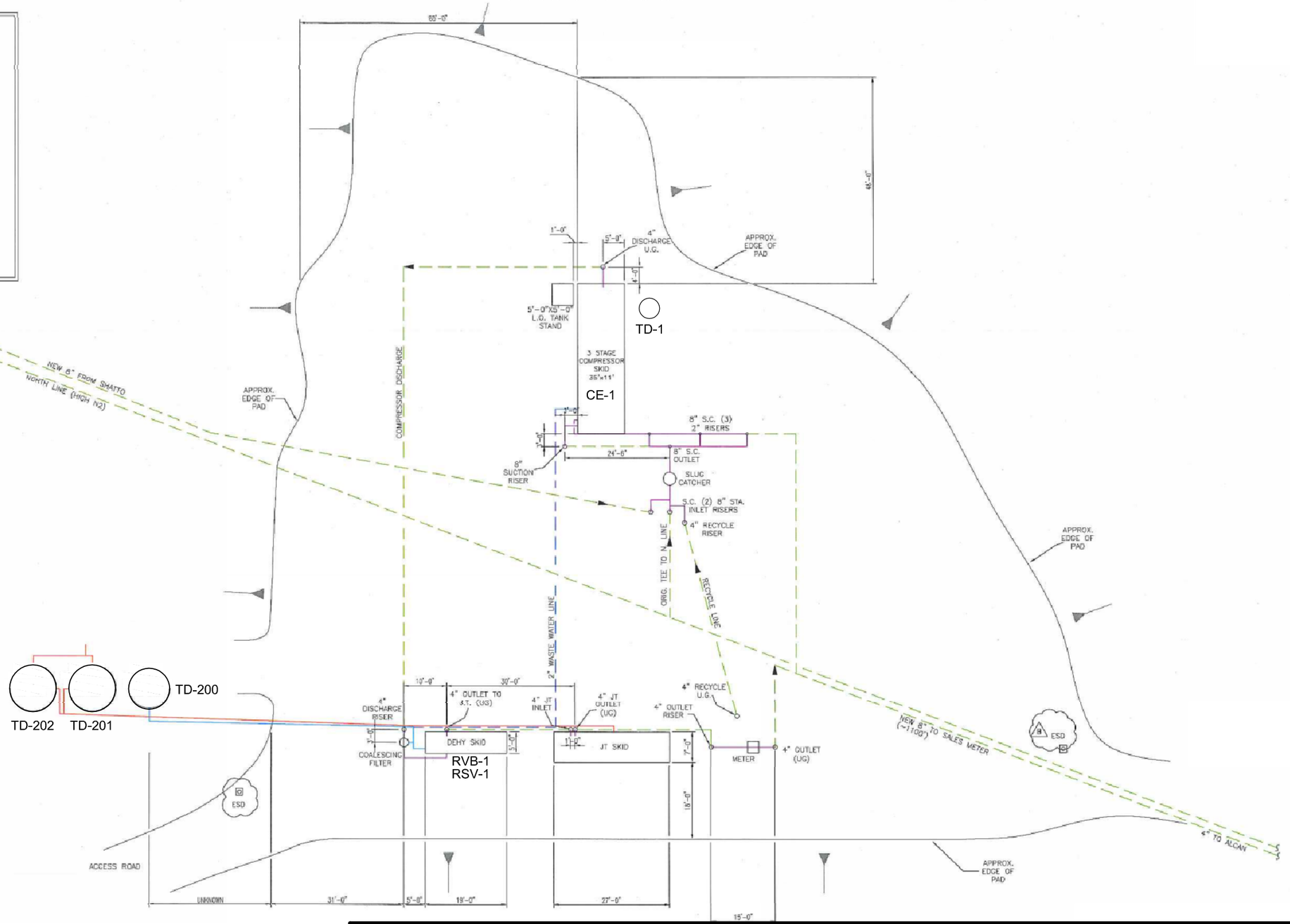
Attachment F

PLOT PLAN

PLOT PLAN

LEGEND

- PROCESS GAS, ABOVE GRADE
- PROCESS GAS, BELOW GRADE
- PRODUCED WATER, ABOVE GRADE
- PRODUCED WATER, BELOW GRADE
- CONDENSATE, ABOVE GRADE
- CONDENSATE, BELOW GRADE
- FUEL GAS, ABOVE GRADE
- FUEL GAS, BELOW GRADE
- ELECTRIC ABOVE GRADE
- ELECTRIC BELOW GRADE
- VAPOR



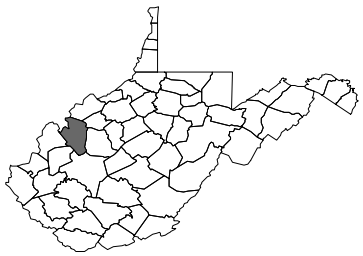
SCALE
0 25 50 FEET

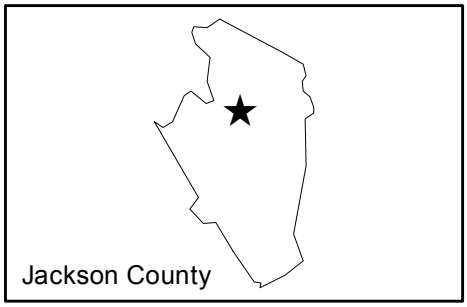
Drawn By SR	ERM®	EXCO	CHK'D MH
CADD Review MH		GREENHILLS COMPRESSOR STATION	0140457
Date Drawn/Rev'd 7/23/12		Environmental Resources Management	APPENDIX E

N:\Projects\E\EXCO\0140457 - General Consulting Services\6.0 Plans and Reports\Figures\Appendix E - Plot Plan.dwg

Attachment G

AREA MAP

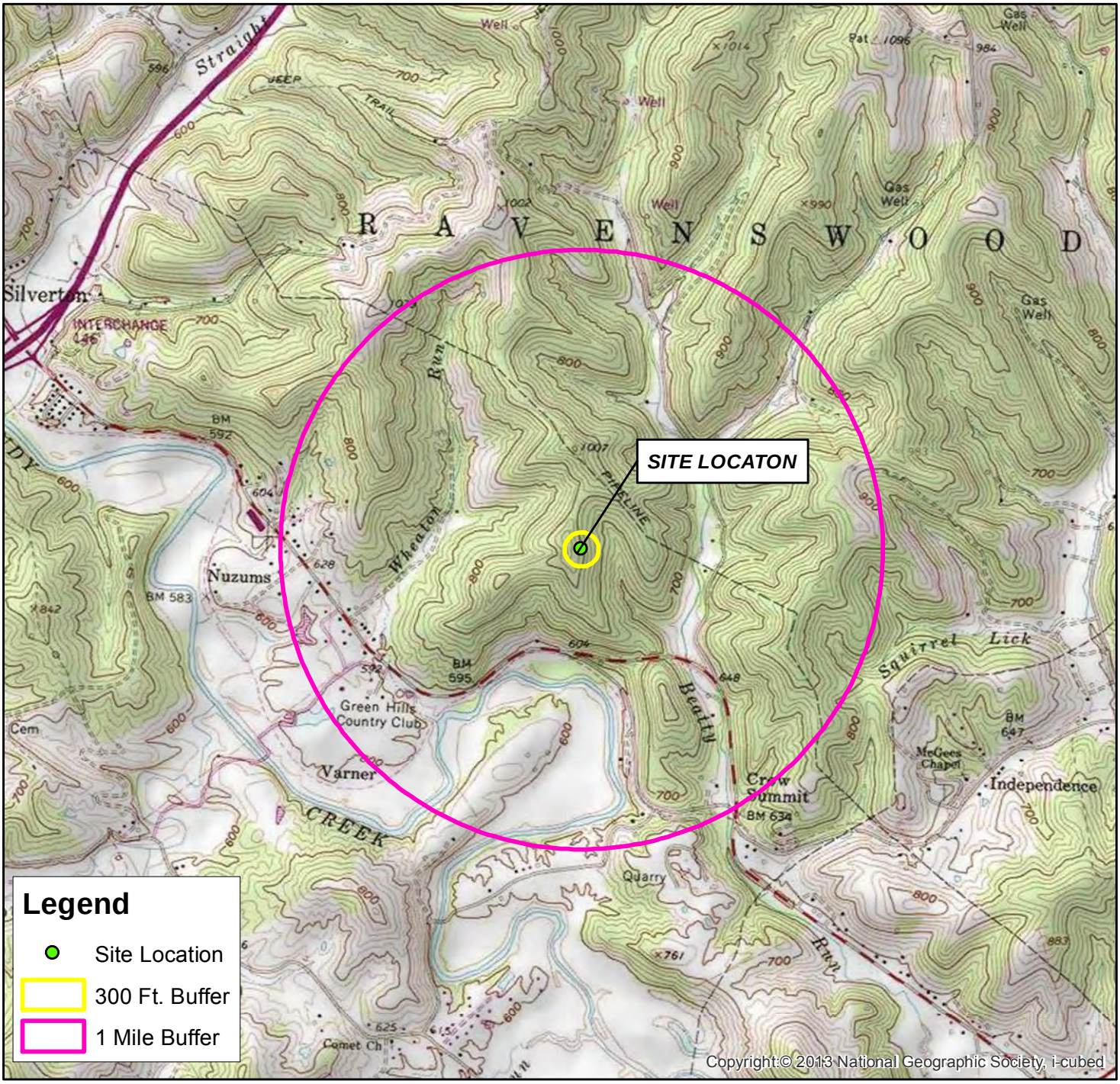




0 1,000 2,000 4,000 Feet

N

LAT. 38.9165 LON. -81.6931
JACKSON COUNTY
WEST VIRGINIA



USGS 1:24K 7.5' Quadrangle:
Sandyville, WV

SITE LOCATION MAP

ERM	**EXCO Resources (PA), LLC** Green Hill Compressor Station Exco Resources (PA), LLC Jackson, West Virginia	GIS Review: PC CHK'D: PC 0330318
Drawn By: SRV-3/14/16	**Environmental Resources Management**	ATTACHMENT G

J:\GIS\Projects\EXCO Resources LLC_MXD\AttachmentA-Site_Location_Map.mxd - 3/14/2016\SRV

Attachment H

APPLICABILITY FORM

General Permit G35-C Registration
Section Applicability Form

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

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

GENERAL PERMIT G35-C APPLICABLE SECTIONS	
☒ Section 5.0	Storage Vessels Containing Condensate and/or Produced Water[1]
☐Section 6.0	Storage Vessel Affected Facility (NSPS, Subpart OOOO)
☐Section 7.0	Control Devices and Emission Reduction Devices not subject to NSPS Subpart OOOO and/or NESHAP Subpart HH
☒ Section 8.0	Small Heaters and Reboilers not subject to 40CFR60 Subpart Dc
☐Section 9.0	Pneumatic Controllers Affected Facility (NSPS, Subpart OOOO)
☐Section 10.0	Centrifugal Compressor Affected Facility (NSPS, Subpart OOOO)[2]
☐Section 11.0	Reciprocating Compressor Affected Facility (NSPS, Subpart OOOO)[2]
☒ Section 12.0	Reciprocating Internal Combustion Engines, Generator Engines. Microturbine Generators
☒ Section 13.0	Tanker Truck Loading[3]
☒ Section 14.0	Glycol Dehydration Units[4]

1 *Applicants that are subject to Section 5 may also be subject to Section 6 if the applicant is subject to the NSPS, Subpart OOOO control requirements or the applicable control device requirements of Section 7.*

2 *Applicants that are subject to Section 10 and 11 may also be subject to the applicable RICE requirements of Section 12.*

3 *Applicants that are subject to Section 13 may also be subject to control device and emission reduction device requirements of Section 7.*

4 *Applicants that are subject to Section 14 may also be subject to the requirements of Section 8 (reboilers). Applicants that are subject to Section 14 may also be subject to control device and emission reduction device requirements of Section 7.*

Attachment I

EMISSION UNITS / EMISSION REDUCTION DEVICES (ERD) TABLE

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

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

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed	Manufac. Date[3]	Design Capacity	Type[4] and Date of Change	Control Device(s)[5]	ERD(s)[6]
CE-1	CE-1	Caterpillar G3508TALE Compressor Engine	2008	2007	630 bhp	Modification	Ox-Cat	
TD-100	TD-100	Lube Oil Storage Tank	2008	----	500 gal	Existing	----	----
TD-200	TD-200	Waste oil/liquids Storage Tank	2008	----	4,033 gal	Existing	----	----
TD-201	TD-201	Process liquids/Condensate Tank #1	2008	----	8,519 gal	Existing	----	----
TD-202	TD-202	Process liquids/Condensate Tank #2	2008	----	8,519 gal	Existing	----	----
RBV-1	RBV-1	Hanover Glycol Dehydration Unit Reboiler	2008	----	0.5 mmBtu/hr	Existing	----	----
RSV-1	RSV-1	Exterran Glycol Dehydration Still Vent	2008	----	3.0 mmscf/day	Modification	----	----

[1] For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.
[2] For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.
[3] When required by rule
[4] New, modification, removal, existing
[5] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.
[6] For ERDs use the following numbering system: 1D, 2D, 3D,... or other appropriate designation.

Attachment J

FUGITIVE EMISSIONS SUMMARY SHEET

ATTACHMENT J – FUGITIVE EMISSIONS SUMMARY SHEET

Sources of fugitive emissions may include loading operations, equipment leaks, blowdown emissions, etc.
Use extra pages for each associated source or equipment if necessary.

Source/Equipment:

Leak Detection Method Used	☐ Audible, visual, and olfactory (AVO) inspections	☐ Infrared (FLIR) cameras	☐ Other (please describe)	☐ None required

Component Type	Closed Vent System	Count	Source of Leak Factors (EPA, other (specify))	Stream type (gas, liquid, etc.)	Estimated Emissions (tpy)		
					VOC	HAP	GHG (CO_2e)
Pumps	☐ Yes ☒ No			☐ Gas ☐ Liquid ☐ Both			
Valves	☒ Yes ☐ No	75	40 CFR 98 Subpart W	☐ Gas ☐ Liquid ☒ Both	0.07	0.0	7.5
Safety Relief Valves	☒ Yes ☐ No	1	40 CFR 98 Subpart W	☐ Gas ☐ Liquid ☒ Both	0.001	<0.001	0.15
Open Ended Lines	☒ Yes ☐ No	2	40 CFR 98 Subpart W	☐ Gas ☐ Liquid ☒ Both	0.0	<0.001	0.45
Sampling Connections	☐ Yes ☒ No		40 CFR 98 Subpart W	☐ Gas ☐ Liquid ☐ Both			
Connections (Not sampling)	☒ Yes ☐ No	296	40 CFR 98 Subpart W	☐ Gas ☐ Liquid ☒ Both	0.03	<0.001	3.29
Compressors	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Flanges	☐ Yes ☒ No			☐ Gas ☐ Liquid ☐ Both			
Other[1]	☐ Yes ☒ No			☐ Gas ☐ Liquid ☐ Both			

[1] Other equipment types may include compressor seals, relief valves, diaphragms, drains, meters, etc.

Please provide an explanation of the sources of fugitive emissions (e.g. pigging operations, equipment blowdowns, pneumatic controllers, etc.):

Please indicate if there are any closed vent bypasses (include component):
Specify all equipment used in the closed vent system (e.g. VRU, ERD, thief hatches, tanker truck loading, etc.)

Attachment K

STORAGE VESSEL DATA SHEET

ATTACHMENT K – STORAGE VESSEL DATA SHEET

Complete this data sheet if you are the owner or operator of a storage vessel that contains condensate and/or produced water. This form must be completed for ***each*** new or modified bulk liquid storage vessel(s) that contains condensate and/or produced water . (If you have more than one (1) identical tank (i.e. 4-400 bbl condensate tanks), then you can list all on one (1) data sheet). **Include gas sample analysis, flashing emissions, working and breathing losses, USEPA Tanks, simulation software (ProMax, E&P Tanks, HYSYS, etc.), and any other supporting documents where applicable.**

The following information is REQUIRED:

□ Composition of the representative sample used for the simulation
□ For each stream that contributes to flashing emissions:
  □ Temperature and pressure (inlet and outlet from separator(s))
  □ Simulation-predicted composition
  □ Molecular weight
  □ Flow rate
□ Resulting flash emission factor or flashing emissions from simulation
□ Working/breathing loss emissions from tanks and/or loading emissions if simulation is used to quantify those emissions

Additional information may be requested if necessary.

GENERAL INFORMATION

1. Bulk Storage Area Name **Condensate Storage Tank Area**	2. Tank Name **Condensate Tanks #1 and #2**
3. Emission Unit ID number **TD-201, TD-202**	4. Emission Point ID number **TD-201, TD-202**
5. Date Installed , Modified or Relocated *(for existing tanks)* 2008, 2008 Was the tank manufactured after August 23, 2011? ☐ Yes ☒ No	6. Type of change: ☐ New construction ☐ New stored material ☒ Other ☐ Relocation
7A. Description of Tank Modification *(if applicable)*	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Was USEPA Tanks simulation software utilized? ☒ Yes ☐ No ***If Yes, please provide the appropriate documentation and items 8-42 below are not required.***	

42. Final maximum gauge pressure and temperature prior to transfer into tank used as inputs into flashing emission calculations.			

STORAGE TANK DATA TABLE

List all deminimis storage tanks (i.e. lube oil, glycol, diesel etc.)

Source ID #[1]	Status[2]	Content[3]	Volume[4]
TD-100	EXIST	Lube Oil	500 gal
TD-200	EXIST	Waste oil/Glycol Liquids	4,033 gal

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, diesel, mercaptan etc.
4. Enter the maximum design storage tank volume in gallons.

Gas Analytical Services

Good

Charleston, WV

555-555-5555

Customer	: 8298 - Exco Resources	**Date Sampled**	: 06/30/2015
Station ID	: GREENHILL	**Date Analyzed**	: 07/02/2015
Cylinder ID	: 2005	**Effective Date**	: 07/01/2015
Producer	:	**Cyl Pressure**	: 0
Lease	: Greenhill Compressor	**Temp**	: 0
Area	: 630 - Exco Resources	**Cylinder Type**	: Spot
State	:	**Sample By**	: M Thomas

COMPONENT	MOL%	GPM@14.73(PSIA)
Carbon-Dioxide	0.0893	0.000
Oxygen	0.0026	0.000
Nitrogen	1.1972	0.000
Methane	81.5049	0.000
Ethane	10.5448	2.829
Propane	4.4264	1.223
Iso-Butane	0.4009	0.132
N-Butane	1.0206	0.323
Neo-Pentane	0.0037	0.001
Iso-Pentane	0.2073	0.076
N-Pentane	0.2132	0.078
N-Hexane	0.0787	0.051
N-Heptane	0.0304	0.014
N-Octane	0.0071	0.004
N-Nonane	0.0018	0.001
N-Decane	0.0007	0.000
Benzene	0.0040	0.001
Toluene	0.0057	0.002
M-Xylene/P-Xylene	0.0030	0.001
O-Xylene	0.0006	0.000
C6's	0.1095	0.044
C7's	0.1040	0.043
C8's	0.0333	0.018
C9's	0.0063	0.003
C10's	0.0029	0.002
C11's	0.0010	0.001
C12's	0.0001	0.000
TOTAL	**100.0000**	**4.847**

Compressibility Factor (Z) @ 14.73 @ 60 Deg. F = 0.9968 **C5+ GPM** : 0.20900

Ideal Gravity: 0.6930 **Real Gravity:** 0.6950 **C5+ Mole %** : 0.7696

BTU @ (PSIA)	@14.65	@14.696	@14.73	@15.025
Ideal GPM	4.804	4.819	4.831	4.927
Ideal BTU Dry	1,200.58	1,204.35	1,207.14	1,231.31
Ideal BTU Sat	1,179.57	1,183.34	1,186.12	1,210.30
Real GPM	4.820	4.835	4.846	4.944
Real BTU Dry	1,204.47	1,208.26	1,211.06	1,235.40

Real BTU Sat	1,183.85	1,187.65	1,190.45	1,214.80

Comments:

Gas Analysis performed in accordance with GPA 2286

Analytical Calculations performed in accordance with GPA 2172

Sample Count : 230000001

COC :

```
*********************************************************************************************
*     Project Setup Information                                                             *
*********************************************************************************************
Project File              : TD-201 & TD-202
Flowsheet Selection       : Oil Tank with Separator
Calculation Method        : AP42
Control Efficiency        : 100.0%
Known Separator Stream    : Low Pressure Gas
Entering Air Composition  : No

Filed Name                : Greenhills Compressor Station
Date                      : 2016.03.15


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

Separator Pressure        : 500.00[psig]
Separator Temperature     : 85.00[F]
Molar GOR                 : 0.0500
Ambient Pressure          : 14.70[psia]
Ambient Temperature       : 70.00[F]
C10+ SG                   : 0.8990
C10+ MW                   : 166.00

-- Low Pressure Gas -----------------------------------------------------------------------
   No.    Component             mol %
   1      H2S                    0.0000
   2      O2                     0.0026
   3      CO2                    0.0895
   4      N2                     1.2002
   5      C1                    81.7103
   6      C2                    10.5714
   7      C3                     4.4376
   8      i-C4                   0.4019
   9      n-C4                   1.0232
   10     i-C5                   0.2078
   11     n-C5                   0.2137
   12     C6                     0.0000
   13     C7+                    0.0501
   14     Benzene                0.0040
   15     Toluene                0.0057
   16     E-Benzene              0.0000
   17     Xylenes                0.0030
   18     n-C6                   0.0789
   19     224Trimethylp          0.0000

   C7+ Molar Ratio: C7  :     C8  :     C9  :     C10+
                    1.0000    1.0000    1.0000    1.0000
```

-- Sales Oil ----------

Production Rate	: 11.5[bbl/day]
Days of Annual Operation	: 365 [days/year]
API Gravity	: 46.0
Reid Vapor Pressure	: 7.70[psia]
Bulk Temperature	: 80.00[F]

-- Tank and Shell Data ----------

Diameter	: 10.00[ft]
Shell Height	: 15.00[ft]
Cone Roof Slope	: 0.06
Average Liquid Height	: 7.50[ft]
Vent Pressure Range	: 0.06[psi]
Solar Absorbance	: 0.68

-- Meteorological Data ----------

-- Emission Summary ----------

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
Total HAPs	0.110	0.025
Total HC	5.168	1.180
VOCs, C2+	4.557	1.040
VOCs, C3+	4.033	0.921

Uncontrolled Recovery Info.

Vapor	280.6900 x1E-3	[MSCFD]
HC Vapor	261.6200 x1E-3	[MSCFD]
GOR	24.41	[SCF/bbl]

-- Emission Composition ----------

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
1	H2S	0.033	0.008
2	O2	0.000	0.000
3	CO2	0.342	0.078
4	N2	0.013	0.003
5	C1	0.611	0.139
6	C2	0.524	0.120
7	C3	1.220	0.279
8	i-C4	0.393	0.090
9	n-C4	1.135	0.259
10	i-C5	0.387	0.088
11	n-C5	0.460	0.105
12	C6	0.136	0.031
13	C7	0.132	0.030
14	C8	0.051	0.012
15	C9	0.010	0.002
16	C10+	0.003	0.001
17	Benzene	0.010	0.002
18	Toluene	0.001	0.000
19	E-Benzene	0.000	0.000
20	Xylenes	0.001	0.000
21	n-C6	0.093	0.021
22	224Trimethylp	0.000	0.000
	Total	5.555	1.268

-- Stream Data ----------

No.	Component	MW	LP Oil mol %	Flash Oil mol %	Sale Oil mol %	Flash Gas mol %	W&S Gas mol %	Total Emissions mol %
1	H2S	34.80	0.0508	0.0350	0.0219	0.6830	0.8412	0.7073
2	O2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	CO2	44.01	0.2437	0.0911	0.0192	6.3627	2.3343	5.7453
4	N2	28.01	0.0102	0.0005	0.0000	0.4011	0.0002	0.3397
5	C1	16.04	0.9543	0.1483	0.0000	33.2838	0.0001	28.1827
6	C2	30.07	0.6701	0.3545	0.1480	13.3286	10.4297	12.8843
7	C3	44.10	2.1827	1.7681	1.3626	18.8121	29.6617	20.4749
8	i-C4	58.12	1.1269	1.0459	0.9490	4.3763	8.4252	4.9969
9	n-C4	58.12	4.6091	4.4126	4.1490	12.4921	25.2619	14.4492
10	i-C5	72.15	3.1066	3.1002	3.0565	3.3616	7.3107	3.9668
11	n-C5	72.15	5.0558	5.0827	5.0528	3.9752	8.8193	4.7176
12	C6	86.16	4.1726	4.2518	4.2929	0.9970	2.3091	1.1981
13	C7	100.20	10.3655	10.6032	10.7546	0.8318	1.9913	1.0095
14	C8	114.23	10.8426	11.1060	11.2827	0.2779	0.6864	0.3405
15	C9	128.28	5.5127	5.6489	5.7417	0.0492	0.1250	0.0608
16	C10+	166.00	45.9695	47.1153	47.9024	0.0097	0.0268	0.0123
17	Benzene	78.11	0.5685	0.5807	0.5881	0.0772	0.1811	0.0931
18	Toluene	92.13	0.2132	0.2183	0.2217	0.0081	0.0197	0.0099
19	E-Benzene	106.17	0.0711	0.0729	0.0740	0.0009	0.0022	0.0011
20	Xylenes	106.17	0.6802	0.6970	0.7084	0.0074	0.0186	0.0091
21	n-C6	86.18	3.5939	3.6669	3.7081	0.6643	1.5553	0.8008
22	224Trimethylp	114.24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	MW		123.89	126.02	126.94	38.57	55.10	41.10
	Stream Mole Ratio		1.0000	0.9757	0.9713	0.0243	0.0044	0.0287
	Heating Value	[BTU/SCF]				2039.54	3025.31	2190.63
	Gas Gravity	[Gas/Air]				1.33	1.90	1.42
	Bubble Pt. @ 100F	[psia]	56.28	19.72	10.60			
	RVP @ 100F	[psia]	126.75	79.05	59.99			
	Spec. Gravity @ 100F		0.800	0.803	0.805			

Attachment L

NATURAL GAS FIRED BURNING UNIT DATA SHEET

Attachment L – Natural Gas Fired Burning Unit Data Sheet

The Greenhills Station does not operate any units that qualify as natural gas fired burning units, as defined in Attachment L. The reboiler unit operated as a part of the TEG dehydration unit is included with this submittal in Attachment O.

Attachment M

INTERNAL COMBUSTION ENGINE DATA SHEET

ATTACHMENT M – INTERNAL COMBUSTION ENGINE DATA SHEET

Complete this data sheet for each internal combustion engine at the facility. Include manufacturer performance data sheet(s) or any other supporting document if applicable. Use extra pages if necessary. *Generator(s) and microturbine generator(s) shall also use this form.*

Emission Unit ID#[1]	CE-1		
Engine Manufacturer/Model	Caterpillar G3508TALE		
Manufacturers Rated bhp/rpm	630 BHP/1,400 RPM		
Source Status[2]	ES		
Date Installed/ Modified/Removed/Relocated[3]	2008		
Engine Manufactured /Reconstruction Date[4]	2007		
Check all applicable Federal Rules for the engine (include EPA Certificate of Conformity if applicable)[5]	☐40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☐40CFR63 Subpart ZZZZ ☒ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources	☐40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☐40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources	☐40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☐40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources
Engine Type[6]	4SLB		
APCD Type[7]	OxCat		
Fuel Type[8]	PQ		
H_2S (gr/100 scf)	----		
Operating bhp/rpm	630 BHP/1,400 RPM		
BSFC (BTU/bhp-hr)	8,533		
Hourly Fuel Throughput	4,463 ft^3/hr 33,386 gal/hr	ft^3/hr gal/hr	ft^3/hr gal/hr
Annual Fuel Throughput (Must use 8,760 hrs/yr unless emergency generator)	39.1 $MMft^3$/yr 292,461,360 gal/yr	$MMft^3$/yr gal/yr	$MMft^3$/yr gal/yr
Fuel Usage or Hours of Operation Metered	Yes ☐ No ☒	Yes ☐ No ☐	Yes ☐ No ☒

Calculation Methodology[9]	**Pollutant[10]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**
MD	NO_x	2.78	12.17				
MD	CO	2.22	9.74				
MD	VOC	0.39	1.7				
AP-42	SO_2	0.003	0.01				
AP-42	PM_{10}	0.05	0.24				
AP-42	Formaldehyde	0.28	1.70				
AP-42	Total HAPs	0.29	1.27				
OT	GHG (CO_2e)	645.7	2,828				

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. Microturbine generator engines should be designated MT-1, MT-2, MT-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	Relocated Source
REM	Removal of Source		

3 Enter the date (or anticipated date) of the engine's installation (construction of source), modification, relocation 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 IIII/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 as appropriate.

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

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

2SLB	Two Stroke Lean Burn	4SRB	Four Stroke Rich Burn
4SLB	Four Stroke Lean Burn		

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	OxCat	Oxidation Catalyst
SCR	Lean Burn & Selective Catalytic Reduction		

8 Enter the Fuel Type using the following codes:

PQ	Pipeline Quality Natural Gas	RG	Raw Natural Gas /Production Gas	D	Diesel

9 Enter the Potential Emissions Data Reference designation using the following codes. Attach all reference data used.

MD	Manufacturer's Data	AP	AP-42	
GR	GRI-HAPCalc™	OT	Other 40 CFR Subpart C	(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*.

11 PTE for engines shall be calculated from manufacturer's data unless unavailable.

USA COMPRESSION

Emissions Report

08/21/2015

USA Compression Unit 1825 G3508TALE/JGE2

Engine Serial Number :	WPN00170	Engine Manufactured Date :	03/07/2007
Max HP :	630	Max RPM :	1400
Number of Engine Cylinders :	8	Total Displacement (in3) :	2105
Combustion Type & Setting :	4 Stroke Lean Burn	Fuel Delivery Method:	Carburetor
Compression Ratio :	8:1	Combustion Air Treatment :	Turbocharged and Aftercooled
Engine Modified/Reconstructed? :	Not Applicable - reconstruction last reviewed 12/7/12		
Compressor Frame Serial # :	F26267 ELP	Unit Packaged Date :	04/11/2007
Compressor Frame Max RPM :	1400	# of Compressor Throws :	2

AIR ENVIRONMENTAL REGULATIONS

County and State Selected for Quote: Jackson WV

NSPS JJJJ	NOx	g/hp-hr	CO	g/hp-hr	VOC	g/hp-hr		
Ozone Non-Attainment / General Permit	NOx	g/hp-hr	CO	g/hp-hr	VOC	g/hp-hr	CH2O	g/hp-hr

RAW ENGINE EMISSIONS

(based on assumption of burning 900-970 LHV BTU/SCF or 80-85 Fuel Methane # Fuel Gas with little to no H2S)

Fuel Consumption : 8,533 HHV BTU/bhp-hr

	g/bhp-hr	lb/MMBTU	lb/hr	TPY
Nitrogen Oxides (NOx) :	2.00		2.778	12.168
Carbon Monoxide (CO) :	1.60		2.222	9.732
Volatile Organic Compounds (NMNEHC excluding CH2O) :	0.28		0.389	1.704
Formaldehyde (CH2O) :	0.25		0.347	1.520
Particulate Matter (PM) Filterable+Condensable :		0.0100	0.054	0.235
Sulfur Dioxide (SO2) :		0.0006	0.003	0.014

	g/bhp-hr	lb/MMBTU	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2) :	500.00		694.44	2,758.88
Methane (CH4) :	2.35		3.26	12.97

CONTROLLED EMISSIONS

Catalytic Converter Make and Model:	IQ-22-10
Catalyst Element Type:	Oxidation
Number of Catalyst Elements currently in Housing:	0
Air/Fuel Ratio Control :	No
Other Engine Emissions Control Equipment :	None

	% Reduction Required to Comply with JJJJ & Non-Attainment / General Permit Limits	lb/hr	TPY
Nitrogen Oxides (NOx) :	0	2.778	12.168
Carbon Monoxide (CO) :	0	2.222	9.732
Volatile Organic Compounds (NMNEHC excluding CH2O) :	0	0.389	1.704
Formaldehyde (CH2O) :	0	0.347	1.520
Particulate Matter (PM) Filterable+Condensable :	0	0.054	0.235
Sulfur Dioxide (SO2) :	0	0.003	0.014

	% Reduction Required to Comply with JJJJ & Non-Attainment / General Permit Limits	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2) :	0	694.44	2,758.88
Methane (CH4) :	0	3.26	12.97

1) g/bhp-hr are based on Engine Manufacturer Specifications assuming a "Pipeline Quality" fuel gas composition, 1200 ft elevation, and 100- 110 F Max Air Inlet. Note that g/bhp-hr values are based on 100% engine load operation and some g/hp-hr values are Nominal and are not representative of Not- To-Exceed values. It is recommended to apply safety factor (i.e. increase the value by a nominal percentage) to the g/hp- hr values for Air Permitting to allow for operational flexibility and variations in fuel gas composition .

2) lb/MMBTU emission Factors are based on EPA's AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combution Sources (Section 3.2 Natural Gas-Fired Reciprocating Engines).

Attachment N

TANKER TRUCK LOADING DATA SHEET

ATTACHMENT N – TANKER TRUCK LOADING DATA SHEET

Complete this data sheet for each new or modified bulk liquid transfer area or loading rack at the facility. This is to be used for bulk liquid transfer operations to tanker trucks. Use extra pages if necessary.

Truck Loadout Collection Efficiencies

The following applicable capture efficiencies of a truck loadout are allowed:

- For tanker trucks passing the MACT level annual leak test – 99.2%
- For tanker trucks passing the NSPS level annual leak test – 98.7%
- For tanker trucks not passing one of the annual leak tests listed above – 70%

Compliance with this requirement shall be demonstrated by keeping records of the applicable MACT or NSPS Annual Leak Test certification for ***every*** truck and railcar loaded/unloaded. This requirement can be satisfied if the trucking company provided certification that its entire fleet was compliant. This certification must be submitted in writing to the Director of the DAQ. These additional requirements must be noted in the Registration Application and will be noted on the issued G35-C Registration.

Emission Unit ID#: LR-1	Emission Point ID#: LR-1	Year Installed/Modified: 2008
Emission Unit Description: Tanker Truck Loading		
Loading Area Data		
Number of Pumps: 1	Number of Liquids Loaded: 1	Max number of trucks loading at one (1) time: 1
Are tanker trucks pressure tested for leaks at this or any other location? ☐ Yes ☒ No ☐ Not Required If Yes, Please describe:		
Provide description of closed vent system and any bypasses. N/A		
Are any of the following truck loadout systems utilized? ☐ Closed System to tanker truck passing a MACT level annual leak test? ☐ Closed System to tanker truck passing a NSPS level annual leak test? ☐ Closed System to tanker truck not passing an annual leak test and has vapor return?		

Projected Maximum Operating Schedule (for rack or transfer point as a whole)

Time	Jan – Mar	Apr - Jun	Jul – Sept	Oct - Dec
Hours/day	As needed	As needed	As needed	As needed
Days/week	As needed	As needed	As needed	As needed

Bulk Liquid Data (use extra pages as necessary)

Liquid Name	Sales Oil		
Max. Daily Throughput (1000 gal/day)	483 gal/day		
Max. Annual Throughput (1000 gal/yr)	176,295 gal/yr		
Loading Method[1]	SUB		
Max. Fill Rate (gal/min)	83		
Average Fill Time (min/loading)	100		
Max. Bulk Liquid Temperature (^{o}F)	80		
True Vapor Pressure[2]	7.70		
Cargo Vessel Condition[3]	U		
Control Equipment or Method[4]	N/A		
Max. Collection Efficiency (%)	N/A		

Max. Control Efficiency (%)		N/A		
Max.VOC Emission Rate	Loading (lb/hr)	0.32		
	Annual (ton/yr)	0.01		
Max.HAP Emission Rate	Loading (lb/hr)	2.51		
	Annual (ton/yr)	<0.001		
Estimation Method[5]		EPA		

1 BF Bottom Fill SP Splash Fill SUB Submerged Fill

2 At maximum bulk liquid temperature

3 B Ballasted Vessel C Cleaned U Uncleaned (dedicated service)
O Other (describe)

4 List as many as apply (complete and submit appropriate Air Pollution Control Device Sheets)
CA Carbon Adsorption VB Dedicated Vapor Balance (closed system)
ECD Enclosed Combustion Device F Flare
TO Thermal Oxidization or Incineration

5 EPA EPA Emission Factor in AP-42 MB Material Balance
TM Test Measurement based upon test data submittal O Other (describe)

Attachment O

GLYCOL DEHYDRATOR UNIT DATA SHEET

ATTACHMENT O – GLYCOL DEHYDRATION UNIT DATA SHEET

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

Manufacturer: NATCO	Model:
Max. Dry Gas Flow Rate: 3.0 mmscf/day	Reboiler Design Heat Input: 0.5 MMBTU/hr
Design Type: ☒ TEG ☐ DEG ☐ EG	Source Status[1]: ES
Date Installed/Modified/Removed[2]: 2008	Regenerator Still Vent APCD/ERD[3]: N/A
Control Device/ERD ID#[3]: N/A	Fuel HV (BTU/scf): 12,235
H_2S Content (gr/100 scf): '--	Operation (hours/year): 8760
Pump Rate (scfm): 1.0 gal/min glycol circulation rate	
Water Content (wt %) in: Wet Gas: 37.07 lbsH20/mmscf	Dry Gas: 7.0 lbsH20/mmscf

Is the glycol dehydration unit exempt from 40CFR63 Section 764(d)? ☒ Yes ☐ No: If Yes, answer the following:

The actual annual average flowrate of natural gas to the glycol dehydration unit is less than 85 thousand standard cubic meters per day, as determined by the procedures specified in §63.772(b)(1) of this subpart. ☒ Yes ☐ No

The actual average emissions of benzene from the glycol dehydration unit process vent to the atmosphere are less than 0.90 megagram per year (1 ton per year), as determined by the procedures specified in §63.772(b)(2) of this subpart. ☐Yes ☒ No

Is the glycol dehydration unit located within an Urbanized Area (UA) or Urban Cluster (UC)? ☒ Yes ☐ No

Is a lean glycol pump optimization plan being utilized? ☐ Yes ☒ No

Recycling the glycol dehydration unit back to the flame zone of the reboiler.
☐ Yes ☒ No

Recycling the glycol dehydration unit back to the flame zone of the reboiler and mixed with fuel.
☐ Yes ☒ No

What happens when temperature controller shuts off fuel to the reboiler?
☒ Still vent emissions to the atmosphere.
☐ Still vent emissions stopped with valve.
☐ Still vent emissions to glow plug.

Please indicate if the following equipment is present.
☒ Flash Tank
☐ Burner management system that continuously burns condenser or flash tank vapors

Control Device Technical Data

Pollutants Controlled	Manufacturer's Guaranteed Control Efficiency (%)
N/A	N/A

Emissions Data

Emission Unit ID / Emission Point ID[4]	Description	Calculation Methodology[5]	PTE[6]	Controlled Maximum Hourly Emissions (lb/hr)	Controlled Maximum Annual Emissions (tpy)
RBV-1	Reboiler Vent	AP-42	NO_x	0.04	0.18
		AP-42	CO	0.03	0.15
		AP-42	VOC	<0.01	<0.01
		AP-42	SO_2	<0.01	<0.01
		AP-42	PM_{10}	<0.01	<0.01
		AP-42	GHG (CO_2e)	58.55	256.44
RSV-1	Glycol Regenerator	GRI-GlyCalc™	VOC	1.65	7.22
		GRI-GlyCalc™	Benzene	0.18	0.79

	Still Vent	GRI-GlyCalc™	Toluene	0.44	1.91
		GRI-GlyCalc™	Ethylbenzene	0.0001	0.0005
		GRI-GlyCalc™	Xylenes	0.44	1.94
		GRI-GlyCalc™	n-Hexane	0.02	0.10
	Glycol Flash Tank	GRI-GlyCalc™	VOC	6.04	26.44
		GRI-GlyCalc™	Benzene	0.06	0.25
		GRI-GlyCalc™	Toluene	0.09	0.42
		GRI-GlyCalc™	Ethylbenzene	<0.0001	0.0001
		GRI-GlyCalc™	Xylenes	0.04	0.19
		GRI-GlyCalc™	n-Hexane	0.17	0.74

1 Enter the Source Status using the following codes:

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

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

3 Enter the Air Pollution Control Device (APCD)/Emission Reduction Device (ERD) type designation using the following codes and the device ID number:

NA	None	CD	Condenser	FL	Flare	
CC	Condenser/Combustion Combination	TO	Thermal Oxidizer	O	Other	(please list)

4 Enter the appropriate Emission Unit ID Numbers and Emission Point ID Numbers for the glycol dehydration unit reboiler vent and glycol regenerator still vent. The glycol dehydration unit reboiler vent and glycol regenerator still vent should be designated RBV-1 and RSV-1, respectively. If the compressor station incorporates multiple glycol dehydration units, a Glycol Dehydration Emission Unit Data Sheet shall be completed for each, using Source Identification RBV-2 and RSV-2, RBV-3 and RSV-3, etc.

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

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

6 Enter the Reboiler Vent and Glycol Regenerator Still Vent Potential to Emit (PTE) for the listed regulated pollutants in lbs per hour and tons per year. The Glycol Regenerator Still Vent potential emissions may be determined using the most recent version of the thermodynamic software model GRI-GLYCalc™ (Radian International LLC & Gas Research Institute). **Attach all referenced Potential Emissions Data (or calculations) and the GRI-GLYCalc™ Aggregate Calculations Report (shall include emissions reports, equipment reports, and stream reports) to this Glycol Dehydration Emission Unit Data Sheet(s). Backup pumps do not have to be considered as operating for purposes of PTE.** This PTE data shall be incorporated in the Emissions Summary Sheet.

Attachment P

PNEUMATIC CONTROLLERS DATA SHEET

ATTACHMENT P – PNEUMATIC CONTROLLERS DATA SHEET
Are there any continuous bleed natural gas driven pneumatic controllers at this facility that commenced construction, modification or reconstruction after August 23, 2011? ☐ Yes ☒ No Please list approximate number.
Are there any continuous bleed natural gas driven pneumatic controllers at this facility with a bleed rate greater than 6 standard cubic feet per hour that are required based on functional needs, including but not limited to response time, safety and positive actuation that commenced construction, modification or reconstruction after August 23, 2011? ☐ Yes ☒ No Please list approximate number.

Attachment Q

AIR POLLUTION CONTROL DEVICE / EMISSION REDUCTION DEVICE (ERD) SHEET

Attachment Q – Air Pollution Control Device/Emission Reduction Device (ERD) Sheet

The Greenhills Station does not operate any units that qualify as air pollution control device, as defined in Attachment Q.

Attachment R

EMISSION CALCULATIONS

Natural Gas Compressor Engine CE-1

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Engine Rating (bhp)	Fuel Consumption (Btu/bhp-hr)	Heat Value of Natural Gas (Btu/scf)	Annual Operating Hours	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
VOC's	0.28	g/bhp-hr	Manufacturer Data	630.0	8,533	1,204.47	8,760	0.39	1.70
Formaldehyde	5.28E-02	lb/MMBtu	AP-42 Chapter 3.2	630.0	8,533	1,204.47	8,760	0.28	1.24
Benzene	4.40E-04	lb/MMBtu	AP-42 Chapter 3.2	630.0	8,533	1,204.47	8,760	<0.01	0.01
Toluene	4.08E-04	lb/MMBtu	AP-42 Chapter 3.2	630.0	8,533	1,204.47	8,760	<0.01	<0.01
Ethylbenzene	3.97E-05	lb/MMBtu	AP-42 Chapter 3.2	630.0	8,533	1,204.47	8,760	<0.01	<0.01
Xylene	1.84E-04	lb/MMBtu	AP-42 Chapter 3.2	630.0	8,533	1,204.47	8,760	<0.01	<0.01
Hexane	1.11E-03	lb/MMBtu	AP-42 Chapter 3.2	630.0	8,533	1,204.47	8,760	<0.01	0.03
CO	1.60	g/bhp-hr	Manufacturer Data	630.0	8,533	1,204.47	8,760	2.22	9.74
NO_x	2.00	g/bhp-hr	Manufacturer Data	630.0	8,533	1,204.47	8,760	2.78	12.17
$PM_{Filterable}$	7.71E-05	lb/MMBtu	AP-42 Chapter 3.2	630.0	8,533	1,204.47	8,760	<0.01	<0.01
$PM_{Condensable}$	9.91E-03	lb/MMBtu	AP-42 Chapter 3.2	630.0	8,533	1,204.47	8,760	0.05	0.23
PM_{Total}	9.99E-03	lb/MMBtu	AP-42 Chapter 3.2	630.0	8,533	1,204.47	8,760	0.05	0.24
SO_2	5.88E-04	lb/MMBtu	AP-42 Chapter 3.2	630.0	8,533	1,204.47	8,760	<0.01	0.01
CO_2	53.06	kg CO_2 / MMBtu	40 CFR Subpart C	630.0	8,533	1,204.47	8,760	644.60	2,823.36
CH_4	0.001	kg CH_4 / MMBtu	40 CFR Subpart C	630.0	8,533	1,204.47	8,760	0.01	0.05
N_2O	0.0001	kg N_2O / MMBtu	40 CFR Subpart C	630.0	8,533	1,204.47	8,760	<0.01	<0.01
Total HAPs								0.29	1.27
Total CO_2e								645.27	2,826.28

Notes:

- Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.
- AP-42, Chapter 3.2, Table 3.2-3 - Uncontrolled Emission Factors for 4-Stroke Rich Burn Engines
- Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.
- CO_2 equivalency solved for using Global Warming Potentials found in 40 CFR 98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

Example Equations:

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(lb/10^6 scf) ÷** Heating Value of Natural Gas **(Btu/scf)** x Boiler Rating (**MMBtu/hr)**

Glycol Dehydrator Reboiler (RBV-1)

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Boiler Rating (MMBtu/hr)	Heat Value of Natural Gas (Btu/scf)	Annual Operating Hours	Max. Hourly Emissions. (lb/hr)	Max. Annual Emissions. (tpy)
VOC's	5.5	lb/10^6 scf	AP-42 Chapter 1.4	0.50	1,235	8,760	<0.01	<0.01
Hexane	1.8	lb/10^6 scf	AP-42 Chapter 1.4	0.50	1,235	8,760	<0.01	<0.01
Formaldehyde	0.075	lb/10^6 scf	AP-42 Chapter 1.4	0.50	1,235	8,760	<0.01	<0.01
Benzene	0.0021	lb/10^6 scf	AP-42 Chapter 1.4	0.50	1,235	8,760	<0.01	<0.01
Toluene	0.0034	lb/10^6 scf	AP-42 Chapter 1.4	0.50	1,235	8,760	<0.01	<0.01
Pb	0.0005	lb/10^6 scf	AP-42 Chapter 1.4	0.50	1,235	8,760	<0.01	<0.01
CO	84	lb/10^6 scf	AP-42 Chapter 1.4	0.50	1,235	8,760	0.03	0.15
NO_x	100	lb/10^6 scf	AP-42 Chapter 1.4	0.50	1,235	8,760	0.04	0.18
$PM_{Filterable}$	1.9	lb/10^6 scf	AP-42 Chapter 1.4	0.50	1,235	8,760	<0.01	<0.01
$PM_{Condensable}$	5.7	lb/10^6 scf	AP-42 Chapter 1.4	0.50	1,235	8,760	<0.01	0.01
PM_{Total}	7.6	lb/10^6 scf	AP-42 Chapter 1.4	0.50	1,235	8,760	<0.01	0.01
SO_2	0.6	lb/10^6 scf	AP-42 Chapter 1.4	0.50	1,235	8,760	<0.01	<0.01
CO_2	53.06	kg CO_2 / MMBtu	40CFR98 Subpart C	0.50	1,235	8,760	58.49	256.18
CH_4	0.001	kg CH_4 / MMBtu	40CFR98 Subpart C	0.50	1,235	8,760	<0.01	<0.01
N_2O	0.0001	kg N_2O / MMBtu	40CFR98 Subpart C	0.50	1,235	8,760	<0.01	<0.01
Total HAPs							<0.01	<0.01
Total CO_2e							58.55	256.44

Notes:

- Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.
- AP-42, Chapter 1.4 references are from the July 1998 revision.
- Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.
- CO_2 equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

Example Equations:

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(lb/10^6 scf)** ÷ Heating Value of Natural Gas **(Btu/scf)** x Boiler Rating (**MMBtu/hr)**

Dehydrator Vents RSV-1

Pollutant	Max. Hourly Emissions using GlyCalc (lb/hr)	Max. Yearly Emissions using GlyCalc (tons/yr)
VOCs	7.69	33.66
HAPs	1.45	6.34
n-Hexane	0.19	0.84
Benzene	0.24	1.05
Toluene	0.53	2.32
Ethylbenzene	<0.01	<0.01
Xylene	0.49	2.13
CO_2	<0.01	0.02
CH_4	13.36	58.50
Total CO_2e	333.90	1462.47

Notes:

-Emission rates for dehydrator RSV-1 were calculated using GRI-GLYCALC version 4.0. The GRI-GLYCALC output sheets for the Greenhills Pad are attached.

-Emissions from Dehydrator Vents RSV-1 are vented to the atmosphere. There is no control device.

-CO_2 equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1. GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

-CO_2 and CH_4 emissions solved for using emissions rates (lb/hr) from the flash tank off gas stream and the regenerator over head stream.

Condensate Tanks #1 TD-201 and #2 TD-202

Pollutant	Max. Hourly Emissions using E&P Tanks (lb/hr)	Max. Yearly Emissions using E&P Tanks (tons/yr)
VOCs	0.92	4.03
HAPs	0.03	0.11
n-Hexane	0.02	0.09
Benzene	<0.01	0.01
Toluene	<0.01	<0.01
Ethylbenzene	<0.01	<0.01
Xylene	<0.01	<0.01
CO_2	0.08	0.34
CH_4	0.14	0.61
Total CO_2e	3.55	15.56

Notes:

- Emissions from the Condensate Tanks #1 and #2 are vented directed to atmosphere.
- CO_2 equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1. GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

Liquid Unloading Operations

Loading Area Name	Saturation Factor	Vapor Pressure (psia)	MW	Temperature (°R)	Calculated Loading Loss (lb/10^3 gal)	Fill Rate (gpm)	Produced Fluids Throughput (10^3 gal/yr)	Fill Time (min/loading)	Uncontrolled Emissions		
									Material Loaded	lb/hr	TPY
LR - 1	0.6	7.70	126.94	530	13.80	83	176	60	VOCs	0.32	0.01
									HAPs	0.03	0.000
									CO_2	0.00	0.000
									CH_4	0.00	0.00
									CO_2e	0.00	0.00

Notes:

- To establish a conservative estimate of VOCs, an assumption was made that all loading losses are VOCs.
-HAP emissions were estimated using the vent gas composition included in the E&P Tank simulations.

Example Calculations:

Loading Loss (lb/1,000 gal) = 12.46 x (saturation factor x vapor pressure psia x molecular weight) ÷ temperature °R

*Loading Loss Calculation from AP-42 5.2-4

Uncontrolled VOC Emissions (lb/hr) = Condensate Loading Emissions + Produced Water Loading Emissions

Fugitive Leaks

Default Average Component Counts for Major Onshore Natural Gas Production Equipment [1]				
Facility Equipment Type	Valves	Connectors	Open-ended Lines	Pressure Relief Valves
Wellheads	8	38	0.5	0
Separators	1	6	0	0
Meters/Piping	12	45	0	0
Compressors	12	57	0	0
In-line Heaters	14	65	2	1
Dehydrators	24	90	2	2

[1]- Table W-1B to 40CFR98 Subpart W

Station Specific Equipment Counts	
Facility Equipment Type	Count on Site
Wellheads	0
Separators	1
Meters/Piping	5
Compressors	1
In-line Heaters	1
Dehydrators	1

Gas Composition													
	Propane	Butane	Pentanes	Heptane	Octanes	Nonanes	Decanes	Hexane	Benzene	Toluene	Ethylbenzene	Xylene	CO_2	CH_4
Mole %	4.43	1.42	0.42	0.03	0.01	0.00	<0.001	0.08	0.00	0.006	<0.001	0.004	0.09	81.50
MW	44	58	72	100	114	128	142	86.00	78.00	92.00	106.00	106.00	44.00	16.00

Fugitive Emissions													
Facility Equipment Type	Total Count	Emission Rate (scf/hr/component)[2]	Hours of Operation	VOCs (lbs/hr)	VOCs (tons/yr)	HAPs (lbs/hr)	HAPs (tons/yr)	CO_2 (lbs/hr)	CO_2 (tons/yr)	CH_4 (lbs/hr)	CH_4 (tons/yr)	Total CO_2e (lbs/hr)	Total CO_2e (tons/yr)
Valves	75	0.027	8760	0.02	0.07	<0.001	0.002	<0.001	<0.001	0.07	0.30	1.71	7.50
Connectors	296	0.003	8760	0.01	0.03	<0.001	<0.001	<0.001	<0.001	0.03	0.13	0.75	3.29
Open-ended Lines	2	0.06	8760	0.001	0.00	<0.001	<0.001	<0.001	<0.001	0.00	0.02	0.10	0.45
Pressure Relief Valves	1	0.04	8760	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	0.00	0.01	0.03	0.15
			Total Emissions:	**0.03**	**0.11**	**<0.001**	**0.003**	**<0.001**	**0.001**	**0.10**	**0.46**	**2.60**	**11.39**

[2]- Table W-1A to 40CFR98 Subpart W

Example Equations:
Fugitive Emissions (lb/hr) = Count x Emission Rate x Hours of Operation ÷ 385.5 scf/lbmol x mol VOC's

Total Greenhills Compressor Station Potentials to Emit

	VOCs		HAPs		CO		NO_x		PM_{Total}		$PM_{Filterable}$		$PM_{Condensable}$		SO_2		CO_2		CH_4		N_2O		CO_2e	
Emission Sources	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
Compressor Engine 1 (CE-1)	0.39	1.70	0.290	1.27	2.22	9.74	2.78	12.17	0.05	0.23	<0.01	<0.01	0.05	0.23	<0.01	0.01	644.60	2,823.36	0.01	0.05	<0.01	<0.01	645.27	2,826.28
Reboiler (RBV-1)	<0.01	<0.01	<0.01	<0.01	0.03	0.15	0.04	0.18	<0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	58.49	256.18	<0.01	<0.01	<0.01	<0.01	58.55	256.44
Dehydrator Vent (RSV-1)	7.69	33.66	1.45	6.34	--	--	--	--	--	--	--	--	--	--	--	--	<0.01	0.02	13.36	58.50	--	--	333.90	1,462.47
Condensate Tanks (TD-201, TD-202)	0.92	4.03	0.03	0.11	--	--	--	--	--	--	--	--	--	--	--	--	0.08	0.34	0.14	0.61	--	--	3.55	15.56
Tank Truck Loading (LR-1)	0.32	0.006	0.03	0.000	--	--	--	--	--	--	--	--	--	--	--	--	0.000	0.000	0.000	0.000	--	--	0.005	0.000
Fugitives	0.03	0.11	<0.001	0.003	--	--	--	--	--	--	--	--	--	--	--	--	<0.001	0.001	0.10	0.46	--	--	2.60	11.39
Totals	9.34	39.52	1.79	7.72	2.26	9.88	2.82	12.35	0.05	0.25	0.000	0.000	0.05	0.24	0.000	0.01	703.17	3,079.90	13.61	59.62	0.000	0.000	1043.87	4,572.14

Total Greenhills Compressor Station HAP Potentials to Emit

	Total HAPs		n-Hexane		Benzene		Toluene		Ethylbenzene		Xylenes		Formaldehyde	
Emission Sources	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
Compressor Engine 1 (CE-1)	0.29	1.27	0.01	0.03	0.002	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.28	1.24
Reboiler (RBV-1)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	--	--	--	--	<0.01	<0.01
Dehydrator Vent (RSV-1)	1.45	6.34	0.19	0.84	0.24	1.05	0.53	2.32	0.00	0.001	0.49	2.13	--	--
Condensate Tanks (TD-201, TD-202)	0.03	0.11	0.02	0.09	0.002	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	--	--
Tank Truck Loading (LR-1)	0.03	0.000	--	--	--	--	--	--	--	--	--	--	--	--
Fugitives	<0.001	0.003	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	--	--
Totals	1.79	7.72	0.22	0.96	0.24	1.07	0.53	2.32	0.000	0.001	0.49	2.13	0.28	1.24

Gas Analytical Services

Good

Charleston, WV

555-555-5555

Customer	: 8298 - Exco Resources	**Date Sampled**	: 06/30/2015
Station ID	: GREENHILL	**Date Analyzed**	: 07/02/2015
Cylinder ID	: 2005	**Effective Date**	: 07/01/2015
Producer	:	**Cyl Pressure**	: 0
Lease	: Greenhill Compressor	**Temp**	: 0
Area	: 630 - Exco Resources	**Cylinder Type**	: Spot
State	:	**Sample By**	: M Thomas

COMPONENT	MOL%	GPM@14.73(PSIA)
Carbon-Dioxide	0.0893	0.000
Oxygen	0.0026	0.000
Nitrogen	1.1972	0.000
Methane	81.5049	0.000
Ethane	10.5448	2.829
Propane	4.4264	1.223
Iso-Butane	0.4009	0.132
N-Butane	1.0206	0.323
Neo-Pentane	0.0037	0.001
Iso-Pentane	0.2073	0.076
N-Pentane	0.2132	0.078
N-Hexane	0.0787	0.051
N-Heptane	0.0304	0.014
N-Octane	0.0071	0.004
N-Nonane	0.0018	0.001
N-Decane	0.0007	0.000
Benzene	0.0040	0.001
Toluene	0.0057	0.002
M-Xylene/P-Xylene	0.0030	0.001
O-Xylene	0.0006	0.000
C6's	0.1095	0.044
C7's	0.1040	0.043
C8's	0.0333	0.018
C9's	0.0063	0.003
C10's	0.0029	0.002
C11's	0.0010	0.001
C12's	0.0001	0.000
TOTAL	**100.0000**	**4.847**

Compressibility Factor (Z) @ 14.73 @ 60 Deg. F = 0.9968 **C5+ GPM** : 0.20900

Ideal Gravity: 0.6930 **Real Gravity:** 0.6950 **C5+ Mole %** : 0.7696

BTU @ (PSIA)	@14.65	@14.696	@14.73	@15.025
Ideal GPM	4.804	4.819	4.831	4.927
Ideal BTU Dry	1,200.58	1,204.35	1,207.14	1,231.31
Ideal BTU Sat	1,179.57	1,183.34	1,186.12	1,210.30
Real GPM	4.820	4.835	4.846	4.944
Real BTU Dry	1,204.47	1,208.26	1,211.06	1,235.40

Real BTU Sat	1,183.85	1,187.65	1,190.45	1,214.80

Comments:

Gas Analysis performed in accordance with GPA 2286

Analytical Calculations performed in accordance with GPA 2172

Sample Count : 230000001

COC :

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: EXCO Resources PA, LLC - Green Hills Compressor Station
File Name: F:\Projects\E\EXCO\0330318 - General Services\6.0 Plans and Reports\Greenhills\G35-C Application (NOT FILED)\Supporting Data\Attachment R - Emissions Calculations\EXCO Greenhills_9_20_16 Update.ddf
Date: September 20, 2016

DESCRIPTION:

Description:

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 82.00 deg. F
Pressure: 900.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.0893
Nitrogen	1.1972
Methane	81.5049
Ethane	10.5448
Propane	4.4264
Isobutane	0.4009
n-Butane	1.0206
Isopentane	0.2073
n-Pentane	0.2132
Cyclopentane	0.0037
n-Hexane	0.0787
Cyclohexane	0.0000
Other Hexanes	0.3740
Heptanes	0.0000
Methylcyclohexane	0.0000
2,2,4-Trimethylpentane	0.0000
Benzene	0.0040
Toluene	0.0057
Ethylbenzene	0.0000
Xylenes	0.0030
C8+ Heavies	0.0436

DRY GAS:

Flow Rate: 3.0 MMSCF/day
Water Content: 7.0 lbs. H2O/MMSCF

LEAN GLYCOL:

Glycol Type: TEG
Water Content: 1.5 wt% H2O
Flow Rate: 1.0 gpm

PUMP:

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

FLASH TANK:

Flash Control: Vented to atmosphere
Temperature: 164.0 deg. F
Pressure: 30.0 psig

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: EXCO Resources PA, LLC - Green Hills Compressor Station
File Name: F:\Projects\E\EXCO\0330318 - General Services\6.0 Plans and Reports\Greenhills\G35-C Application (NOT FILED)\Supporting Data\Attachment R - Emissions Calculations\EXCO Greenhills_9_20_16 Update.ddf
Date: September 20, 2016

DESCRIPTION:

Description:

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0714	1.714	0.3128
Ethane	0.0686	1.646	0.3004
Propane	0.0927	2.225	0.4061
Isobutane	0.0175	0.421	0.0768
n-Butane	0.0637	1.528	0.2789
Isopentane	0.0168	0.403	0.0735
n-Pentane	0.0239	0.573	0.1045
Cyclopentane	0.0040	0.097	0.0176
n-Hexane	0.0228	0.547	0.0998
Cyclohexane	<0.0001	<0.001	<0.0001
Other Hexanes	0.0711	1.706	0.3113
Heptanes	<0.0001	<0.001	<0.0001
Methylcyclohexane	<0.0001	<0.001	<0.0001
2,2,4-Trimethylpentane	<0.0001	<0.001	<0.0001
Benzene	0.1811	4.347	0.7933
Toluene	0.4354	10.450	1.9071
Ethylbenzene	0.0001	0.003	0.0005
Xylenes	0.4433	10.639	1.9416
C8+ Heavies	0.2755	6.613	1.2069
Total Emissions	1.7879	42.911	7.8312
Total Hydrocarbon Emissions	1.7879	42.911	7.8312
Total VOC Emissions	1.6480	39.551	7.2180
Total HAP Emissions	1.0827	25.985	4.7423
Total BTEX Emissions	1.0599	25.438	4.6425

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	13.2843	318.823	58.1853
Ethane	3.9243	94.184	17.1887
Propane	2.7181	65.235	11.9053
Isobutane	0.3628	8.707	1.5890
n-Butane	1.0427	25.025	4.5670
Isopentane	0.2584	6.201	1.1317
n-Pentane	0.3020	7.248	1.3228
Cyclopentane	0.0124	0.297	0.0542
n-Hexane	0.1692	4.060	0.7410

Cyclohexane	<0.0001	<0.001	<0.0001
Other Hexanes	0.6955	16.691	3.0461
Heptanes	<0.0001	<0.001	<0.0001
Methylcyclohexane	<0.0001	<0.001	<0.0001
2,2,4-Trimethylpentane	<0.0001	<0.001	<0.0001
Benzene	0.0576	1.381	0.2521
Toluene	0.0951	2.282	0.4164
Ethylbenzene	<0.0001	<0.001	0.0001
Xylenes	0.0427	1.025	0.1870
C8+ Heavies	0.2809	6.742	1.2304
Total Emissions	23.2459	557.902	101.8172
Total Hydrocarbon Emissions	23.2459	557.902	101.8172
Total VOC Emissions	6.0373	144.895	26.4433
Total HAP Emissions	0.3645	8.748	1.5966
Total BTEX Emissions	0.1953	4.688	0.8555

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	13.3557	320.537	58.4980
Ethane	3.9929	95.831	17.4891
Propane	2.8108	67.460	12.3114
Isobutane	0.3803	9.128	1.6659
n-Butane	1.1064	26.553	4.8459
Isopentane	0.2752	6.604	1.2052
n-Pentane	0.3259	7.821	1.4274
Cyclopentane	0.0164	0.393	0.0718
n-Hexane	0.1920	4.607	0.8409
Cyclohexane	<0.0001	<0.001	<0.0001
Other Hexanes	0.7665	18.397	3.3574
Heptanes	<0.0001	<0.001	<0.0001
Methylcyclohexane	<0.0001	<0.001	<0.0001
2,2,4-Trimethylpentane	<0.0001	<0.001	<0.0001
Benzene	0.2387	5.728	1.0454
Toluene	0.5305	12.731	2.3235
Ethylbenzene	0.0001	0.003	0.0006
Xylenes	0.4860	11.663	2.1286
C8+ Heavies	0.5565	13.355	2.4373
Total Emissions	25.0339	600.813	109.6484
Total Hydrocarbon Emissions	25.0339	600.813	109.6484
Total VOC Emissions	7.6852	184.445	33.6613
Total HAP Emissions	1.4472	34.734	6.3389
Total BTEX Emissions	1.2553	30.126	5.4980

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	58.4980	58.4980	0.00
Ethane	17.4891	17.4891	0.00
Propane	12.3114	12.3114	0.00
Isobutane	1.6659	1.6659	0.00
n-Butane	4.8459	4.8459	0.00

Isopentane	1.2052	1.2052	0.00
n-Pentane	1.4274	1.4274	0.00
Cyclopentane	0.0718	0.0718	0.00
n-Hexane	0.8409	0.8409	0.00
Cyclohexane	<0.0001	<0.0001	0.00
Other Hexanes	3.3574	3.3574	0.00
Heptanes	<0.0001	<0.0001	0.00
Methylcyclohexane	<0.0001	<0.0001	0.00
2,2,4-Trimethylpentane	<0.0001	<0.0001	0.00
Benzene	1.0454	1.0454	0.00
Toluene	2.3235	2.3235	0.00
Ethylbenzene	0.0006	0.0006	0.00
Xylenes	2.1286	2.1286	0.00
C8+ Heavies	2.4373	2.4373	0.00
Total Emissions	109.6484	109.6484	0.00
Total Hydrocarbon Emissions	109.6484	109.6484	0.00
Total VOC Emissions	33.6613	33.6613	0.00
Total HAP Emissions	6.3389	6.3389	0.00
Total BTEX Emissions	5.4980	5.4980	0.00

EQUIPMENT REPORTS:

ABSORBER

NOTE: Because the Calculated Absorber Stages was below the minimum allowed, GRI-GLYCalc has set the number of Absorber Stages to 1.25 and has calculated a revised Dry Gas Dew Point.

Calculated Absorber Stages:	1.25	
Calculated Dry Gas Dew Point:	1.39	lbs. H2O/MMSCF
Temperature:	82.0	deg. F
Pressure:	900.0	psig
Dry Gas Flow Rate:	3.0000	MMSCF/day
Glycol Losses with Dry Gas:	0.0256	lb/hr
Wet Gas Water Content:	Saturated	
Calculated Wet Gas Water Content:	37.07	lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	13.44	gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	3.74%	96.26%
Carbon Dioxide	99.50%	0.50%
Nitrogen	99.96%	0.04%
Methane	99.97%	0.03%
Ethane	99.89%	0.11%
Propane	99.84%	0.16%
Isobutane	99.78%	0.22%
n-Butane	99.71%	0.29%
Isopentane	99.72%	0.28%
n-Pentane	99.63%	0.37%
Cyclopentane	98.36%	1.64%
n-Hexane	99.42%	0.58%
Cyclohexane	97.27%	2.73%
Other Hexanes	99.55%	0.45%
Heptanes	98.95%	1.05%

Component		
Methylcyclohexane	97.13%	2.87%
2,2,4-Trimethylpentane	99.57%	0.43%
Benzene	77.07%	22.93%
Toluene	69.60%	30.40%
Ethylbenzene	63.51%	36.49%
Xylenes	53.93%	46.07%
C8+ Heavies	98.00%	2.00%

FLASH TANK

Flash Control: Vented to atmosphere
Flash Temperature: 164.0 deg. F
Flash Pressure: 30.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.01%	0.99%
Carbon Dioxide	4.69%	95.31%
Nitrogen	0.52%	99.48%
Methane	0.53%	99.47%
Ethane	1.72%	98.28%
Propane	3.30%	96.70%
Isobutane	4.61%	95.39%
n-Butane	5.76%	94.24%
Isopentane	6.34%	93.66%
n-Pentane	7.59%	92.41%
Cyclopentane	24.86%	75.14%
n-Hexane	12.17%	87.83%
Cyclohexane	36.61%	63.39%
Other Hexanes	9.84%	90.16%
Heptanes	20.99%	79.01%
Methylcyclohexane	41.52%	58.48%
2,2,4-Trimethylpentane	12.52%	87.48%
Benzene	77.08%	22.92%
Toluene	83.48%	16.52%
Ethylbenzene	89.44%	10.56%
Xylenes	92.34%	7.66%
C8+ Heavies	54.92%	45.08%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	65.99%	34.01%
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	4.01%	95.99%
n-Pentane	3.77%	96.23%

Cyclopentane	1.72%	98.28%
n-Hexane	2.79%	97.21%
Cyclohexane	7.96%	92.04%
Other Hexanes	6.31%	93.69%
Heptanes	1.89%	98.11%
Methylcyclohexane	8.82%	91.18%
2,2,4-Trimethylpentane	7.33%	92.67%
Benzene	6.41%	93.59%
Toluene	9.39%	90.61%
Ethylbenzene	11.55%	88.45%
Xylenes	13.91%	86.09%
C8+ Heavies	19.50%	80.50%

STREAM REPORTS:

WET GAS STREAM

Temperature: 82.00 deg. F
Pressure: 914.70 psia
Flow Rate: 1.25e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.81e-002	4.64e+000
Carbon Dioxide	8.91e-002	1.29e+001
Nitrogen	1.19e+000	1.10e+002
Methane	8.13e+001	4.30e+003
Ethane	1.05e+001	1.04e+003
Propane	4.42e+000	6.43e+002
Isobutane	4.00e-001	7.67e+001
n-Butane	1.02e+000	1.95e+002
Isopentane	2.07e-001	4.92e+001
n-Pentane	2.13e-001	5.06e+001
Cyclopentane	3.69e-003	8.54e-001
n-Hexane	7.85e-002	2.23e+001
Cyclohexane	9.98e-007	2.77e-004
Other Hexanes	3.73e-001	1.06e+002
Heptanes	9.98e-007	3.30e-004
Methylcyclohexane	9.98e-007	3.23e-004
2,2,4-Trimethylpentane	9.98e-007	3.76e-004
Benzene	3.99e-003	1.03e+000
Toluene	5.69e-003	1.73e+000
Ethylbenzene	9.98e-007	3.50e-004
Xylenes	2.99e-003	1.05e+000
C8+ Heavies	4.35e-002	2.45e+001
Total Components	100.00	6.65e+003

DRY GAS STREAM

Temperature: 82.00 deg. F
Pressure: 914.70 psia
Flow Rate: 1.25e+005 scfh

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

Water	2.92e-003	1.73e-001
Carbon Dioxide	8.88e-002	1.29e+001
Nitrogen	1.20e+000	1.10e+002
Methane	8.14e+001	4.30e+003
Ethane	1.05e+001	1.04e+003
Propane	4.42e+000	6.42e+002
Isobutane	4.00e-001	7.65e+001
n-Butane	1.02e+000	1.95e+002
Isopentane	2.07e-001	4.91e+001
n-Pentane	2.12e-001	5.05e+001
Cyclopentane	3.64e-003	8.40e-001
n-Hexane	7.82e-002	2.22e+001
Cyclohexane	9.72e-007	2.70e-004
Other Hexanes	3.72e-001	1.06e+002
Heptanes	9.89e-007	3.26e-004
Methylcyclohexane	9.71e-007	3.14e-004
2,2,4-Trimethylpentane	9.95e-007	3.74e-004
Benzene	3.08e-003	7.93e-001
Toluene	3.96e-003	1.20e+000
Ethylbenzene	6.35e-007	2.22e-004
Xylenes	1.62e-003	5.66e-001
C8+ Heavies	4.27e-002	2.40e+001
Total Components	100.00	6.64e+003

LEAN GLYCOL STREAM

Temperature: 82.00 deg. F
Flow Rate: 1.00e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	5.54e+002
Water	1.50e+000	8.44e+000
Carbon Dioxide	1.14e-012	6.43e-012
Nitrogen	7.91e-013	4.45e-012
Methane	8.90e-018	5.01e-017
Ethane	9.35e-008	5.26e-007
Propane	7.51e-009	4.23e-008
Isobutane	9.00e-010	5.07e-009
n-Butane	2.50e-009	1.41e-008
Isopentane	1.24e-004	7.00e-004
n-Pentane	1.66e-004	9.36e-004
Cyclopentane	1.25e-005	7.05e-005
n-Hexane	1.16e-004	6.55e-004
Cyclohexane	4.44e-008	2.50e-007
Other Hexanes	8.51e-004	4.79e-003
Heptanes	3.08e-009	1.74e-008
Methylcyclohexane	6.88e-008	3.87e-007
2,2,4-Trimethylpentane	4.36e-009	2.45e-008
Benzene	2.21e-003	1.24e-002
Toluene	8.01e-003	4.51e-002
Ethylbenzene	2.63e-006	1.48e-005
Xylenes	1.27e-002	7.16e-002
C8+ Heavies	1.19e-002	6.67e-002
Total Components	100.00	5.63e+002

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 82.00 deg. F
Pressure: 914.70 psia
Flow Rate: 1.06e+000 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.35e+001	5.54e+002
Water	2.18e+000	1.29e+001
Carbon Dioxide	1.69e-002	1.00e-001
Nitrogen	5.89e-002	3.49e-001
Methane	2.25e+000	1.34e+001
Ethane	6.74e-001	3.99e+000
Propane	4.74e-001	2.81e+000
Isobutane	6.42e-002	3.80e-001
n-Butane	1.87e-001	1.11e+000
Isopentane	4.65e-002	2.76e-001
n-Pentane	5.51e-002	3.27e-001
Cyclopentane	2.78e-003	1.65e-002
n-Hexane	3.25e-002	1.93e-001
Cyclohexane	1.45e-006	8.58e-006
Other Hexanes	1.30e-001	7.71e-001
Heptanes	7.39e-007	4.38e-006
Methylcyclohexane	1.78e-006	1.06e-005
2,2,4-Trimethylpentane	4.51e-007	2.67e-006
Benzene	4.24e-002	2.51e-001
Toluene	9.71e-002	5.76e-001
Ethylbenzene	2.42e-005	1.43e-004
Xylenes	9.41e-002	5.58e-001
C8+ Heavies	1.05e-001	6.23e-001
Total Components	100.00	5.93e+002

FLASH TANK OFF GAS STREAM

Temperature: 164.00 deg. F
Pressure: 44.70 psia
Flow Rate: 4.13e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	6.55e-001	1.28e-001
Carbon Dioxide	1.99e-001	9.53e-002
Nitrogen	1.14e+000	3.47e-001
Methane	7.61e+001	1.33e+001
Ethane	1.20e+001	3.92e+000
Propane	5.67e+000	2.72e+000
Isobutane	5.74e-001	3.63e-001
n-Butane	1.65e+000	1.04e+000
Isopentane	3.29e-001	2.58e-001
n-Pentane	3.85e-001	3.02e-001
Cyclopentane	1.62e-002	1.24e-002
n-Hexane	1.80e-001	1.69e-001
Cyclohexane	5.94e-006	5.44e-006
Other Hexanes	7.42e-001	6.95e-001
Heptanes	3.18e-006	3.46e-006
Methylcyclohexane	5.78e-006	6.18e-006

Component		
2,2,4-Trimethylpentane	1.88e-006	2.34e-006
Benzene	6.77e-002	5.76e-002
Toluene	9.48e-002	9.51e-002
Ethylbenzene	1.31e-005	1.51e-005
Xylenes	3.70e-002	4.27e-002
C8+ Heavies	1.52e-001	2.81e-001
Total Components	100.00	2.38e+001

FLASH TANK GLYCOL STREAM

Temperature: 164.00 deg. F
Flow Rate: 1.01e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.74e+001	5.54e+002
Water	2.25e+000	1.28e+001
Carbon Dioxide	8.25e-004	4.69e-003
Nitrogen	3.22e-004	1.83e-003
Methane	1.26e-002	7.14e-002
Ethane	1.21e-002	6.86e-002
Propane	1.63e-002	9.27e-002
Isobutane	3.08e-003	1.75e-002
n-Butane	1.12e-002	6.37e-002
Isopentane	3.07e-003	1.75e-002
n-Pentane	4.36e-003	2.48e-002
Cyclopentane	7.20e-004	4.09e-003
n-Hexane	4.12e-003	2.34e-002
Cyclohexane	5.52e-007	3.14e-006
Other Hexanes	1.33e-002	7.59e-002
Heptanes	1.62e-007	9.20e-007
Methylcyclohexane	7.71e-007	4.39e-006
2,2,4-Trimethylpentane	5.88e-008	3.34e-007
Benzene	3.40e-002	1.94e-001
Toluene	8.45e-002	4.81e-001
Ethylbenzene	2.25e-005	1.28e-004
Xylenes	9.05e-002	5.15e-001
C8+ Heavies	6.02e-002	3.42e-001
Total Components	100.00	5.69e+002

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.01e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.06e+001	4.35e+000
Carbon Dioxide	4.00e-002	4.69e-003
Nitrogen	2.45e-002	1.83e-003
Methane	1.67e+000	7.14e-002
Ethane	8.56e-001	6.86e-002
Propane	7.89e-001	9.27e-002
Isobutane	1.13e-001	1.75e-002
n-Butane	4.11e-001	6.37e-002
Isopentane	8.73e-002	1.68e-002

n-Pentane	1.24e-001	2.39e-002
Cyclopentane	2.15e-002	4.02e-003
n-Hexane	9.92e-002	2.28e-002
Cyclohexane	1.29e-005	2.89e-006
Other Hexanes	3.09e-001	7.11e-002
Heptanes	3.38e-006	9.03e-007
Methylcyclohexane	1.53e-005	4.00e-006
2,2,4-Trimethylpentane	1.02e-006	3.10e-007
Benzene	8.70e-001	1.81e-001
Toluene	1.77e+000	4.35e-001
Ethylbenzene	4.01e-004	1.13e-004
Xylenes	1.57e+000	4.43e-001
C8+ Heavies	6.07e-001	2.76e-001
Total Components	100.00	6.15e+000

Attachment S

FACILITY-WIDE EMISSION SUMMARY SHEET

ATTACHMENT S – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET

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

Emission Point ID#	NO_x		CO		VOC		SO_2		PM_{10}		$PM_{2.5}$		GHG (CO_2e)	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-1	2.78	12.17	2.22	9.78	0.39	1.70	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	645.27	2,826.28
TD-201&202	--	--	--	--	0.92	4.03	--	--	--	--	--	--	3.55	15.56
LR-1	--	--	--	--	0.32	0.01	--	--	--	--	--	--	<0.01	<0.01
RSV-1	--	--	--	--	7.69	33.66	--	--	--	--	--	--	333.90	1,462.47
RBV-1	0.04	0.18	0.03	0.15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	58.55	256.44
TOTAL	2.82	12.35	2.26	9.88	9.32	39.40	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	1,041.27	4,560.76

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

ATTACHMENT S – FACILITY-WIDE HAP CONTROLLED EMISSIONS SUMMARY SHEET

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

Emission Point ID#	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		Hexane		Total HAPs	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-1	0.28	1.24	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.29	1.27
TD-201&202	--	--	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.09	0.03	0.01
LR-1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	0.03	<0.01
RSV-1	--	--	0.24	1.05	0.53	2.32	<0.01	<0.01	0.49	2.13	0.19	0.84	1.45	6.34
RBV-1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TOTAL	0.28	1.24	0.24	1.07	0.53	2.32	<0.01	<0.01	0.49	2.13	0.24	0.96	1.79	7.72

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

Attachment T

CLASS I LEGAL ADVERTISEMENT

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that EXCO Resources (PA), LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a G35-C General Permit Registration for the Greenhills Compressor Station located off State Route 56 near Ravenswood, Jackson County, West Virginia. The latitude and longitude coordinates are: 38.91695, -81.69417.

The applicant estimates the increased potential to discharge the following regulated air pollutants on a facility-wide basis will be:

Carbon Monoxide (CO) = 9.88 tpy
Nitrogen Oxides (NO_x) = 12.35 tpy
Particulate Matter (PM) = 0.25 tpy
Sulfur Dioxide (SO_2) = 0.01 tpy
Volatile Organic Compounds (VOC) = 39.52 tpy
Formaldehyde = 1.24 tpy
Hexane = 0.96 tpy
Benzene = 1.07 tpy
Toluene = 2.32 tpy
Xylene = 2.13 tpy
Hazardous Air Pollutants (HAPs) = 7.72 tpy
Carbon Dioxide Equivalents (CO_2e) = 4,572.14 tpy

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 XXth day of September, 2016.

By: EXCO Resources PA LLC
Cary Cannon
Environmental Affairs Director