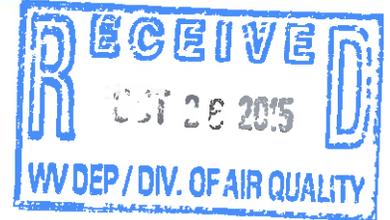




October 2, 2015

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



Re: Permit Determination Request- Martin's Branch Station

Dear Director,

SLR International Corporation, on behalf of Cranberry Pipeline Corporation, is submitting for your consideration the attached Permit Determination Application for the Martin's Branch Station. The facility revision consists of installing a 1.5 MMBTU/HR natural gas fired line heater.

If you have any questions please contact me at (304) 545-8563 or by e-mail at jhanshaw@slrconsulting.com

Sincerely,

Jesse Hanshaw, P.E.
Principal Engineer
SLR International Corporation

Cc Randy Spencer- Cranberry Pipeline Corporation



global environmental solutions

Cranberry Pipeline Corporation
c/o Cabot Oil & Gas Corporation

Martin's Branch Station
Sissonville, West Virginia

Permit Determination

SLR Ref. 116.00400.00132

October 2015



global environmental solutions

Permit Determination
Martin's Branch Station
Sissonville, West Virginia

Prepared for:

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

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

A handwritten signature in blue ink, appearing to read "Michelle Nottingham".

Michelle Nottingham
Project Scientist

A handwritten signature in blue ink, appearing to read "Jesse W. Hanshaw".

Jesse W. Hanshaw P.E.
Principal Engineer

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ATTACHMENT B PROCESS FLOW DIAGRAM

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APPLICATION FOR PERMIT DETERMINATION

Permit Determination

**Martin's Branch Station
Sissonville, West Virginia**

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



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

**PERMIT DETERMINATION FORM
(PDF)**

FOR AGENCY USE ONLY: PLANT I.D. # _____
PDF # _____ PERMIT WRITER _____

1. NAME OF APPLICANT (AS REGISTERED WITH THE WV SECRETARY OF STATE'S OFFICE):
Cranberry Pipeline Corporation

2. NAME OF FACILITY (IF DIFFERENT FROM ABOVE):
Martin's Branch Meter Station

3. NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (NAICS) CODE:
211111

4A. MAILING ADDRESS:
102 3rd Street
Glasgow, West Virginia 25086

4B. PHYSICAL ADDRESS:
0.17 miles onto Geraint Rd. Sissonville, WV

5A. DIRECTIONS TO FACILITY (PLEASE PROVIDE MAP AS ATTACHMENT A):
From the Interstate 77 Northbound take exit 111 for Tupper's Creek Rd. toward WV 29, turn left onto Walker Dr. continue onto Call Rd. travel approximately 1.2 miles. Turn Right onto Sissonville Dr. for 1.2 miles. Turn left on WV-622 S for 1.2 miles. Turn left onto Geraint Road facility is located on the left.

5B. NEAREST ROAD:
Martin's Branch Rd.

5C. NEAREST CITY OR TOWN:
Sissonville

5D. COUNTY:
Kanawha

5E. UTM NORTHING (KM):
4257989.85

5F. UTM EASTING (KM):
440467.20

5G. UTM ZONE:
17

6A. INDIVIDUAL TO CONTACT IF MORE INFORMATION IS REQUIRED:
Jesse Hanshaw

6B. TITLE:
Principal Engineer

6C. TELEPHONE:
304-545-8563

6D. FAX:
N/a

6E. E-MAIL:
jhsanshaw@slrconsulting.com

7A. DAQ PLANT I.D. NO. (FOR AN EXISTING FACILITY ONLY):
039-00045

7B. PLEASE LIST ALL CURRENT 45CSR13, 45CSR14, 45CSR19 AND/OR TITLE V (45CSR30) PERMIT NUMBERS ASSOCIATED WITH THIS PROCESS (FOR AN EXISTING FACILITY ONLY):
N/a

7C. IS THIS PDF BEING SUBMITTED AS THE RESULT OF AN ENFORCEMENT ACTION? IF YES, PLEASE LIST:
N/a

8A. TYPE OF EMISSION SOURCE (CHECK ONE):
 NEW SOURCE ADMINISTRATIVE UPDATE
 MODIFICATION OTHER (PLEASE EXPLAIN IN 11B)

8B. IF ADMINISTRATIVE UPDATE, DOES DAQ HAVE THE APPLICANT'S CONSENT TO UPDATE THE EXISTING PERMIT WITH THE INFORMATION CONTAINED HEREIN?
 YES NO

9. IS DEMOLITION OR PHYSICAL RENOVATION AT AN EXISTING FACILITY INVOLVED? YES NO

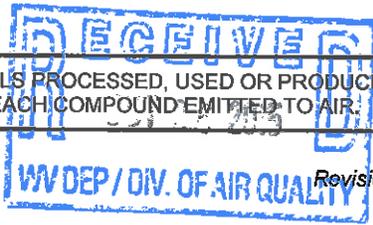
10A. DATE OF ANTICIPATED INSTALLATION OR CHANGE:
ASAP

10B. DATE OF ANTICIPATED START-UP:
ASAP

11A. PLEASE PROVIDE A DETAILED PROCESS FLOW DIAGRAM SHOWING EACH PROPOSED OR MODIFIED PROCESS EMISSION POINT AS ATTACHMENT B.

11B. PLEASE PROVIDE A DETAILED PROCESS DESCRIPTION AS ATTACHMENT C.

12. PLEASE PROVIDE MATERIAL SAFETY DATA SHEETS (MSDS) FOR ALL MATERIALS PROCESSED, USED OR PRODUCED AS ATTACHMENT D. FOR CHEMICAL PROCESSES, PLEASE PROVIDE A MSDS FOR EACH COMPOUND EMITTED TO AIR.



13A. REGULATED AIR POLLUTANT EMISSIONS:

⇒ **FOR A NEW FACILITY**, PLEASE PROVIDE PLANT WIDE EMISSIONS BASED ON THE POTENTIAL TO EMIT (PTE) FOR THE FOLLOWING AIR POLLUTANTS INCLUDING ALL PROCESSES.

⇒ **FOR AN EXISTING FACILITY**, PLEASE PROVIDE THE PROPOSED CHANGE IN EMISSIONS BASED ON THE PTE OF ALL PROCESS CHANGES FOR THE FOLLOWING AIR POLLUTANTS.

PTE FOR A GIVEN POLLUTANT IS TYPICALLY BEFORE AIR POLLUTION CONTROL DEVICES AND IS COLLECTED BASED ON THE MAXIMUM DESIGN CAPACITY OF PROCESS EQUIPMENT.

POLLUTANT	HOURLY PTE (LB/HR)	YEARLY PTE (TON/YR) (HOURLY PTE MULTIPLIED BY 8760 HR/YR) DIVIDED BY 2000 LB/TON
PM	0.12	0.54
PM ₁₀	0.12	0.54
VOCs	4.47	19.58
CO	1.25	5.46
NO _x	9.37	41.02
SO ₂	0.01	0.01
Pb	NA	NA
HAPs (AGGREGATE AMOUNT)	0.23	1.02
TAPs (INDIVIDUALLY)*	NA	NA
OTHER (INDIVIDUALLY)*	NA	NA

* ATTACH ADDITIONAL PAGES AS NEEDED

13B. PLEASE PROVIDE ALL SUPPORTING CALCULATIONS AS ATTACHMENT E.

CALCULATE AN HOURLY AND YEARLY PTE OF EACH PROCESS EMISSION POINT (SHOWN IN YOUR DETAILED PROCESS FLOW DIAGRAM) FOR ALL AIR POLLUTANTS LISTED ABOVE INCLUDING INDIVIDUAL HAP'S (LISTED IN SECTION 112[b] OF THE 1990 CAAA), TAP'S (LISTED IN 45CSR27), AND OTHER AIR POLLUTANTS (E.G. POLLUTANTS LISTED IN TABLE 45-13A OF 45CSR13, MINERAL ACIDS PER 45CSR7, ETC.).

14. CERTIFICATION OF DATA

I, (TYPE NAME) ATTEST THAT ALL THE REPRESENTATIONS CONTAINED IN THIS APPLICATION, OR APPENDED HERETO, ARE TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE BASED ON INFORMATION AND BELIEF AFTER REASONABLE INQUIRY, AND THAT I AM A **RESPONSIBLE OFFICIAL**** (PRESIDENT, VICE PRESIDENT, SECRETARY OR TREASURER, GENERAL PARTNER OR SOLE PROPRIETOR) OF THE APPLICANT.

SIGNATURE OF RESPONSIBLE OFFICIAL: _____



TITLE: EHS Manager **Date:** 10 / 2 / 15

** THE DEFINITION OF THE PHRASE 'RESPONSIBLE OFFICIAL' CAN BE FOUND AT 45CSR13, SECTION 2.23.

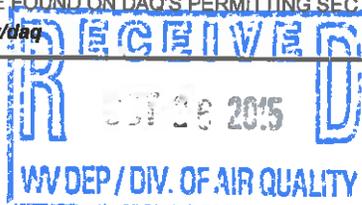
NOTE: PLEASE CHECK ENCLOSED ATTACHMENTS:

ATTACHMENT A ATTACHMENT B ATTACHMENT C ATTACHMENT D ATTACHMENT E

RECORDS ON ALL CHANGES ARE REQUIRED TO BE KEPT AND MAINTAINED ON-SITE FOR TWO (2) YEARS.

THE PERMIT DETERMINATION FORM WITH THE INSTRUCTIONS CAN BE FOUND ON DAQ'S PERMITTING SECTION WEB SITE:

www.dep.wv.gov/daq



ATTACHMENT A

AREA MAP

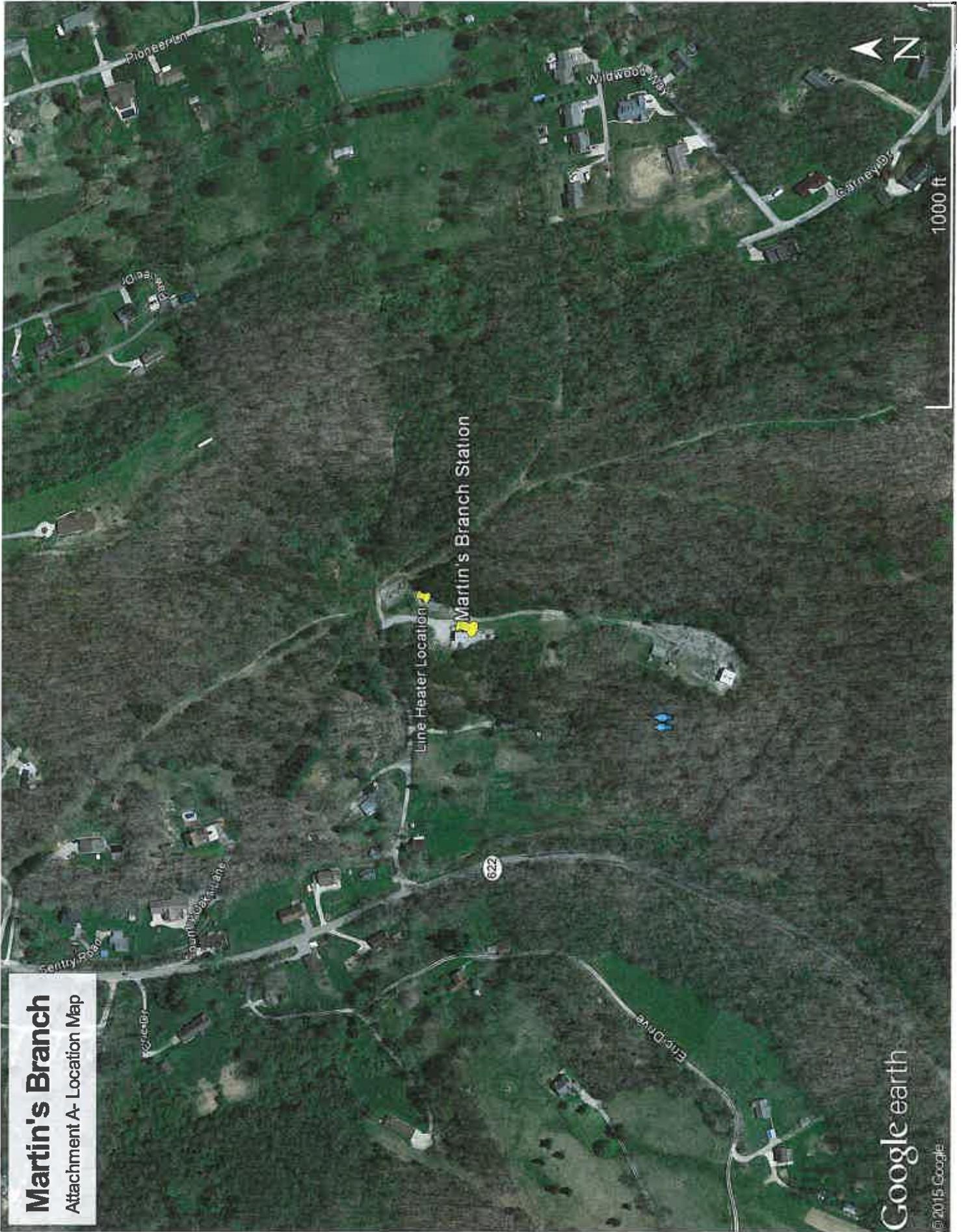
Permit Determination

**Martin's Branch Station
Sissonville, West Virginia**

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

Martin's Branch

Attachment A- Location Map



Google earth

© 2015 Google

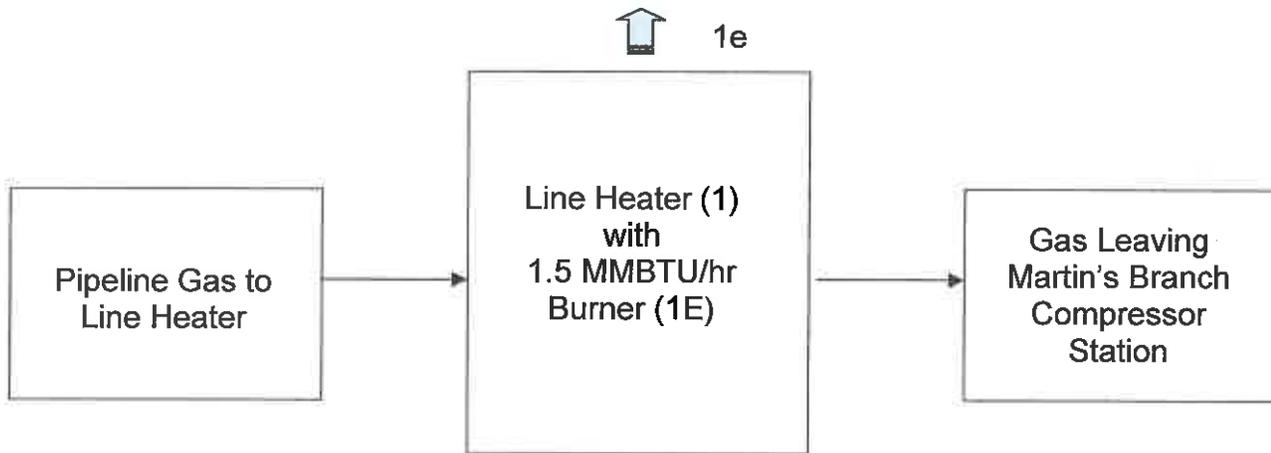
ATTACHMENT B

PROCESS FLOW DIAGRAM

Permit Determination

Martin's Branch Station
Sissonville, West Virginia

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



ATTACHMENT C

PROCESS DESCRIPTION

Permit Determination

**Martin's Branch Station
Sissonville, West Virginia**

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

PROCESS DESCRIPTION

Cabot Oil and Gas is proposing to install a new 1.5 MMBtu/hr line heater at its existing Martin's Branch compressor station. This station was built in 1972 and operated under Title V operating permit number R30-03900045-1996. However, after the 1350 hp Cooper Bessemer engine was removed from service the site was taken out of the Title V major source program. This was documented within a November 17, 2004 letter from DAQ Director John Benedict to Cabot Oil and Gas President Thomas Liberatore.

Due to the new heater being adjacently located to the existing compressor station the entire site wide emissions were evaluated for completeness as part of this determination application. The site's existing equipment consist of a 400 hp Cooper Bessemer compressor engine, a 100 bbl pipeline liquids tank and a 35 bbl engine oil tank.

The emissions from the engine were estimated using 2SLB factors from AP-42. Tank emissions were estimated to include flashing, working and breathing contributions assuming 5 bbl/day maximum throughput. The tank composition was assumed to be equivalent to that measured by pressurized liquid sampling during Cabot's Putnam B6 sampling study. The fugitive equipment leaks and truck loading contributions were also included in the facility wide totals for completeness.

The emissions from the line heater addition was found to be less than modification thresholds as defined in 45CSR13 and the site wide emissions remain below Title V major source thresholds defined within 45CSR30.

ATTACHMENT D

SUPPORTING DOCUMENTS

Permit Determination

Martin's Branch Station
Sissonville, West Virginia

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

**CABOT OIL & GAS CORPORATION
MARTIN'S BRANCH COMPRESSOR STATION
ROCKY FORK COMPRESSOR STATION**

**2003 BOTH WERE TITLE V FACILITIES
IN 2004 BOTH WERE PLACED IN A NON-MAJOR SOURCE
OPERATING FEE PROGRAM**

**SEE THE (3) THREE LETTERS ATTACHED
DATED NOVEMBER 2004**



west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25304

Bob Wise, Governor
Stephanie R. Timmermeyer, Cabinet Secretary
www.wvdep.org

November 17, 2004

Mr. Thomas Liberatore
Vice President, Appalachian Region
Cabot Oil & Gas Corporation
900 Lee Street East, Suite 500
Huntington Square
Charleston, WV 25301

Re: Rocky Fork Compressor Station
Kanawha County
R30-03900219-1996

Dear Mr. Liberatore:

With the incorporation of lean burn technology on the White Superior GTL-825 natural gas fired compressor engine, which reduced emissions below Title V major source thresholds, the Rocky Fork Compressor Station is no longer considered a major Title V source. This is in accordance with the information submitted on November 5, 2004 and the supplemental information contained in your revised Certified Emission Statement Registration Form submitted on November 10, 2004.

The Title V Operating Permit for this facility will be placed as inactive and the facility will now be placed in the 45CSR22 non-major source operating fee program. You will soon be receiving an application for a Rule 22 Certificate to Operate.

If you have questions concerning the Rule 22 fee program, please contact Ms. Jan Newton at 304.926.0499 ext. 1228.

Sincerely,

A handwritten signature in black ink, appearing to read "John A. Benedict", is written over a horizontal line.

John A. Benedict,
Director

C: Jan Newton

Promoting a healthy environment.



west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25304

Bob Wise, Governor
Stephanie R. Timmermeyer, Cabinet Secretary
www.wvdep.org

November 17, 2004

Mr. Thomas Liberatore
Vice President, Appalachian Region
Cabot Oil & Gas Corporation
900 Lee Street East, Suite 500
Huntington Square
Charleston, WV 25301

Re: Martin's Branch Compressor Station
Kanawha County
R30-03900045-1996

Dear Mr. Liberatore:

With the information submitted on November 5, 2004 concerning the retirement of the Cooper GMV-H6 natural gas fired compressor engine and the supplemental information contained in your revised Certified Emission Statement Registration Form submitted on November 10, 2004, the Martin's Branch Compressor Station is no longer considered a major Title V source.

The Title V Operating Permit for this facility will be placed as inactive and the facility will now be placed in the 45CSR22 non-major source operating fee program. You will soon be receiving an application for a Rule 22 Certificate to Operate.

If you have questions concerning the Rule 22 fee program, please contact Ms. Jan Newton at 304.926.0499 ext. 1228.

Sincerely,

John A. Benedict,
Director

C: Jan Newton



Cabot Oil & Gas Corporation

November 8, 2004

Hand Delivered

Director
WVDEP - Division of Air Quality
601-57th Street
Charleston, WV 25304

Title V Permit Termination

Cabot Oil & Gas Corporation

Martin's Branch Compressor Station Plant ID: 03-054-039-00025

Rocky Fork Compressor Station Plant ID: 03-54-039-00219

Dear Director:

Per a telephone request from Mr. Jay Fedczak for certain supplemental information to its November 2, 2004 submission, this letter is again requesting Title V Permit Termination for Cabot Oil & Gas Corporation's Martin's Branch Compressor Station and Rocky Fork Compressor station, both located near Sissonville, West Virginia.

Accompanying this letter are Certified Emissions Statement (CES) Applicability Forms for both stations. When applicability was determined, in 1994, both stations were determined to be subject as a result of potential emissions of one or more criteria pollutants equal to, or greater than, 100 tons per year. The stations were not subject because of the potential to emit Hazardous Air Pollutants (HAP), applicability of a New Source Performance Standard (NSPS), applicability of a National Emission Standard for Hazardous Air Pollutants (NESHAP), nor applicability of Title IV. Further, none of these triggers has been met since that time.

Please be aware that the CES forms include emissions of formaldehyde, the largest single HAP. The HAP Total is for all identified HAPs.

Attached to this letter are documents, previously submitted, requesting the termination of the Title V permits for these two (2) stations. If you have any questions, or need any additional information, please contact Mr. Michael Goff at 304-347-1664.

Sincerely,

Thomas Liberatore

Vice President, Appalachian Region

Cc: Michael Goff, CCRG
Joe Morgan, FRSU

RECEIVED

NOV 11 2004

DEPARTMENT OF ENVIRONMENTAL PROTECTION

SECTION III. SPECIFIC REQUIREMENTS

A. EMISSION POINTS AND POLLUTION CONTROL DEVICES

The following table provides a list of all sources of air pollutant emissions authorized to operate by this permit at the subject facility:

Source ID	Emission Point ID	Equipment Description	Design Capacity	Year Installed
#1	001-02	Reciprocating Engine/Integral Compressor; Cooper Bessemer GMV D-6; Serial # 45004	400 HP	1972
#2	001-03	Reciprocating Engine/Integral Compressor; Cooper Bessemer GMV H-6; Serial # 48366	1350 HP	1983
Dehy	001-04	TEG Dehydration Unit; Sivalls; Serial # 37496 Contains a reboiler.- Sivalls	2.5 MMft ³ /hr 0.75 MMBtu/hr	1983
004	001-06	TEG Dehydrator Vent	N/A	N/A
Tank 001	001-07	Drip Tank No. 1; Above ground vertical fixed roof	4200 gallon	1972
Tank 002	001-08	Engine Oil Tank No. 1; Above ground vertical fixed roof	1470gallon	1972

B. INSIGNIFICANT ACTIVITIES LIST

The following is a list of all insignificant emission units or activities which may be operated at this facility: C.S.R. § 45-30-3.2.d

1. Air compressors and pneumatically operated equipment, including hand tools.
2. Any consumer product used in the same manner as in normal consumer use, provided the use results in a duration and frequency of exposure which are not greater than those experienced by consumers, and which may include, but not limited to, personal use items; janitorial cleaning supplies, office supplies and supplies to maintain copying equipment.
3. Bathroom/toilet vent emissions.
4. Brazing, soldering or welding equipment used as an auxiliary to the principal equipment at the source.
5. Combustion emissions from propulsion of mobile sources, except for vessel emissions from Outer Continental Shelf sources.
6. Combustion units designed and used exclusively for comfort heating that used liquid petroleum gas or natural gas as fuel.



global environmental solutions

Putnam B6 Compressor Station

Cranberry Pipeline Corporation

Glasgow District, West Virginia

Pressurized Separator Sampling and Emissions Estimation
Report

SLR Ref: 116.00400.00064

August 2013



Pressurized Separator Sampling and Emissions Estimation Report

Prepared for:

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

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

Nathaniel Lanham
Senior Environmental Specialist

Fuad Wadud, P.E.
Senior Engineer

CONTENTS

1. INTRODUCTION.....	1
1.1 Applicability and Designation of Affected Source	1
1.2 Sample Collection & Analysis Frequency.....	1
2. PARAMETERS	3
3. CALCULATION OF EMISSIONS.....	4
4. COMPARISON TO EMISSION LIMIT AND THRESHOLD.....	5

TABLES

Table 3.1	Actual Emissions for Drip Tank T-01
Table 4.1	VOC Comparison

Appendix A	GPA Method 2286 Laboratory Results
Appendix B	Operational data and Supporting documents
Appendix C	E&P TANK Version 3.0 Emission Estimate

1. INTRODUCTION

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

1.1 APPLICABILITY AND DESIGNATION OF AFFECTED SOURCE

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

40 CFR 60 Subpart OOOO

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

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

40CFR§6.5395(a)(1) and (2)

For each storage vessel affected facility emitting more than 6 tpy VOC, you must reduce emissions by 95 percent or greater.

1.2 SAMPLE COLLECTION & ANALYSIS FREQUENCY

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

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

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

2. PARAMETERS

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

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

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

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

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

The following default assumptions were made:

- Reid Vapor Pressure is 7.70 psia

3. CALCULATION OF EMISSIONS

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

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

Table 3.1. Actual Emissions for Drip Tank T0-1

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

4. COMPARISON TO EMISSION LIMIT AND THRESHOLD

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

Table 4.1. VOC Emissions Comparison

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

APPENDIX A

GPA METHOD 2286 LABORATORY RESULTS

**Pressurized Separator Sampling and Emissions Estimation
Report**

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

August 2013

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

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

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

Date Sampled: 04/25/13

Job Number: 33213.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

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

Characteristics of Heptanes Plus:

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

Characteristics of Total Sample:

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

Base Conditions: 14.650 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

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

David Dannhaus 361-661-7015

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.019	0.002	0.002
Carbon Dioxide	0.044	0.007	0.007
Methane	1.228	0.194	0.068
Ethane	1.343	0.335	0.139
Propane	1.724	0.443	0.262
Isobutane	0.292	0.089	0.058
n-Butane	1.395	0.410	0.279
2,2 Dimethylpropane	0.048	0.017	0.012
Isopentane	0.610	0.208	0.151
n-Pentane	0.932	0.315	0.231
2,2 Dimethylbutane	0.012	0.005	0.003
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.120	0.046	0.036
2 Methylpentane	0.457	0.177	0.136
3 Methylpentane	0.283	0.108	0.084
n-Hexane	0.940	0.360	0.279
Methylcyclopentane	0.528	0.174	0.153
Benzene	0.054	0.014	0.015
Cyclohexane	0.519	0.165	0.150
2-Methylhexane	0.418	0.181	0.144
3-Methylhexane	0.379	0.162	0.131
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	0.550	0.226	0.188
n-Heptane	1.093	0.470	0.377
Methylcyclohexane	1.528	0.573	0.516
Toluene	0.251	0.079	0.080
Other C-8's	2.887	1.279	1.095
n-Octane	1.425	0.681	0.560
E-Benzene	0.220	0.079	0.080
M & P Xylenes	0.586	0.212	0.214
O-Xylene	0.471	0.167	0.172
Other C-9's	2.953	1.461	1.283
n-Nonane	1.635	0.858	0.722
Other C-10's	4.741	2.578	2.305
n-decane	1.254	0.718	0.614
Undecanes(11)	5.356	2.989	2.710
Dodecanes(12)	5.045	3.041	2.795
Tridecanes(13)	4.918	3.178	2.962
Tetradecanes(14)	4.334	3.000	2.834
Pentadecanes(15)	3.784	2.806	2.682
Hexadecanes(16)	3.075	2.437	2.350
Heptadecanes(17)	2.764	2.316	2.254
Octadecanes(18)	2.683	2.367	2.317
Nonadecanes(19)	2.474	2.274	2.239
Eicosanes(20)	2.166	2.069	2.050
Heneicosanes(21)	1.881	1.891	1.884
Docosanes(22)	1.954	2.047	2.051
Tricosanes(23)	1.593	1.729	1.743
Tetracosanes(24)	1.905	2.143	2.170
Pentacosanes(25)	1.406	1.641	1.669
Hexacosanes(26)	1.487	1.799	1.838
Heptacosanes(27)	1.631	2.046	2.099
Octacosanes(28)	1.481	1.920	1.977
Nonacosanes(29)	1.181	1.581	1.634
Triacosanes(30)	1.004	1.386	1.437
Hentriacosanes Plus(31+)	<u>16.940</u>	<u>42.546</u>	<u>45.761</u>
Total	100.000	100.000	100.000

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

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

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

Heptanes	Liq. Vol/ %
2-methylhexane	0.418
3-methylhexane	0.379
n-Heptane	1.193
Other C-7's	0.55

APPENDIX B

OPERATIONAL DATA AND SUPPORTING DOCUMENTS

(Tank throughput not provided)

Pressurized Separator Sampling and Emissions Estimation Report

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

August 2013

APPENDIX C

E&P TANKS VERSION 3.0 EMISSION ESTIMATE

Pressurized Separator Sampling and Emissions Estimation Report

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

August 2013

Report

* Project Setup Information

*

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

Date : 2013.07.23

* Data Input

*

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

-- Low Pressure Oil

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

-- Sales oil

Production Rate : 5[bb1/day]
Days of Annual Operation : 365 [days/year]

Report

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

-- Tank and Shell Data

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

-- Meteorological Data

 City : Charleston, WV
 Page 1-----

E&P TANK

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

* Calculation Results

*

-- Emission Summary

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

Uncontrolled Recovery Info.

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

--- Emission Composition

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

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

-- Stream Data

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

Page 2

E&P TANK

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

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

ATTACHMENT E

SUPPORTING CALCULATIONS

Permit Determination

Martin's Branch Station
Sissonville, West Virginia

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

Table 1. Annual Potential To Emit (PTE)
Cranberry Pipeline Corporation - Martin's Branch Station

Source	Potential to Emit (PTE) Installation of Line Heater									
	PM	PM10	PM2.5	SO2	NOx	CO	VOC	HAP's	CO2e	
Line Heater	0.049	0.367	0.367	0.004	0.644	0.541	0.035	0.012	768.323	

Potential to Emit (PTE) Aggregated to Include Martin's Branch Compressor station

Source	PM	PM10	PM2.5	SO2	NOx	CO	VOC	HAP's	CO2e
Line Heater	0.049	0.367	0.367	0.004	0.644	0.541	0.035	0.012	768.323
Tanks							0.319		
Engine	0.489	0.489	0.489	0.007	40.376	4.916	1.528	1.005	1491.518
Fugitive Equipment Leaks							17.591		408.988
Fugitive Truck Loading							0.105		
Total Emissions (ton/yr)	0.538	0.856	0.856	0.011	41.021	5.458	19.579	1.018	2668.829
Total Emissions (lb/day)	2.948	4.692	4.692	0.062	224.770	29.904	107.284	5.576	14623.720
Total Emissions (lb/hr)	0.123	0.195	0.195	0.003	9.365	1.246	4.470	0.232	609.322

PTE Hazardous Air Pollutants

Source	*Benzene	*Ethylbenzene	*Toluene	Xylenes	*n-Hexane	Formaldehyde
Line Heater	0.000	0.000	0.000	0.000	0.012	0.000
Tanks	0.000	0.000	0.000	0.000	0.000	0.000
Engine	0.025	0.000	0.012	0.003	0.000	0.703
Total Emissions (ton/yr)	0.025	0.000	0.012	0.003	0.012	0.704
Total Emissions (lb/day)	0.135	0.001	0.067	0.019	0.064	3.855
Total Emissions (lb/hr)	0.006	0.000	0.003	0.001	0.003	0.161

**Table 2. Heater Rates and VOC/HAP Emissions
Cranberry Pipeline Corporation - Martin's Branch Station**

Pollutant	Emission Factor	Emissions (tons/year)
Criteria Pollutants		
PM/PM10/PM2.5	7.6 lb/MMcf (1)	0.049
SO ₂	0.6 lb/MMcf (1)	0.004
NOx	100 lb/MMcf (2)	0.644
CO	84 lb/MMcf (2)	0.541
VOC	5.5 lb/MMcf (1)	0.035
Hazardous Air Pollutants		
Arsenic	2.0E-04 lb/MMcf (3)	0.000
Benzene	2.1E-03 lb/MMcf (4)	0.000
Beryllium	1.2E-05 lb/MMcf (3)	0.000
Cadmium	1.1E-03 lb/MMcf (3)	0.000
Chromium	1.4E-03 lb/MMcf (3)	0.000
Cobalt	8.4E-05 lb/MMcf (3)	0.000
Dichlorobenzene	1.2E-03 lb/MMcf (4)	0.000
Formaldehyde	7.5E-02 lb/MMcf (4)	0.000
Hexane	1.8E+00 lb/MMcf (4)	0.012
Lead	5.0E-04 lb/MMcf (3)	0.000
Manganese	3.8E-04 lb/MMcf (3)	0.000
Mercury	2.6E-04 lb/MMcf (3)	0.000
Naphthalene	6.1E-04 lb/MMcf (4)	0.000
Nickel	2.1E-03 lb/MMcf (3)	0.000
PAH/POM	1.3E-03 lb/MMcf (4)	0.000
Selenium	2.4E-05 lb/MMcf (3)	0.000
Toluene	3.4E-03 lb/MMcf (4)	0.000
Total HAP	1.9E+00 lb/MMCF	0.012
Greenhouse Gas Emissions		
CO ₂	116.89 lb/MMBtu (5)	767.961
CH ₄	2.2E-03 lb/MMBtu (5)	0.014
N ₂ O	0.0 lb/MMBtu (5)	0.000
CO ₂ e ^(b)		768.323

Calculations:

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

Number of Heaters= 1
 Fuel Use (MMBtu/hr) = 1.5
 Hours of Operation (hr/yr)= 8760
 MMBtu/MMcf= 1020
 PTE Fuel Use (MMcf/yr) = 12.9

(b) CO₂ equivalent = [(CO₂ emissions)*(GWP_{CO2})]+[(CH₄ emissions)*(GWP_{CH4})]+[(N₂O emissions)*(GWP_{N2o})]
 Global Warming Potential (GWP)

CO ₂	1	(6)
CH ₄	25	(6)
N ₂ O	298	(6)

Notes:

- (1) AP-42, Chapter 1.4, Table 1.4-2. Emission Factors For Criteria Pollutants and Greenhouse Gases From Natural Gas Combustion, July 1998.
- (2) AP-42, Chapter 1.4, Table 1.4-1. Emission Factors For Nitrogen Oxides (Nox) and Carbon Monoxide(CO) From Natural Gas Combustion, July 1998.
- (3) AP-42, Chapter 1.4, Table 1.4-4. Emission Factors For Metals From Natural Gas Combustion, July 1998.
- (4) AP-42, Chapter 1.4, Table 1.4-3. Emission Factors for Speciated Organic Compounds from Natural Gas Combustion, July 1998.
- (5) Emission factors are from 40 CFR 98, Subpart C, Table C-1 and C-2.
- (6) Global Warming Potentials obtained from 40 CFR 98, Subpart A, Table A-1

**Table 3. Tank Emissions
Cranberry Pipeline Corporation - Martin's Branch Station**

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

Note: This tank is filled by the liquids removed compressor suction pots.

Calculations:

Notes:

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

**Table 4. Natural Gas Compressor Engine Data Sheet
Cranberry Pipeline Corporation - Martin's Branch Station**

Pollutant	Emission Factor	PTE (lb/hr)	PTE ^(a) (tons/yr)
Criteria Pollutants			
PM/PM10/PM2.5	3.84E-02 lb/MMBtu (1)	0.112	0.489
SO ₂	5.88E-04 lb/MMBtu (1)	0.002	0.007
NOx	3.17E+00 lb/MMBtu (1)	9.218	40.376
CO	3.86E-01 lb/MMBtu (1)	1.122	4.916
VOC	1.20E-01 lb/MMBtu (1)	0.349	1.528
Hazardous Air Pollutants			
1,1,2,2-Tetrachloroethane	6.63E-05 lb/MMBtu (1)	1.93E-04	8.44E-04
1,1,2-Trichloroethane	5.27E-05 lb/MMBtu (1)	1.53E-04	6.71E-04
1,3-Butadiene	8.20E-04 lb/MMBtu (1)	2.38E-03	1.04E-02
1,3-Dichloropropene	4.38E-05 lb/MMBtu (1)	1.27E-04	5.58E-04
2-Methylnaphthalene	2.14E-05 lb/MMBtu (1)	6.22E-05	2.73E-04
2,2,4-Trimethylpentane	8.46E-04 lb/MMBtu (1)	2.46E-03	1.08E-02
Acetaldehyde	7.76E-03 lb/MMBtu (1)	2.26E-02	9.88E-02
Acrolein	7.78E-03 lb/MMBtu (1)	2.26E-02	9.91E-02
Benzene	1.94E-03 lb/MMBtu (1)	5.64E-03	2.47E-02
Carbon Tetrachloride	6.07E-05 lb/MMBtu (1)	1.77E-04	7.73E-04
Chlorobenzene	4.44E-05 lb/MMBtu (1)	1.29E-04	5.66E-04
Chloroform	4.71E-05 lb/MMBtu (1)	1.37E-04	6.00E-04
Ethylbenzene	1.08E-05 lb/MMBtu (1)	3.14E-05	1.38E-04
Ethylene Dibromide	7.34E-05 lb/MMBtu (1)	2.13E-04	9.35E-04
Formaldehyde	5.52E-02 lb/MMBtu (1)	1.61E-01	7.03E-01
Methanol	2.48E-03 lb/MMBtu (1)	7.21E-03	3.16E-02
Methylene Chloride	1.47E-04 lb/MMBtu (1)	4.27E-04	1.87E-03
Naphthalene	9.63E-05 lb/MMBtu (1)	2.80E-04	1.23E-03
PAH (POM)	1.34E-04 lb/MMBtu (1)	3.90E-04	1.71E-03
Styrene	5.48E-05 lb/MMBtu (1)	1.59E-04	6.98E-04
Toluene	9.63E-04 lb/MMBtu (1)	2.80E-03	1.23E-02
Vinyl Chloride	2.47E-05 lb/MMBtu (1)	7.18E-05	3.15E-04
Xylenes	2.68E-04 lb/MMBtu (1)	7.79E-04	3.41E-03
Total HAP		0.230	1.01
Greenhouse Gas Emissions			
CO ₂	116.98 lb/MMBtu (3)	340.18	1.49E+03
CH ₄	2.2E-03 lb/MMBtu (3)	6.41E-03	2.81E-02
N ₂ O	2.2E-04 lb/MMBtu (3)	6.41E-04	2.81E-03
CO ₂ e ^(b)	-	340.18	1491.52

Calculations:

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

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

Engine Power Output (kW) =	298.3
Engine Power Output (hp) =	400.0
Number of engines Operating at a Time =	1
Fuel Throughput (cf/hr) =	2967
BSFC (Btu/hp-hr) =	7,270 (2)
Heat Content Natural Gas(Btu/scf) =	980.0 (4)
PTE Hours of Operation =	8,760

(b) CO₂ equivalent = [(CO₂ emissions)*(GWP_{CO2})]+[(CH₄ emissions)*(GWP_{CH4})]+[(N₂O emissions)*(GWP_{N2o})]
Global Warming Potential (GWP)

CO ₂	1	(5)
CH ₄	25	(5)
N ₂ O	298	(5)

Notes:

- (1) AP-42, Chapter 3.2, Table 3.2-1. *Natural Gas-fired Reciprocating Engines (7/00)*. Uncontrolled Emission Factors for 2-Stroke Lean-Burn Engines.
- (2) Emission factors from **Manufacturer's** spec sheet of typical 2SLB for White Superior
- (3) Emission factors are from 40 CFR 98, Subpart C, C-2.
- (4) Default natural gas heat value
- (5) Global Warming Potentials obtained from 40 CFR 98, Subpart A, Table A-1

**Table 5. Fugitive Leak Emissions
Cranberry Pipeline Corporation -Martin's Branch Station**

Pollutant	Emission Factor	PTE ^(a) Gas Service (tons/yr)
Valves	9.9E-03 lb/hr/source (1)	21.72
Low Bleed Pneumatic Valves	9.9E-03 lb/hr/source (1)	4.34
Flanges	8.6E-04 lb/hr/source (1)	4.52
Connector	4.4E-04 lb/hr/source (1)	2.32
Other Points in Gas Service	1.9E-02 lb/hr/source (1)	37.46
Total Gas Released	-	70.36
Total VOC Released (gas service)	(b)	17.59
Calculations:	CO2e	408.99

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

(b) Gas sample from Hamon gas analysis as worst case at 25 wt % VOC

Number of Components in Gas Service

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

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

(2) Like kind site estimate from GP12.1 LDAR Count

**Table 6. Truck Loading (TL) VOC Emissions
Cranberry Pipeline Corporation -Martin's Branch Station**

Contents	Volume Transferred ³	Loading Loss ^(a) (lb VOC/1000gal)	PTE VOC Emissions (lb/hr)	PTE VOC Emissions (ton/yr) ^(b)
Pipeline Liquids	76,650 gal/yr	3.659	0.032	0.105
Total			0.032	0.105

Calculations:

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

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

	<u>Pipeline liquids</u>	
Saturation factor	0.60	Note ⁽¹⁾
Pvap (psia)	7.70	Note ⁽²⁾
Molecular Weight Vap (lb/lbmol)	33.37	Note ⁽²⁾
Bulk Liquid Temperature (F)	65.00	Note ⁽²⁾

Notes:

- (1) AP-42 Section 5.2
- (2) Putnam B6 Compressor Station Pressurized Separator Sampling and Emission Estimation Report, August 2013
- (3) Annual rates based on maximum throughput of 5 bbls/d