Mountain Gathering, LLC

G70-D Permit Application

Boggess Production Facility

Lumberport, WV

Prepared By:

ENVIRONMENTAL RESOURCES MANAGEMENT, Inc.
Hurricane, West Virginia

November 2017

810 Houston St.
Fort Worth TX 76102
www.xtoenergy.com

TEL: (817) 885-2800

Demarco Jones

MOUNTAIN GATHERING, LLC

October 27, 2017

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

RE: G70D Permit Registration Application
Mountain Gathering, LLC.
Boggess Natural Gas Production Facility

Dear Director Durham:

Enclosed are one (1) original hard copy and two (2) complete PDFs included on CD-ROM of a G70D permit registration application for the Boggess natural gas production facility. Presently, Mountain Gathering maintains the Boggess natural gas production and compression facilities under permits G70-A159 and G35-A061.

Mountain Gathering requests the authority to construct a compressor engine at the facility permitted under G70A-159. Based upon operational needs, Mountain Gathering has shutdown the site permit under G35-A061 and removed the compression sources. Mountain Gathering has notified the WVDAQ of the request to close permit G35-A061 in a separate action.

The wellpad facility and compression station were permitted prior to the issuance of the EPA aggregation document, "Source Determination Guidance for Certain Emission Units in the Oil and Natural Gas Sector." With the new permitting action required at the wellpad, Mountain Gathering seeks to update the determination of aggregation and permit the equipment at both surface sites under the G70D, as the two facilities are located with ¼ mile and share equipment.

If you have any questions concerning this registration application, please contact me at (817) 885-1242 or by email at demarco_jones@xtoenergy.com.

Sincerely,

Demarco Jones

Demarco Jones
Mountain Gathering, LLC.

Enclosures

INTRODUCTION

Mountain Gathering, LLC (Mountain Gathering) submits this G70D permit application for a New Source Review (NSR) Permit to the West Virginia Department of Environmental Protection's (WVDEP's) Department of Air Quality for the Boggess natural gas production and compression sites located in Harrison, County West Virginia. The Boggess production and compression sites are presently permitted under permits G70-A159 and G35-A061. These sites are located within a quarter mile of each other and share equipment. The production and compression sites are being aggregated into this new permit application for review by WVDEP, consistent with USEPA's "Source Determination Guidance for Certain Emission Units in the Oil and Natural Gas Sector," effective on August 2, 2016. This application addresses the operational activities associated with the production of natural gas at the Boggess sites.

FACILITY DESCRIPTION

The Boggess natural gas production facility operates in Harrison County, WV and consists of two (2) natural gas wells. Natural gas and liquids, are extracted from underground deposits. The natural gas will be transported from the wells to a gas line for compression and additional processing, as necessary. The produced liquids are stored in storage vessels.

The following equipment is currently permitted under G70-A159 for the Boggess Production site:

- Four (4) Line Heaters each rated at 0.5 MMBtu/hr heat input;
- Four (4) 400 barrel (bbl) Produced Water Tanks;
- One (1) Dehydrator Reboiler rated at 20 MMSCFD;
- One (1) 400 barrel Dehydrator Still Column and Flash Tank; and
- One (1) Produced Water Tank Truck Loading Operation.

The applicant seeks to remove the following equipment from their G70-A159 permit. These items were never constructed at the Boggess Production site:

- Two (2) Line Heaters each rated at 0.5 MMBtu/hr heat input;
- One (1) Dehydrator Reboiler rated at 20 MMSCFD;
- One (1) 400 barrel Dehydrator Still Column and Flash Tank; and

Neighboring the Boggess Production Facility is the Boggess Compressor Station, which was never fully constructed to the scope listed in permit G35-A061. The following items represent the equipment present at that site:

- One (1) Dehydrator Reboiler rated at 2.0 MMBtu/hr heat input;

- One (1) Dehydrator Still Vent rated at 10 MMSCFD
- One (1) 400 barrel Dehydrator Flash Tank; and
- One (1) 400 barrel Sump Storage Tank.

The Boggess Compressor Station is located adjacent to the Boggess Production Facility. This is discussed in greater detail in the "Statement of Aggregation." In conjunction with this permit modification, Mountain Gathering is submitting a request for WVDEP to rescind their G35-A061 permit, in a separate action, so that the equipment listed above can be added to their G70-A159 permit.

Additionally, with the submission of this application Mountain Gathering seeks the authority to construct the following:

- One (1) Reciprocating Compression Engine rated at 1,265 bhp.

There are no compressor engines presently located at the G35-A061 facility. The construction of the listed Reciprocating Compression Engine would be directly related to the operations specifically at the Boggess Production Facility.

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

STATEMENT OF AGGREGATION

The Boggess production and compression facilities are located in Harrison County, WV and operated by Mountain Gathering. Stationary sources of air pollutants may require aggregation of total emission levels to evaluate the potential applicability of Title I, Parts C and D preconstruction permitting programs, and the Title V operating permit program if these sources share the same industrial grouping, are operating under common control, and are classified as contiguous or adjacent properties.

The Boggess production and compression sites, permitted under G70-A159 and G35-A061, qualify as aggregated sites in accordance with EPA guidance. Both sites share the same SIC code, and are under common ownership by Mountain Gathering. The facilities also qualify as adjacent in accordance with EPA guidance. EPA's "Source Determination Guidance for Certain Emission Units in the Oil and Natural Gas Sector," effective on August 2, 2016, defines the term "adjacent" follows:

> *Equipment and activities in the oil and gas sector that are under common control will be considered part of the same source if they are located near each other – specifically, if they are located on the same site or on sites that share equipment and are within ¼ mile of each other.*

The Boggess production and compression facilities fall within a ¼ mile of each other and share equipment, in accordance EPA's recommendation for determining aggregated facilities their Source Determination Guidance. Furthermore both facilities operate under SIC Code 1311 (Crude and Petroleum and Natural Gas Extraction), and inter-related to each other in terms of operation.

Based on the above reasoning, Mountain Gathering is subject to the aggregation of stationary emission sources since the stationary sources are considered contiguous or adjacent facilities. Mountain Gathering has requested in a letter that permit G35-A061 be rescinded, and the remaining equipment be added to the modified permit for the Boggess production facility.

REGULATORY DISCUSSION

This section outlines the state air quality regulations that could be reasonably expected to apply to the Boggess facility and makes an applicability determination for each regulation based on activities conducted at the site and the emissions of regulated air pollutants. This review is presented to supplement and/or add clarification to the information provided in the WVDEP G70-D permit application forms.

The West Virginia State Regulations address applicable state (i.e. State Implementation Plan) rules as well as federal regulations, including Title I Prevention of Significant Deterioration Nonattainment New Source Review preconstruction permitting, Title V, New Source Performance Standards, and National Emission Standards for Hazardous Air Pollutants. The regulatory requirements in reference to Boggess 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 line heaters are indirect heat exchangers that combust natural gas but are exempt since the heat input capacities are 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 Boggess facility are subject to this requirement. Based on the nature of the process at the facility, the presence of objectionable odors is unlikely.

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

The Boggess site does not have a combustion device and is therefore not subject to this rule.

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

The line heaters are indirect heat exchangers that combust natural gas but are exempt since the heat input capacities are less than 10 MMBtu/hr.

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

This G70-D permit application is being submitted for the operational activities associated with Mountain Gathering's production of natural gas.

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 described in more detail in the Federal Regulations section.

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

Federally regulated construction permitting programs regulate new and modified major sources of regulated pollutants.

Operation of equipment at the Boggess facility will not exceed major source emission thresholds established by these permitting programs. Mountain Gathering will monitor future construction and modification activities at the site closely and will compare any future increase in emissions with major source thresholds to ensure these activities will not trigger these programs.

Harrison County, WV is in attainment for all pollutants with the National Ambient Air Quality Standards (NAAQS). Therefore this regulation would not apply to the Boggess facility.

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

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 any combination of HAPs, and 100 tpy of all other regulated pollutants.

The potential emissions of all regulated pollutants are below the corresponding threshold(s) at this facility. The facility is not a major source with respect to the Title V operating permit program.

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. The NESHAP Rules are discussed further in the Federal Regulation section of this document.

FEDERAL REGULATIONS

New Source Performance Standards

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

Subpart JJJJ is applicable to manufacturers, owners, and operators of new stationary spark ignition internal combustion engines (ICE) manufactured on or after July 1, 2008 and sets forth nitrogen oxides (NOx), carbon monoxide (CO), and volatile organic compound (VOC) emission limits, fuel requirements, installation requirements, and monitoring requirements.

The Boggess site is seeking the authority to construct the following compression engine at the station:

- One Caterpillar G3516 natural gas-fired compressor engines rated at 1,265 bhp

This engines were manufactured after July 1, 2008 and, therefore, the requirements of this subpart apply to the listed compressor engine.

40 CFR 60 Subpart OOOO – Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution for which Construction, Modification, or Reconstruction Commenced After August 23, 2011 and On or Before September 18, 2015

Subpart OOOO establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide (SO_2) emissions from affected

facilities that commence construction, modification or reconstruction between August 23, 2011 and September 18, 2015.

The Boggess production facility is a gas well affected facility under OOOO.

There are several equipment types that have been installed at Boggess that do not meet the affected facility definitions as specified by EPA. These include:

- Storage vessels: Emissions from each storage vessel were determined to be below 6 tons per year (tpy) of VOC. Therefore, the produced water tanks are not affected storage vessels.
- Pneumatic devices: All pneumatic devices installed at the Boggess facility are either low-continuous bleed or intermittent bleed and do not qualify as affected sources.

40 CFR 60 Subpart OOOOa (Standards of Performance for Crude Oil and Natural Gas Facilities for Which Construction, Modification, or Reconstruction Commenced After September 18, 2015)

As a Fugitive Component Affected Facility, in order to comply, LDAR monitoring at the Boggess site must be performed within 60 days of startup of production and then quarterly thereafter.

There are several equipment types that have been installed at Boggess that do not meet the affected facility definitions as specified by EPA. These include:

- Storage vessels: Emissions from each storage vessel were determined to be below 6 tons per year (tpy) of VOC. Therefore, the produced water tanks are not affected storage vessels.
- Pneumatic devices: All pneumatic devices installed at the Boggess facility are either low-continuous bleed or intermittent bleed and do not qualify as affected sources.
- Reciprocating Compressor: The installation of the 1,265 bhp G3516 Caterpillar compressor engine does not meet the definition of a Reciprocating Compressor Affected Facility as the compressor is located at the wellsite.

National Emissions Standards for Hazardous Air Pollutants

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

The Boggess site will contain one natural gas dehydration unit that is upstream from a point of custody transfer and are relevant to requirements under subpart HH. Since the emissions from the storage vessels and natural gas dehydration

unit are below major source thresholds, Boggess should be considered an area source for MACT applicability under this NESHAP.[i] Based on PTE calculations provided within this application, the dehydration unit is expected to emit less than 0.9 megagrams of benzene (or 1 ton of benzene) per year, which classifies the unit as a small dehydration unit. Small dehydration units are exempt from the control requirements expressed in §63.764(e).

40 CFR 63, Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines)

The Caterpillar G3516 natural gas-fired compressor engines comply with Subpart ZZZZ by satisfying NSPS Subpart JJJJ.

[i] As defined in §63.761, facilities that are production field facilities, only HAP emissions from glycol dehydration units and storage vessels shall be aggregated for a major source determination. For facilities that are not production field facilities, HAP emissions from all HAP emission units shall be aggregated for a major source determination.

west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25 4
Phone (304) 926-0475
Fax (304) 926-0479
www.dep.wv.gov

G70-D GENERAL PERMIT REGISTRATION APPLICATION

PREVENTION AND CONTROL OF AIR POLLUTION IN REGARD TO THE CONSTRUCTION, MODIFICATION, RELOCATION, ADMINISTRATIVE UPDATE AND OPERATION OF NATURAL GAS PRODUCTION FACILITIES LOCATED AT THE WELL SITE

☐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): Mountain Gathering, LLC.

Federal Employer ID No. (FEIN): 75-2347769

Applicant's Mailing Address: 810 Houston Street

City: Fort Worth	State: TX	ZIP Code: 76102

Facility Name: Boggess Production Facility

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

City: Lumberport	Zip Code: 26386	County: Harrison

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Latitude: 39.37614
Longitude: -80.38580

SIC Code: 1311 NAICS Code: 211111	DAQ Facility ID No. (For existing facilities) 033-00257, 033-00199

CERTIFICATION OF INFORMATION

This G70-D General Permit Registration Application shall be signed below by a Responsible Official. A Responsible Official is a President, Vice President, Secretary, Treasurer, General Partner, General Manager, a member of the Board of Directors, or Owner, depending on business structure. A business may certify an Authorized Representative who shall have authority to bind the Corporation, Partnership, Limited Liability Company, Association, Joint Venture or Sole Proprietorship. Required records of daily throughput, hours of operation and maintenance, general correspondence, compliance certifications and all required notifications must be signed by a Responsible Official or an Authorized Representative. If a business wishes to certify an Authorized Representative, the official agreement below shall be checked off and the appropriate names and signatures entered. **Any administratively incomplete or improperly signed or unsigned G70-D Registration Application will be returned to the applicant. Furthermore, if the G70-D forms are not utilized, the application will be returned to the applicant. No substitution of forms is allowed.**

I hereby certify that Holly Camilli 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 G70-D General Permit Registration Application and any supporting documents appended hereto is, to the best of my knowledge, true, accurate and complete, and that all reasonable efforts have been made to provide the most comprehensive information possible.

Responsible Official Signature: Holly Camilli
Name and Title: Holly Camilli, Vice President – Central Division Operations Phone: (817) 378-5317 Fax:
Email: Holly_Camilli@xtoenergy.com Date: 11/14/17

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

If applicable:
Environmental Contact
Name and Title: Demarco Jones Phone: (817) 885 - 1242 Fax:
Email: Demarco_Jones@xtoenergy.com Date:

OPERATING SITE INFORMATION	
Briefly describe the proposed new operation and/or any change(s) to the facility: Addition of a 1,265 bhp Compressor Engine in conjunction with the remaining Dehydrator and associated tanks at the Boggess Compressor Station Facility. XTO is requesting WVDEP rescind their G35-A061 permit for the compressor station in conjunction with this permit update.	
Directions to the facility: From Lumberport, WV take State Route 20 southwest, before turning right on County Route 20/7. Take County route 20/7 north for 1 mile, until you reach the Boggess site on your left.	
ATTACHMENTS AND SUPPORTING DOCUMENTS	
I have enclosed the following required documents:	
Check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR13 and 45CSR22). ☐ 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): ☒$500 (Construction, Modification, and Relocation) ☐$300 (Class II Administrative Update) ☒$1,000 NSPS fee for 40 CFR60, Subpart IIII, JJJJ, OOOO and/or OOOOa [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)** – 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
☒ G70-D Section Applicability Form – Attachment H	☒ Emission Units/ERD Table – Attachment I
☒ Fugitive Emissions Summary Sheet – Attachment J	
☒ Gas Well Affected Facility Data Sheet (if applicable) – Attachment K	
☒ 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 L	
☒ Natural Gas Fired Fuel Burning Unit(s) Data Sheet (GPUs, Heater Treaters, In-Line Heaters if applicable) – Attachment M	
☒ Internal Combustion Engine Data Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment N	
☒ Tanker Truck/Rail Car Loading Data Sheet (if applicable) – Attachment O	
☒ Glycol Dehydration Unit Data Sheet(s) (include wet gas analysis, GRI- GLYCalc™ input and output reports and information on reboiler if applicable) – Attachment P	
☐ Pneumatic Controllers Data Sheet – Attachment Q	
☐ Pneumatic Pump Data Sheet – Attachment R	
☐ Air Pollution Control Device/Emission Reduction Device(s) Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment S	
☒ Emission Calculations (please be specific and include all calculation methodologies used) – Attachment T	
☒ Facility-wide Emission Summary Sheet(s) – Attachment U	
☒ Class I Legal Advertisement – Attachment V	
☒ One (1) paper copy and two (2) copies of CD or DVD with pdf copy of application and attachments	

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

Attachment A

SINGLE SOURCE DETERMINATION

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).

The Source Determination Rule for the oil and gas industry was published in the Federal Register on June 3, 2016 and will become effective on August 2, 2016. EPA defined the term "adjacent" and stated that equipment and activities in the oil and gas sector that are under common control will be considered part of the same source if they are located on the same site or on sites that share equipment and are within ¼ mile of each other.

Is there equipment and activities in the same industrial grouping (defined by SIC code)?
Yes ☒ No ☐

Is there equipment and activities under the control of the same person/people?
Yes ☒ No ☐

Is there equipment and activities located on the same site or on sites that share equipment and are within ¼ mile of each other?
Yes ☒ No ☐

Attachment B

SITING CRITERIA WAIVER

(NOT APPLICABLE)

Attachment C

CURRENT BUSINESS CERTIFICATE

State of West Virginia

Certificate

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

XTO ENERGY INC.

a corporation formed under the laws of Delaware filed an application to be registered as a foreign corporation authorizing it to transact business in West Virginia. The application was found to conform to law and a "Certificate of Authority" was issued by the West Virginia Secretary of State on May 30, 2008.

I further certify that the corporation has not been revoked by the State of West Virginia nor has a Certificate of Withdrawal been issued to the corporation by the West Virginia Secretary of State.

Accordingly, I hereby issue this

CERTIFICATE OF AUTHORIZATION

Validation ID:6WV5R_YEDXX

Given under my hand and the Great Seal of the State of West Virginia on this day of March 10, 2015

Secretary of State

State of West Virginia

Certificate

I, Betty Ireland, Secretary of State of the State of West Virginia, hereby certify that

XTO ENERGY INC.

Control Number: 999BI

a corporation formed under the laws of Delaware has filed its "Application for Certificate of Authority" to transact business in West Virginia as required by the provisions of the West Virginia Code. I hereby declare the organization to be registered as a foreign corporation from its effective date of May 30, 2008.

Therefore, I issue this

CERTIFICATE OF AUTHORITY

to the corporation authorizing it to transact business in West Virginia

Given under my hand and the Great Seal of the State of West Virginia on this day of May 30, 2008

Betty Ireland

Secretary of State

Betty Ireland
Secretary of State
State Capitol
1900 Kanawha Blvd. E.
Charleston, WV 25305
FILE ONE ORIGINAL
FEES PER SCHEDULE

CERTIFICATE OF AUTHORITY

Penney Barker, Manager
Corporations Division
Tel. (304) 558-8000
Fax (304) 558-8381
www.wvsos.com
Hours: 8:30am-5:00pm
PLEASE READ INSTRUCTIONS

CTRL # 999BI

1. HOME STATE INFORMATION:

a. The name of the corporation as it is registered in its home state is: XTO Energy Inc.

b. State of Delaware Date of Incorp. 10/9/90 Duration (# yrs. or perpetual) perpetual

Warning: Tax reporting requirements in West Va. will not end until a withdrawal is filed.

c. NAIC # _____ (If an insurance company)

FILED

2. PRINCIPAL OFFICE INFORMATION:

a. Address of the principal office of the corporation:
No. & Street: 810 Houston Street
City/State/Zip: Fort Worth, TX 76102

MAY 30 2008

b. Mailing address, if different, from above address:
Street/PO Box: _____
City/State/Zip: _____

IN THE OFFICE OF SECRETARY OF STATE WEST VIRGINIA

3. WEST VIRGINIA INFORMATION:

a. Corporate name to be used in W. Va.: (check one, follow instructions)
☒ Home state name as listed on line 1.a. above, if available.
☐ DBA name

b. Address of registered office in West Virginia, if any
No. & Street: _____
City/State/Zip: _____

c. Mailing address in WV, if different, from above
Street/PO Box: _____
City/State/Zip: _____

d. Proposed purpose(s) for transaction of business in WV
Oil and Gas

4. AGENT OF PROCESS:
Properly designated person to whom notice of process may be sent, if any:
Name: Corporation Service Company
Address: 209 West Washington Street, Charleston, WV 25302

5. **CORPORATE STATUS INFORMATION:**

a. Corporation is organized as (check one): ☒ For profit

☐ Non-profit

b. Directors and Officers: (Add extra page if necessary; please list all officers)

Officer	Name	Address
(see attached)	(see attached)	(see attached)

6. The number of acres of land it holds or expects to hold in West Virginia is: 0

7. **Contact and Signature Information**

a. Frank G. McDonald — Contact Name; (817) 870-2800 — Phone Number

b. Frank G. McDonald — Print or type name of signer; Sr. VP, GC and Asst. Secretary — Title or Capacity of Signer

c. Signature of Signer: Frank G. McDonald Date: May 8, 2008

XTO ENERGY INC.

Directors:

Class I	Phillip R. Kevil, Herbert D. Simons; Vaughn O. Vennerberg II (expires 5/09)
Class II	Lane G. Collins, Scott G. Sherman, Bob R. Simpson (expires 5/10)
Class III	William H. Adams III, Keith A. Hutton, Jack P. Randall (expires 5/08)

Business Address for XTO Energy Inc. Officers and Directors:

810 Houston Street, Fort Worth, TX 76102

Officers:

Chairman of the Board and Chief Executive Officer	Bob R. Simpson
President	Keith A. Hutton
Senior Executive Vice President and Chief of Staff	Vaughn O. Vennerberg II
Executive Vice President and Chief Financial Officer	Louis G. Baldwin
Executive Vice President - Acquisitions	Timothy L. Petrus
Senior Vice President and Treasurer	Brent W. Clum
Senior Vice President - Land	James L. Death
Senior Vice President - Natural Gas Operations	Nick J. Dungey
Senior Vice President - East Texas Operations	Ken K. Kirby
Senior Vice President and Controller	Bennie G. Kniffen
Senior Vice President, General Counsel and Assistant Secretary	Frank G. McDonald
Senior Vice President - Reservoir Engineering	F. Terry Perkins
Senior Vice President - Geology & Geophysics	Mark J. Pospisil
Senior Vice President - Land Administration	Edwin S. Ryan, Jr.
Senior Vice President - Marketing	Terry L. Schultz
Senior Vice President - Mid-Continent Operations	Douglas C. Schultze
Senior Vice President - Investor Relations and Finance	Gary D. Simpson
Senior Vice President - Engineering	Kenneth F. Staab
Senior Vice President - Taxation	Mark A. Stevens
Vice President - Financial Reporting	Scott T. Agosta
Vice President & Corporate Secretary	Virginia N. Anderson
Vice President, Associate General Counsel & Assistant Secretary	Kathy L. Cox
Vice President Operations - San Juan Division	Del L. Craddock
Vice President Operations - Permian Division & Alaska	Kyle M. Hammond
Vice President - Environmental, Health & Safety	Nina C. Hutton
Vice President Operations - Fort Worth Division	Timothy B. McIlwain
Vice President - Information Technology	L. Frank Thomas III
Vice President - Facilities	T. Joy Webster
Vice President - Human Resources	Karen S. Wilson
Assistant Treasurer	William B. Butler
Assistant Controller	Martha L. Montgomery

Rev. 5/8/08

Delaware

The First State

I, HARRIET SMITH WINDSOR, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY "XTO ENERGY INC." IS DULY INCORPORATED UNDER THE LAWS OF THE STATE OF DELAWARE AND IS IN GOOD STANDING AND HAS A LEGAL CORPORATE EXISTENCE SO FAR AS THE RECORDS OF THIS OFFICE SHOW, AS OF THE SIXTH DAY OF MAY, A.D. 2008.

AND I DO HEREBY FURTHER CERTIFY THAT THE SAID "XTO ENERGY INC." WAS INCORPORATED ON THE NINTH DAY OF OCTOBER, A.D. 1990.

AND I DO HEREBY FURTHER CERTIFY THAT THE ANNUAL REPORTS HAVE BEEN FILED TO DATE.

AND I DO HEREBY FURTHER CERTIFY THAT THE FRANCHISE TAXES HAVE BEEN PAID TO DATE.

Harriet Smith Windsor

Harriet Smith Windsor, Secretary of State

2243325 8300

080510772

AUTHENTICATION: 6572039

DATE: 05-06-08

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

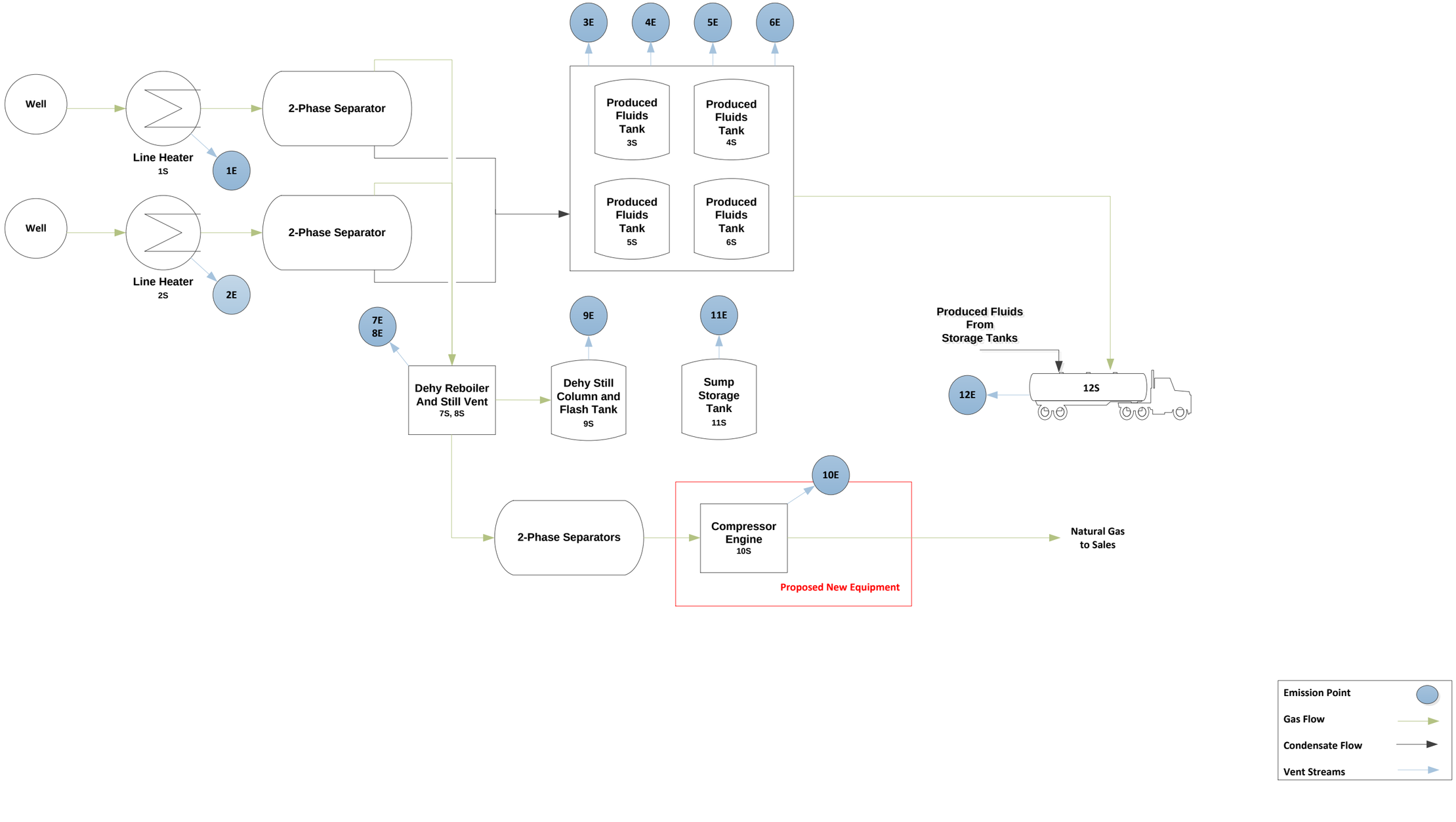
Attachment D

PROCESS FLOW DIAGRAM

Attachment D

Boggess Production Facility

Process Flow Diagram



Attachment E

PROCESS DESCRIPTION

Attachment E – Process Description

This permit application is being filed for Mountain Gathering, LLC for the operational activities associated with the Boggess natural gas production facility. Incoming raw natural gas from the two (2) wells enters the site through a pipeline. The raw gas is routed through line heaters (1S, 2S) to assist with the phase separation process in the downstream two-phase separators. In the separators, produced water, is removed from the raw gas and transferred to the produced water storage tanks (3S – 6S). From the phase separators, the natural gas stream flows through a glycol dehydration unit (7S), where any fluids still entrained within the gas is removed prior to the gas entering the downstream sales pipeline. The gas is routed to one (1) Caterpillar 1,265 bhp G3516 Compression Engine. Fluids are removed from the site from the onsite produced water tanks via tanker truck on an as needed basis. Vapors during truck loading will be uncontrolled.

A process flow diagram is included as Attachment D.

Attachment F

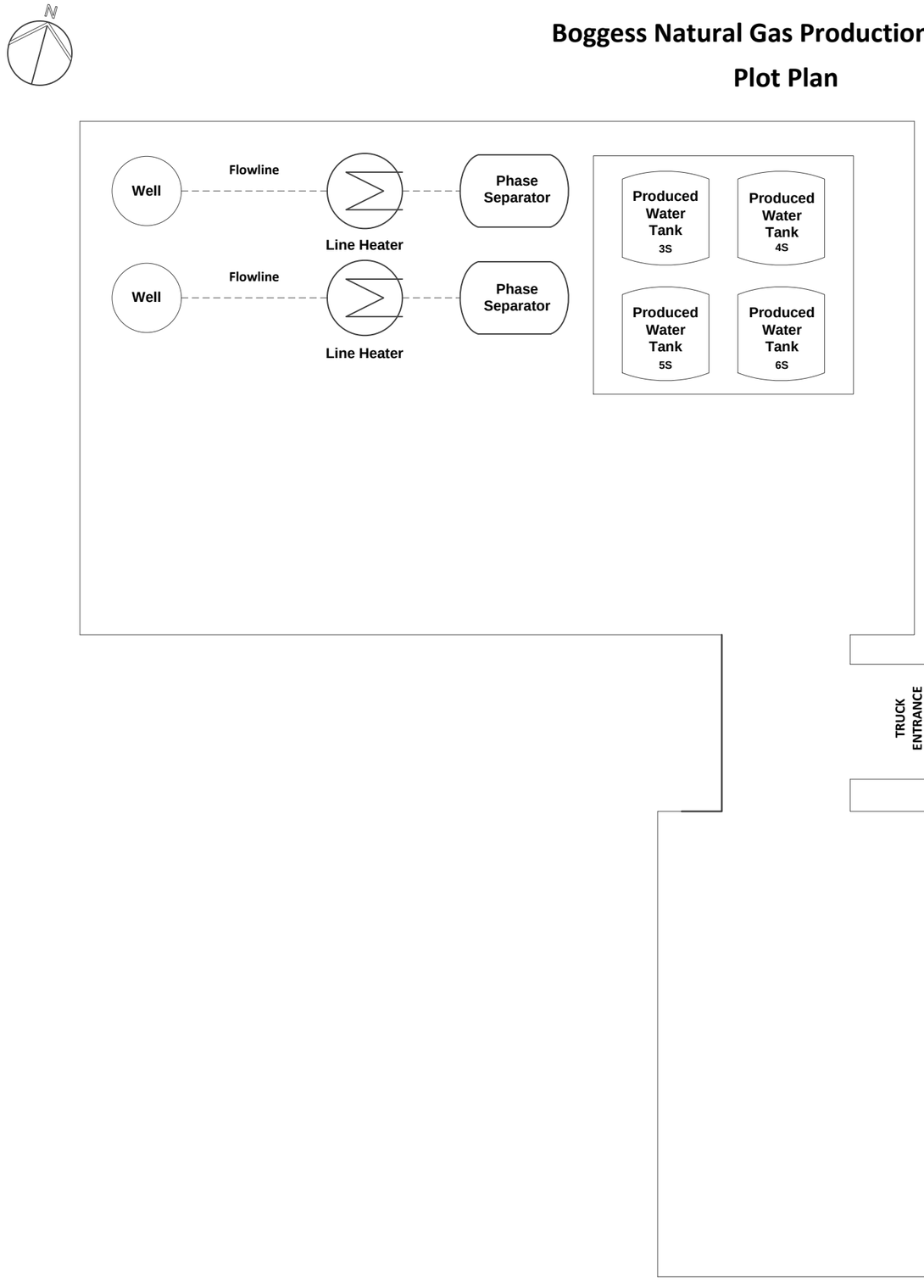
PLOT PLAN

Coordinates
Latitude: 39.37614
Longitude: -80.38580
Elevation: 3,200 ft
Drawn: 09/19/2017

Attachment F

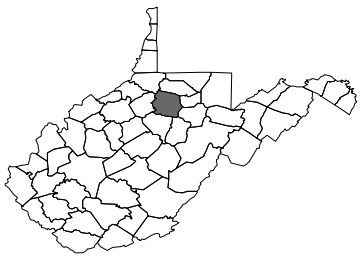
Boggess Natural Gas Production Facility

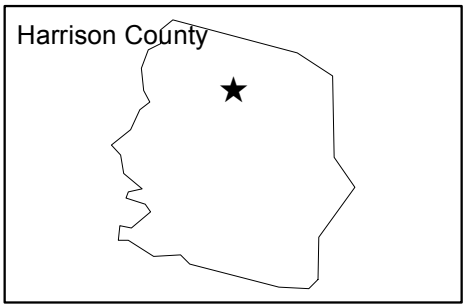
Plot Plan



Attachment G

AREA MAP

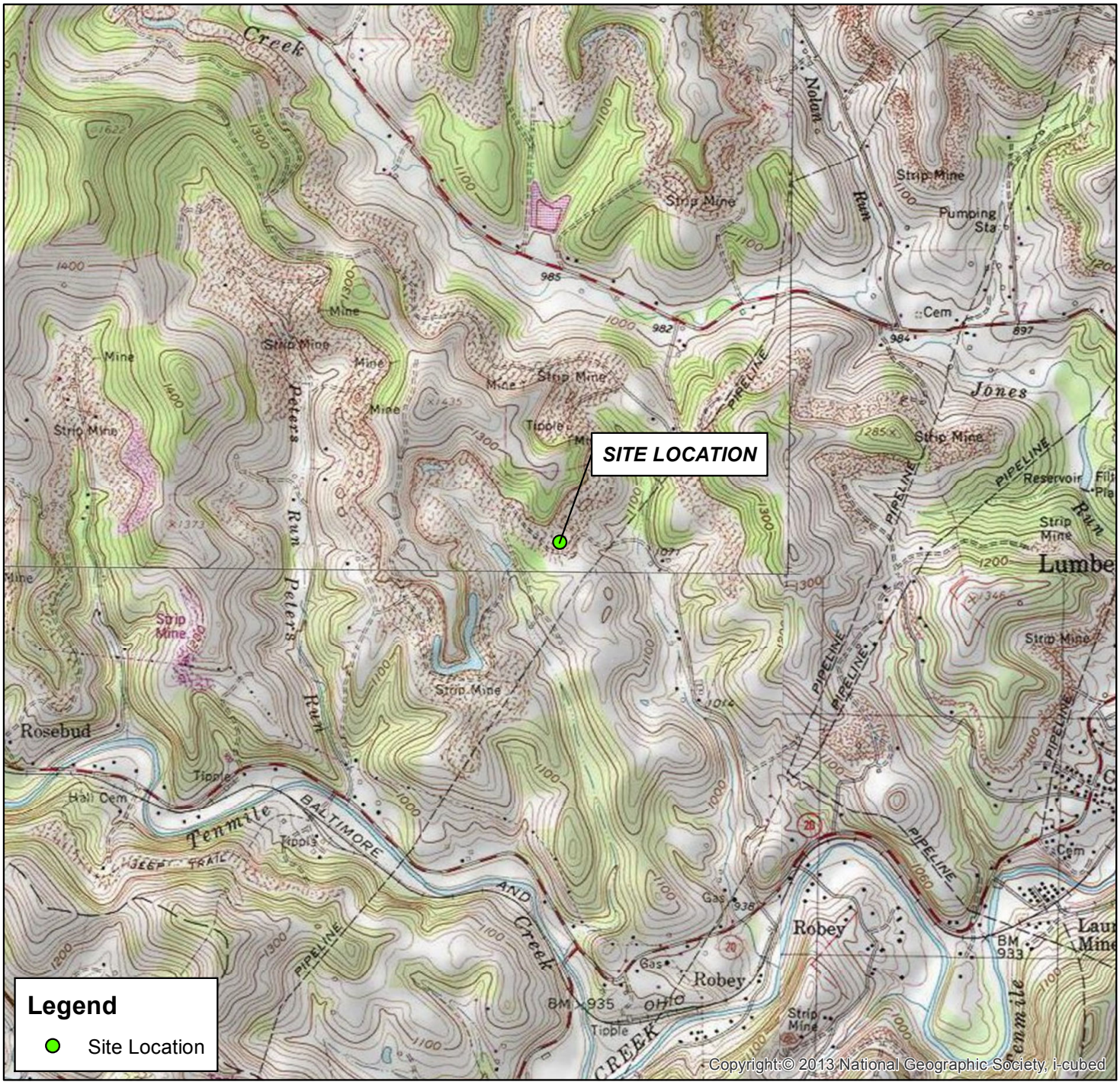




0 1,000 2,000 4,000 Feet

N

LAT. 39.37614 LON. -80.38580
HARRISON COUNTY
WEST VIRGINIA



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

SITE LOCATION MAP

ERM	**XTO Energy, Inc.** Boggess Well Pad and Compressor Station Lumberport, West Virginia	GIS Review: MC CHK'D: MC 0416206
Drawn By: SRV-8/23/17	**Environmental Resources Management**	ATTACHMENT G

J:\Projects\SiteLocationMaps\XTO Energy_MXD\AttachmentG-SiteLocationMap_20170823.mxd - 8/23/2017|SRV

Attachment H

G70-D SECTION APPLICABILITY FORM

ATTACHMENT H – G70-D SECTION APPLICABILITY FORM

General Permit G70-D Registration
Section Applicability Form

General Permit G70-D was developed to allow qualified applicants to seek registration for a variety of sources. These sources include gas well affected facilities, storage vessels, gas production units, in-line heaters, heater treaters, glycol dehydration units and associated reboilers, pneumatic controllers, pneumatic pumps, reciprocating internal combustion engines (RICEs), tank truck/rail car 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 G70-D allows the registrant to choose which sections of the permit they are seeking registration under. Therefore, please mark which additional sections that you are applying for registration under. If the applicant is seeking registration under multiple sections, please select all that apply. Please keep in mind, that if this registration is approved, the issued registration will state which sections will apply to your affected facility.

GENERAL PERMIT G70-D APPLICABLE SECTIONS	
☒Section 5.0	Gas and Oil Well Affected Facility (NSPS, Subpart OOOO/OOOOa)
☒Section 6.0	Storage Vessels Containing Condensate and/or Produced Water[1]
☐Section 7.0	Storage Vessel Affected Facility (NSPS, Subpart OOOO/OOOOa)
☐Section 8.0	Control Devices and Emission Reduction Devices not subject to NSPS Subpart OOOO/OOOOa and/or NESHAP Subpart HH
☒Section 9.0	Small Heaters and Reboilers not subject to 40CFR60 Subpart Dc
☐Section 10.0	Pneumatic Controllers Affected Facility (NSPS, Subpart OOOO/OOOOa)
☐Section 11.0	Pneumatic Pump Affected Facility (NSPS, Subpart OOOOa)
☒Section 12.0	Fugitive Emissions GHG and VOC Standards (NSPS, Subpart OOOOa)
☒Section 13.0	Reciprocating Internal Combustion Engines, Generator Engines
☒Section 14.0	Tanker Truck/Rail Car Loading[2]
☒Section 15.0	Glycol Dehydration Units[3]

1 *Applicants that are subject to Section 6 may also be subject to Section 7 if the applicant is subject to the NSPS, Subparts OOOO or OOOOa control requirements or the applicable control device requirements of Section 8.*

2 *Applicants that are subject to Section 14 may also be subject to control device and emission reduction device requirements of Section 8.*

3 *Applicants that are subject to Section 15 may also be subject to the requirements of Section 9 (reboilers). Applicants that are subject to Section 15 may also be subject to control device and emission reduction device requirements of Section 8.*

Attachment I

EMISSIONS UNITS/ERD TABLE

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

Include ALL emission units and air pollution control devices/ERDs that will be part of this permit application review. Do not include fugitive emission sources in this table. Deminimis storage tanks shall be listed in the Attachment L 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]
1S	1E	Line Heater	2015	2015	0.5 MMBtu/hr	2015	None	None
2S	2E	Line Heater	2015	2015	0.5 MMBtu/hr	2015	None	None
3S	3E	Produced Water Tank	2015	2015	400 bbl.	2015	None	None
4S	4E	Produced Water Tank	2015	2015	400 bbl.	2015	None	None
5S	5E	Produced Water Tank	2015	2015	400 bbl.	2015	None	None
6S	6E	Produced Water Tank	2015	2015	400 bbl.	2015	None	None
7S	7E	Compressor Engine	2017	2017	1,265 bhp	New	None	None
8S	8E	Dehy Reboiler	2015	2015	2.0 MMBtu/hr	2015	None	None
9S	9E	Dehy Still Vent	2015	2015	10 MMSCFD	2015	None	None
10S	10E	Dehy Flash Tank	2015	2015	400 bbl.	2015	None	None
11S	11E	Sump Storage Tank	2015	2015	400 bbl.	2015	None	None
12S	12E	Truck Loading – Produced Water	2015	2015	5,761 bbl/yr	2015	None	None

[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: Boggess Natural Gas Production Site 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 (methane, CO_2e)
Pumps	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Valves	☐ Yes ☒ No	118	EPA	☒ Gas ☐ Liquid ☐ Both	0.01	<0.01	0.55, 13.86
Safety Relief Valves	☐ Yes ☒ No	4	EPA	☐ Gas ☐ Liquid ☐ Both	<0.01	<0.01	0.03, 0.70
Open Ended Lines	☐ Yes ☒ No	7	EPA	☒ Gas ☐ Liquid ☐ Both	<0.01	<0.01	0.07, 1.86
Sampling Connections	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Connections (Not sampling)	☐ Yes ☒ No	500	EPA	☐ Gas ☐ Liquid ☐ Both	<0.01	<0.01	6.52
Compressors	☐ Yes ☐ No		40 CFR 98 Subpart W-1B: Default average component counts are used for major equipment. Compressor components (12 valves and 57 connections) are included in valve and connection counts.	☒ 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.):
N/A

Please indicate if there are any closed vent bypasses (include component):
N/A

Specify all equipment used in the closed vent system (e.g. VRU, ERD, thief hatches, tanker truck/rail car loading, etc.)
N/A

Attachment K

GAS WELL AFFECTED FACILITY DATA SHEET

ATTACHMENT K – GAS WELL AFFECTED FACILITY DATA SHEET

Complete this data sheet if you are the owner or operator of a gas well affected facility for which construction, modification or reconstruction commenced after August 23, 2011. This form must be completed for natural gas well affected facilities regardless of when flowback operations occur (or have occurred).

API Number	Date of Flowback	Date of Well Completion	Green Completion and/or Combustion Device	Subject to OOOO or OOOOa?
047-033-05509	12/29/2015	2015	N/A	OOOO
047-033-05547	12/30/2015	2015	N/A	OOOO

Note: If future wells are planned and no API number is available please list as PLANNED. If there are existing wells that commenced construction prior to August 23, 2011, please acknowledge as existing.

This is the same API (American Petroleum Institute) well number(s) provided in the well completion notification and as provided to the WVDEP, Office of Oil and Gas for the well permit. The API number may be provided on the application without the state code (047).

Every oil and gas well permitted in West Virginia since 1929 has been issued an API number. This API is used by agencies to identify and track oil and gas wells.

The API number has the following format: 047-001-00001

Where,

047 = State code. The state code for WV is 047.

001 = County Code. County codes are odd numbers, beginning with 001 (Barbour) and continuing to 109 (Wyoming).

00001= Well number. Each well will have a unique well number.

Attachment L

STORAGE VESSEL DATA SHEETS

ATTACHMENT L – 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 (REQUIRED)

1. Bulk Storage Area Name **Produced Water Tank Storage**	2. Tank Name **Produced Water Tank**
3. Emission Unit ID number **3S – 6S**	4. Emission Point ID number **3E – 6E**
5. Date Installed , Modified or Relocated *(for existing tanks)* **02/2014** Was the tank manufactured after August 23, 2011 and on or before September 18, 2015? ☒ Yes ☐ No Was the tank manufactured after September 18, 2015? ☐ Yes ☒ No	6. Type of change: ☐ New construction ☐ New stored material ☐ Other ☐ Relocation
7A. Description of Tank Modification *(if applicable)* **N/A**	
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.***	

TANK INFORMATION

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height. **400 bbl**	
9A. Tank Internal Diameter (ft.) **12**	9B. Tank Internal Height (ft.) **20**
10A. Maximum Liquid Height (ft.) **18**	10B. Average Liquid Height (ft.) **10**
11A. Maximum Vapor Space Height (ft.) **20**	11B. Average Vapor Space Height (ft.) **10**
12. Nominal Capacity *(specify barrels or gallons).* This is also known as "working volume". **400 bbl**	
13A. Maximum annual throughput (gal/yr) **242,260**	13B. Maximum daily throughput (gal/day) **664**
14. Number of tank turnovers per year **3.6**	15. Maximum tank fill rate (gal/min) **0.461**
16. Tank fill method ☐ Submerged ☒ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☐ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): ☒ Fixed Roof ☒ vertical ☐ horizontal ☐ flat roof ☐ cone roof ☒ dome roof ☐ other (describe) ☐ External Floating Roof ☐ pontoon roof ☐ double deck roof ☐ Domed External (or Covered) Floating Roof ☐ Internal Floating Roof ☐ vertical column support ☐ self-supporting ☐ Variable Vapor Space ☐ lifter roof ☐ diaphragm ☐ Pressurized ☐ spherical ☐ cylindrical ☐ Other (describe)	

PRESSURE/VACUUM CONTROL DATA

19. Check as many as apply:

☒ Does Not Apply ☐ Rupture Disc (psig)

☐ Inert Gas Blanket of _____ ☐ Carbon Adsorption[1]

☐ Vent to Vapor Combustion Device[1] (vapor combustors, flares, thermal oxidizers, enclosed combustors)

☐ Conservation Vent (psig) ☐ Condenser[1]

Vacuum Setting Pressure Setting

☐ Emergency Relief Valve (psig)

Vacuum Setting Pressure Setting

☐ Thief Hatch Weighted ☐ Yes ☐ No

[1] Complete appropriate Air Pollution Control Device Sheet

20. Expected Emission Rate (submit Test Data or Calculations here or elsewhere in the application).

Material Name	Flashing Loss		Breathing Loss		Working Loss		Total Emissions Loss		Estimation Method[1]
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
See Attachment U									

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)

Remember to attach emissions calculations, including TANKS Summary Sheets and other modeling summary sheets if applicable.

TANK CONSTRUCTION AND OPERATION INFORMATION			
21. Tank Shell Construction: ☒ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☐ Other (describe)			
21A. Shell Color: **Green**	21B. Roof Color: **Green**	21C. Year Last Painted:	
22. Shell Condition (if metal and unlined): ☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable			
22A. Is the tank heated? ☐ Yes ☒ No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?	
23. Operating Pressure Range (psig): **-0.03 – 0.03 psig** **Must be listed for tanks using VRUs with closed vent system.**			
24. Is the tank a **Vertical Fixed Roof Tank**? ☒ Yes ☐ No	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft):	
25. Complete item 25 for **Floating Roof Tanks** ☐ Does not apply ☐			
25A. Year Internal Floaters Installed:			
25B. Primary Seal Type *(check one):* ☐ Metallic (mechanical) shoe seal ☐ Liquid mounted resilient seal ☐ Vapor mounted resilient seal ☐ Other (describe):			
25C. Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐ No			
25D. If yes, how is the secondary seal mounted? *(check one)* ☐ Shoe ☐ Rim ☐ Other (describe):			
25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No			
25F. Describe deck fittings:			
26. Complete the following section for **Internal Floating Roof Tanks** ☐ Does not apply			
26A. Deck Type: ☐ Bolted ☐ Welded	26B. For bolted decks, provide deck construction:		
26C. Deck seam. Continuous sheet construction: ☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
27. Closed Vent System with VRU? ☐ Yes ☒ No			
28. Closed Vent System with Enclosed Combustor? ☐ Yes ☒ No			
SITE INFORMATION			
29. Provide the city and state on which the data in this section are based: **Pittsburgh, PA**			
30. Daily Avg. Ambient Temperature (°F):	31. Annual Avg. Maximum Temperature (°F): **59.9**		
32. Annual Avg. Minimum Temperature (°F): **40.7**	33. Avg. Wind Speed (mph): **9.075**		
34. Annual Avg. Solar Insulation Factor (BTU/ft^2-day): **1202.96**	35. Atmospheric Pressure (psia): **14.1085**		
LIQUID INFORMATION			
36. Avg. daily temperature range of bulk liquid (°F): **54.6483**	36A. Minimum (°F):	36B. Maximum (°F):	
37. Avg. operating pressure range of tank (psig): **0.302**	37A. Minimum (psig): 0.212	37B. Maximum (psig): 0.429	
38A. Minimum liquid surface temperature (°F):	38B. Corresponding vapor pressure (psia):		
39A. Avg. liquid surface temperature (°F): **61.1967**	39B. Corresponding vapor pressure (psia):		
40A. Maximum liquid surface temperature (°F): **72.1381**	40B. Corresponding vapor pressure (psia):		
41. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
41A. Material name and composition:	**Produced Water**		
41B. CAS number:	**Multiple**		

41C. Liquid density (lb/gal):	**8.31**		
41D. Liquid molecular weight (lb/lb-mole):	**18.1356**		
41E. Vapor molecular weight (lb/lb-mole):	**19.4778**		
41F. Maximum true vapor pressure (psia):			
41G. Maximum Reid vapor pressure (psia):			
41H. Months Storage per year. From: To:	**Jan-Dec**		
42. Final maximum gauge pressure and temperature prior to transfer into tank used as inputs into flashing emission calculations.	**37°F, 530 psig**		

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]
11S	EXIST	Sump Oil	16800

1. Enter the appropriate Source Identification Numbers (Source ID #) for each storage tank located at the well site. 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.

Attachment M

NATURAL DAS FIRED BURNING UNITS DATA SHEET

ATTACHMENT M – SMALL HEATERS AND REBOILERS NOT SUBJECT TO 40CFR60 SUBPART DC
DATA SHEET

Complete this data sheet for each small heater and reboiler not subject to 40CFR60 Subpart Dc at the facility. ***The Maximum Design Heat Input (MDHI) must be less than 10 MMBTU/hr.***

Emission Unit ID#[1]	Emission Point ID#[2]	Emission Unit Description (manufacturer, model #)	Year Installed/ Modified	Type[3] and Date of Change	Maximum Design Heat Input (MMBTU/hr)[4]	Fuel Heating Value (BTU/scf)[5]
1S	1E	Line Heater	2015	NA	0.50	1,026
2S	2E	Line Heater	2015	NA	0.50	1,026
7S	7E	Dehy Reboiler	2015	NA	2.00	1,026

1 Enter the appropriate Emission Unit (or Source) identification number for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For sources, use 1S, 2S, 3S…or other appropriate designation. Enter glycol dehydration unit Reboiler Vent data on the Glycol Dehydration Unit Data Sheet.

2 Enter the appropriate Emission Point identification numbers for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For emission points, use 1E, 2E, 3E…or other appropriate designation.

3 New, modification, removal

4 Enter design heat input capacity in MMBtu/hr.

5 Enter the fuel heating value in BTU/standard cubic foot.

Attachment N

INTERNAL COMBUSTION ENGINE DATA SHEETS

ATTACHMENT N – 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]	10S		
Engine Manufacturer/Model	Caterpillar G3516		
Manufacturers Rated bhp/rpm	1,265/1,400		
Source Status[2]	NS		
Date Installed/ Modified/Removed/Relocated[3]	2017		
Engine Manufactured /Reconstruction Date[4]	2017		
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]	LB4S		
APCD Type[7]	OxCat		
Fuel Type[8]	RG		
H_2S (gr/100 scf)	N/A		
Operating bhp/rpm	1,265/1,400		
BSFC (BTU/bhp-hr)	8,372		
Hourly Fuel Throughput	10,322 ft^3/hr 77,215 gal/hr		ft^3/hr gal/hr
Annual Fuel Throughput (Must use 8,760 hrs/yr unless emergency generator)	90.42 $MMft^3$/yr 676,407,289 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	5.58	24.43				
MD	CO	5.24	22.97				
MD	VOC	0.81	3.54				
AP	SO_2	0.01	0.03				
AP	PM_{10}	0.21	0.90				
AP	Formaldehyde	0.70	3.05				
AP	Total HAPs	0.72	3.16				
OT	GHG (CO_2e)	1,492.34	6,536.43				

1 Enter the appropriate Source Identification Number for each natural gas-fueled reciprocating internal combustion engine/generator engine located at the well site. Multiple 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 98 Subpart C (please list)

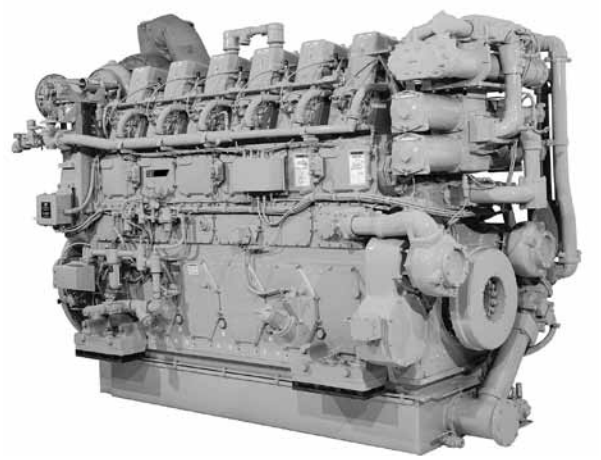
10 Enter each engine's Potential to Emit (PTE) for the listed regulated pollutants in pounds per hour and tons per year. PTE shall be calculated at manufacturer's rated brake horsepower and may reflect reduction efficiencies of listed Air Pollution Control Devices. Emergency generator engines may use 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.

G3606 LE Gas Petroleum Engine

1324-1413 bkW (1775-1895 bhp) 1000 rpm

0.5 g/bhp-hr NOx or 0.7 g/bhp-hr NOx (NTE)



Shown with Optional Equipment

CAT® ENGINE SPECIFICATIONS

In-Line 6, 4-Stroke-Cycle

Bore	300 mm (11.8 in.)
Stroke	300 mm (11.8 in.)
Displacement	127.2 L (7,762 cu. in.)
Aspiration	Turbocharged-Aftercooled
Digital Engine Management Governor and Protection	Electronic (ADEM™ A3)
Combustion	Low Emission (Lean Burn)
Engine Weight net dry (approx)	15,676 kg (34,560 lb)
Power Density	11.1 kg/kW (18.2 lb/hp)
Power per Displacement	14.9 bhp/L
Total Cooling System Capacity	401.3 L (106 gal)
Jacket Water	340.7 L (90 gal)
Aftercooler Circuit	60.6 L (16 gal)
Lube Oil System (refill)	707.9 L (187 gal)
Oil Change Interval	5000 hours
Rotation (from flywheel end)	Counterclockwise
Flywheel Teeth	255

FEATURES

Engine Design
- Proven reliability and durability
- Ability to burn a wide spectrum of gaseous fuels
- Robust diesel strength design prolongs life and lowers owning and operating costs
- Broad operating speed range

Emissions
Meets U.S. EPA Spark Ignited Stationary NSPS Emissions for 2010/11 with the use of an oxidation catalyst

Lean Burn Engine Technology
Lean-burn engines operate with large amounts of excess air. The excess air absorbs heat during combustion reducing the combustion temperature and pressure, greatly reducing levels of NOx. Lean-burn design also provides longer component life and excellent fuel consumption.

Ease of Operation
- High-strength pan and rails for excellent mounting and stability
- Side covers on block allow for inspection of internal components

Advanced Digital Engine Management
ADEM A3 engine management system integrates speed control, air/fuel ratio control, and ignition/detonation controls into a complete engine management system. ADEM A3 has improved: user interface, display system, shutdown controls, and system diagnostics.

Full Range of Attachments
Large variety of factory-installed engine attachments reduces packaging time.

Testing
Every engine is full-load tested to ensure proper engine performance.

Gas Engine Rating Pro
GERP is a PC-based program designed to provide site performance capabilities for Cat® natural gas engines for the gas compression industry. GERP provides engine data for your site's altitude, ambient temperature, fuel, engine coolant heat rejection, performance data, installation drawings, spec sheets, and pump curves.

Product Support Offered Through Global Cat Dealer Network
More than 2,200 dealer outlets

Cat factory-trained dealer technicians service every aspect of your petroleum engine

Cat parts and labor warranty

Preventive maintenance agreements available for repair-before-failure options

S•O•S℠ program matches your oil and coolant samples against Caterpillar set standards to determine:
- Internal engine component condition
- Presence of unwanted fluids
- Presence of combustion by-products
- Site-specific oil change interval

Over 80 Years of Engine Manufacturing Experience
Over 60 years of natural gas engine production

Ownership of these manufacturing processes enables Caterpillar to produce high quality, dependable products
- Cast engine blocks, heads, cylinder liners, and flywheel housings
- Machine critical components
- Assemble complete engine

Web Site
For all your petroleum power requirements, visit www.catoilandgas.cat.com.

STANDARD EQUIPMENT

Air Inlet System
Air cleaner — standard-duty inlet air adapter

Control System
ADEM A3 control system provides electronic governing integrated with air/fuel ratio control and individual cylinder ignition timing control

Cooling System
Jacket water pump
Jacket water thermostats and housing
Aftercooler pump
Aftercooler water thermostats and housing
Single-stage aftercooler

Exhaust System
Dry wrapped exhaust manifolds
Vertical outlet adapter

Flywheels and Flywheel Housing
SAE standard rotation

Fuel System
Gas admission valves with electronically controlled fuel supply pressure

Ignition System
A3 control system senses individual cylinder detonation and controls individual cylinder timing

Instrumentation
LCD display panel monitors engine parameters and displays diagnostic codes

Lube System
Crankcase breathers (top mounted)
Oil cooler
Oil filter
Oil pan drain valve

Mounting System
Engine mounting feet (four total)

Protection
Electronic shutoff system with purge cycle
Crankcase explosion relief valves
Gas shutoff valve

Starting System
Air starting system

General
Paint — Cat yellow
Vibration dampers

OPTIONAL EQUIPMENT

Air Inlet System
Heavy-duty air cleaner with precleaners
Heavy-duty air cleaner with rain protection

Charging System
Charging alternators

Control System
Custom control system software is available for non-standard ratings. Software is field programmable using flash memory.

Cooling System
Expansion tank
Flexible connections
Jacket water heater

Exhaust System
Flexible bellows adapters
Exhaust expander
Weld flanges

Fuel System
Fuel filter
Gas pressure regulator
Flexible connection
Low energy fuel system
Corrosive gas fuel system

Ignition System
CSA certification

Instrumentation
Remote data monitoring and speed control
Compatible with Cat® Electronic Technician (ET) and Data View
Communication Device — PL1000T/E
Display panel deletion is optional

Lube System
Air or electric motor-driven prelube
Duplex oil filter
LH or RH service
Lube oil makeup system

Mounting System
Mounting plates (set of six)

Power Take-Offs
Front stub shafts

Starting System
Air pressure reducing valve
Natural gas starting system

General
Engine barring device
Damper guard

Attachment O

TANKER TRUCK/RAIL CAR LOADING SHEET

ATTACHMENT O – TANKER TRUCK/RAIL CAR 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/rail cars. Use extra pages if necessary.

Truck/Rail Car Loadout Collection Efficiencies

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

- For tanker trucks/rail cars passing the MACT level annual leak test – 99.2%
- For tanker trucks/rail cars passing the NSPS level annual leak test – 98.7%
- For tanker trucks/rail cars 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/rail car 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.

Emission Unit ID#: P-11S	Emission Point ID#: P-11E	Year Installed/Modified: 6/30/2015
Emission Unit Description: Truck Loading – Produced Water		
Loading Area Data		
Number of Pumps: 1	Number of Liquids Loaded: 1	Max number of trucks/rail cars loading at one (1) time: 0
Are tanker trucks/rail cars 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.		
Are any of the following truck/rail car loadout systems utilized? ☐ Closed System to tanker truck/rail car passing a MACT level annual leak test? ☐ Closed System to tanker truck/rail car passing a NSPS level annual leak test? ☐ Closed System to tanker truck/rail car 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			
Days/week	As Needed			

Bulk Liquid Data (use extra pages as necessary)

Liquid Name	Produced Water		
Max. Daily Throughput (1000 gal/day)	0.664		
Max. Annual Throughput (1000 gal/yr)	242.26		
Loading Method[1]	SP		
Max. Fill Rate (gal/min)	0.461		
Average Fill Time (min/loading)	200 min		
Max. Bulk Liquid Temperature (^{o}F)	54.65 ^{o}F		
True Vapor Pressure[2]	NA		
Cargo Vessel Condition[3]			

Control Equipment or Method[4]		NA		
Max. Collection Efficiency (%)		NA		
Max. Control Efficiency (%)		NA		
Max.VOC Emission Rate	Loading (lb/hr)	<0.01		
	Annual (ton/yr)	<0.01		
Max.HAP Emission Rate	Loading (lb/hr)	<0.01		
	Annual (ton/yr)	<0.01		
Estimation Method[5]		Pro-Max		

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 P

GLYCOL DEHYDRATION UNIT DATA SHEET

ATTACHMENT P – 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: JACTO	Model:
Max. Dry Gas Flow Rate: 10.0 mmscf/day	Reboiler Design Heat Input: 2.0 MMBTU/hr
Design Type: ☒ TEG ☐ DEG ☐ EG	Source Status[1]: ES
Date Installed/Modified/Removed[2]: 2011	Regenerator Still Vent APCD/ERD[3]: NA
Control Device/ERD ID#[3]: NA	Fuel HV (BTU/scf): 1,026
H_2S Content (gr/100 scf): 0	Operation (hours/year): 8,760
Pump Rate (gpm): 7.5	
Water Content (wt %) in: Wet Gas: 0.0158% Dry Gas: 0.0040%	

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 (%)
NA	NA

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)
7S	Reboiler Vent	AP	NO_x	0.19	0.85
		AP	CO	0.16	0.72
		AP	VOC	0.01	0.05

		AP	SO_2	<0.01	0.01
		AP	PM_{10}	0.01	0.06
		AP	GHG (CO_2e)	234.20	1,025.78
8S	Glycol Regenerator Still Vent	GRI-GlyCalc™	VOC	0.19	0.85
		GRI-GlyCalc™	Benzene	0.04	0.20
		GRI-GlyCalc™	Toluene	0.04	0.19
		GRI-GlyCalc™	Ethylbenzene	<0.01	0.01
		GRI-GlyCalc™	Xylenes	0.01	0.02
		GRI-GlyCalc™	n-Hexane	<0.01	<0.01
9S	Glycol Flash Tank	GRI-GlyCalc™	VOC	0.13	0.59
		GRI-GlyCalc™	Benzene	0.01	0.03
		GRI-GlyCalc™	Toluene	0.01	0.05
		GRI-GlyCalc™	Ethylbenzene	<0.01	<0.01
		GRI-GlyCalc™	Xylenes	<0.01	0.01
		GRI-GlyCalc™	n-Hexane	<0.01	<0.01

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 well site 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.

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Boggess Dehy
File Name: L:\Philadelphia\Projects\0416206 Exxon Appalachia Air Per.AD\Boggess\Glycalc\XTO Boggess_Wellpad II.ddf
Date: October 26, 2017

DESCRIPTION:

Description:

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 37.00 deg. F
Pressure: 526.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	1.5529
Nitrogen	1.2181
Methane	88.8214
Ethane	7.3093
Propane	0.9392
Isobutane	0.0300
n-Butane	0.0130
Isopentane	0.0021
n-Pentane	0.0010
n-Hexane	0.0014
Cyclohexane	0.0102
Other Hexanes	0.0041
Heptanes	0.0080
Benzene	0.0160
Toluene	0.0397
Ethylbenzene	0.0039
Xylenes	0.0160
C8+ Heavies	0.2000

DRY GAS:

Flow Rate: 10.0 MMSCF/day
Water Content: 7.0 lbs. H2O/MMSCF

LEAN GLYCOL:

Glycol Type: TEG
Water Content: 1.5 wt% H2O
Flow Rate: 7.5 gpm

PUMP:

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

FLASH TANK:

Flash Control:	Combustion device
Flash Control Efficiency:	98.00 %
Temperature:	84.0 deg. F
Pressure:	38.0 psig

REGENERATOR OVERHEADS CONTROL DEVICE:

Control Device:	Condenser
Temperature:	77.0 deg. F
Pressure:	44.0 psia

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Boggess Dehy
File Name: C:\Users\adam.diantonio\Documents\My Received Files\XTO_Boggess_Wellpad II.ddf
Date: October 25, 2017

DESCRIPTION:

Description:

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.7115	17.075	3.1162
Ethane	0.4373	10.496	1.9154
Propane	0.0831	1.994	0.3639
Isobutane	0.0040	0.097	0.0176
n-Butane	0.0021	0.050	0.0091
Isopentane	0.0002	0.004	0.0008
n-Pentane	0.0002	0.005	0.0009
n-Hexane	0.0002	0.006	0.0011
Cyclohexane	0.0072	0.172	0.0314
Other Hexanes	0.0006	0.014	0.0026
Heptanes	0.0017	0.040	0.0073
Benzene	0.0446	1.071	0.1955
Toluene	0.0433	1.038	0.1895
Ethylbenzene	0.0014	0.035	0.0063
Xylenes	0.0053	0.128	0.0233
C8+ Heavies	0.0004	0.010	0.0019
Total Emissions	1.3431	32.235	5.8828
Total Hydrocarbon Emissions	1.3431	32.235	5.8828
Total VOC Emissions	0.1943	4.664	0.8512
Total HAP Emissions	0.0949	2.278	0.4157
Total BTEX Emissions	0.0947	2.272	0.4147

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.7812	18.749	3.4217
Ethane	0.7166	17.199	3.1389
Propane	0.4123	9.894	1.8057
Isobutane	0.0389	0.934	0.1704
n-Butane	0.0284	0.682	0.1244
Isopentane	0.0081	0.194	0.0353
n-Pentane	0.0057	0.137	0.0250
n-Hexane	0.0285	0.684	0.1248
Cyclohexane	1.2904	30.970	5.6520
Other Hexanes	0.0519	1.247	0.2275
Heptanes	0.5759	13.821	2.5223
Benzene	10.0493	241.182	44.0157

Toluene	34.0756	817.814	149.2510
Ethylbenzene	4.1637	99.930	18.2372
Xylenes	17.6656	423.974	77.3753
C8+ Heavies	36.4125	873.901	159.4869
Total Emissions	106.3046	2551.311	465.6142
Total Hydrocarbon Emissions	106.3046	2551.311	465.6142
Total VOC Emissions	104.8068	2515.362	459.0536
Total HAP Emissions	65.9827	1583.584	289.0040
Total BTEX Emissions	65.9542	1582.900	288.8792

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.3122	31.493	5.7474
Ethane	0.2704	6.490	1.1844
Propane	0.0678	1.627	0.2970
Isobutane	0.0037	0.089	0.0162
n-Butane	0.0019	0.047	0.0085
Isopentane	0.0004	0.010	0.0018
n-Pentane	0.0002	0.006	0.0010
n-Hexane	0.0006	0.013	0.0024
Cyclohexane	0.0058	0.140	0.0256
Other Hexanes	0.0014	0.033	0.0061
Heptanes	0.0046	0.111	0.0202
Benzene	0.0058	0.138	0.0252
Toluene	0.0107	0.256	0.0467
Ethylbenzene	0.0006	0.015	0.0028
Xylenes	0.0018	0.044	0.0081
C8+ Heavies	0.0286	0.685	0.1251
Total Emissions	1.7166	41.198	7.5186
Total Hydrocarbon Emissions	1.7166	41.198	7.5186
Total VOC Emissions	0.1340	3.215	0.5867
Total HAP Emissions	0.0195	0.467	0.0853
Total BTEX Emissions	0.0189	0.454	0.0828

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	65.6100	1574.640	287.3718
Ethane	13.5211	324.505	59.2222
Propane	3.3902	81.365	14.8491
Isobutane	0.1848	4.435	0.8094
n-Butane	0.0972	2.333	0.4257
Isopentane	0.0211	0.506	0.0924
n-Pentane	0.0119	0.286	0.0521
n-Hexane	0.0276	0.663	0.1209
Cyclohexane	0.2918	7.004	1.2782
Other Hexanes	0.0692	1.660	0.3030
Heptanes	0.2303	5.526	1.0086
Benzene	0.2882	6.916	1.2621
Toluene	0.5332	12.797	2.3355
Ethylbenzene	0.0320	0.768	0.1401
Xylenes	0.0923	2.216	0.4044

C8+ Heavies	1.4278	34.267	6.2538
Total Emissions	85.8286	2059.886	375.9293
Total Hydrocarbon Emissions	85.8286	2059.886	375.9293
Total VOC Emissions	6.6975	160.741	29.3352
Total HAP Emissions	0.9733	23.359	4.2631
Total BTEX Emissions	0.9457	22.697	4.1421

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	2.0237	48.568	8.8636
Ethane	0.7077	16.986	3.0999
Propane	0.1509	3.621	0.6609
Isobutane	0.0077	0.185	0.0338
n-Butane	0.0040	0.097	0.0176
Isopentane	0.0006	0.015	0.0027
n-Pentane	0.0004	0.010	0.0019
n-Hexane	0.0008	0.019	0.0035
Cyclohexane	0.0130	0.312	0.0570
Other Hexanes	0.0020	0.048	0.0087
Heptanes	0.0063	0.150	0.0275
Benzene	0.0504	1.210	0.2208
Toluene	0.0539	1.294	0.2362
Ethylbenzene	0.0021	0.050	0.0091
Xylenes	0.0072	0.172	0.0314
C8+ Heavies	0.0290	0.696	0.1269
Total Emissions	3.0597	73.432	13.4014
Total Hydrocarbon Emissions	3.0597	73.432	13.4014
Total VOC Emissions	0.3283	7.879	1.4379
Total HAP Emissions	0.1144	2.745	0.5010
Total BTEX Emissions	0.1136	2.726	0.4975

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	290.7935	8.8636	96.95
Ethane	62.3611	3.0999	95.03
Propane	16.6548	0.6609	96.03
Isobutane	0.9798	0.0338	96.55
n-Butane	0.5502	0.0176	96.79
Isopentane	0.1277	0.0027	97.92
n-Pentane	0.0771	0.0019	97.55
n-Hexane	0.2457	0.0035	98.58
Cyclohexane	6.9301	0.0570	99.18
Other Hexanes	0.5305	0.0087	98.36
Heptanes	3.5309	0.0275	99.22
Benzene	45.2778	0.2208	99.51
Toluene	151.5865	0.2362	99.84
Ethylbenzene	18.3773	0.0091	99.95
Xylenes	77.7797	0.0314	99.96
C8+ Heavies	165.7406	0.1269	99.92

Total Emissions	841.5435	13.4014	98.41
Total Hydrocarbon Emissions	841.5435	13.4014	98.41
Total VOC Emissions	488.3888	1.4379	99.71
Total HAP Emissions	293.2671	0.5010	99.83
Total BTEX Emissions	293.0213	0.4975	99.83

EQUIPMENT REPORTS:

CONDENSER

Condenser Outlet Temperature:	77.00 deg. F
Condenser Pressure:	44.00 psia
Condenser Duty:	1.97e-002 MM BTU/hr
Hydrocarbon Recovery:	8.50 bbls/day
Produced Water:	0.32 bbls/day
VOC Control Efficiency:	99.81 %
HAP Control Efficiency:	99.86 %
BTEX Control Efficiency:	99.86 %
Dissolved Hydrocarbons in Water:	554.64 mg/L

Component	Emitted	Condensed
Water	0.38%	99.62%
Carbon Dioxide	74.85%	25.15%
Nitrogen	86.34%	13.66%
Methane	91.07%	8.93%
Ethane	61.02%	38.98%
Propane	20.15%	79.85%
Isobutane	10.34%	89.66%
n-Butane	7.33%	92.67%
Isopentane	2.27%	97.73%
n-Pentane	3.40%	96.60%
n-Hexane	0.85%	99.15%
Cyclohexane	0.56%	99.44%
Other Hexanes	1.16%	98.84%
Heptanes	0.29%	99.71%
Benzene	0.44%	99.56%
Toluene	0.13%	99.87%
Ethylbenzene	0.03%	99.97%
Xylenes	0.03%	99.97%
C8+ Heavies	0.00%	100.00%

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:	0.33 lbs. H2O/MMSCF
Temperature:	37.0 deg. F
Pressure:	526.0 psig
Dry Gas Flow Rate:	10.0000 MMSCF/day
Glycol Losses with Dry Gas:	0.0020 lb/hr

Wet Gas Water Content: Saturated
Calculated Wet Gas Water Content: 11.71 lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio: 94.62 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	2.83%	97.17%
Carbon Dioxide	98.88%	1.12%
Nitrogen	99.94%	0.06%
Methane	99.95%	0.05%
Ethane	99.78%	0.22%
Propane	99.54%	0.46%
Isobutane	99.20%	0.80%
n-Butane	98.86%	1.14%
Isopentane	98.62%	1.38%
n-Pentane	98.15%	1.85%
n-Hexane	96.14%	3.86%
Cyclohexane	83.59%	16.41%
Other Hexanes	97.25%	2.75%
Heptanes	91.21%	8.79%
Benzene	25.04%	74.96%
Toluene	14.20%	85.80%
Ethylbenzene	8.08%	91.92%
Xylenes	5.16%	94.84%
C8+ Heavies	90.26%	9.74%

FLASH TANK

Flash Control: Combustion device
Flash Control Efficiency: 98.00 %
Flash Temperature: 84.0 deg. F
Flash Pressure: 38.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.95%	0.05%
Carbon Dioxide	15.95%	84.05%
Nitrogen	1.17%	98.83%
Methane	1.18%	98.82%
Ethane	5.03%	94.97%
Propane	10.84%	89.16%
Isobutane	17.39%	82.61%
n-Butane	22.62%	77.38%
Isopentane	27.95%	72.05%
n-Pentane	32.72%	67.28%
n-Hexane	51.02%	48.98%
Cyclohexane	82.13%	17.87%
Other Hexanes	43.39%	56.61%
Heptanes	71.57%	28.43%
Benzene	97.35%	2.65%
Toluene	98.58%	1.42%
Ethylbenzene	99.32%	0.68%
Xylenes	99.55%	0.45%
C8+ Heavies	96.66%	3.34%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	93.03%	6.97%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	1.41%	98.59%
n-Pentane	1.27%	98.73%
n-Hexane	0.89%	99.11%
Cyclohexane	3.81%	96.19%
Other Hexanes	2.03%	97.97%
Heptanes	0.67%	99.33%
Benzene	5.11%	94.89%
Toluene	7.98%	92.02%
Ethylbenzene	10.43%	89.57%
Xylenes	12.91%	87.09%
C8+ Heavies	12.01%	87.99%

STREAM REPORTS:

WET GAS STREAM

Temperature: 37.00 deg. F
Pressure: 540.70 psia
Flow Rate: 4.17e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	2.47e-002	4.89e+000
Carbon Dioxide	1.55e+000	7.50e+002
Nitrogen	1.22e+000	3.75e+002
Methane	8.86e+001	1.56e+004
Ethane	7.29e+000	2.41e+003
Propane	9.37e-001	4.55e+002
Isobutane	2.99e-002	1.91e+001
n-Butane	1.30e-002	8.30e+000
Isopentane	2.10e-003	1.66e+000
n-Pentane	9.98e-004	7.92e-001
n-Hexane	1.40e-003	1.32e+000
Cyclohexane	1.02e-002	9.43e+000
Other Hexanes	4.09e-003	3.88e+000
Heptanes	7.98e-003	8.80e+000
Benzene	1.60e-002	1.37e+001
Toluene	3.96e-002	4.02e+001
Ethylbenzene	3.89e-003	4.55e+000
Xylenes	1.60e-002	1.87e+001
C8+ Heavies	2.00e-001	3.74e+002
Total Components	100.00	2.01e+004

DRY GAS STREAM

Temperature: 37.00 deg. F
Pressure: 540.70 psia
Flow Rate: 4.17e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	6.99e-004	1.38e-001
Carbon Dioxide	1.54e+000	7.42e+002
Nitrogen	1.22e+000	3.74e+002
Methane	8.88e+001	1.56e+004
Ethane	7.29e+000	2.41e+003
Propane	9.35e-001	4.53e+002
Isobutane	2.98e-002	1.90e+001
n-Butane	1.28e-002	8.20e+000
Isopentane	2.07e-003	1.64e+000
n-Pentane	9.81e-004	7.78e-001
n-Hexane	1.35e-003	1.27e+000
Cyclohexane	8.52e-003	7.88e+000
Other Hexanes	3.99e-003	3.77e+000
Heptanes	7.30e-003	8.03e+000
Benzene	4.01e-003	3.44e+000
Toluene	5.64e-003	5.70e+000
Ethylbenzene	3.15e-004	3.67e-001
Xylenes	8.26e-004	9.63e-001
C8+ Heavies	1.80e-001	3.38e+002
Total Components	100.00	2.00e+004

LEAN GLYCOL STREAM

Temperature: 37.00 deg. F
Flow Rate: 7.47e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.82e+001	4.13e+003
Water	1.50e+000	6.31e+001
Carbon Dioxide	2.00e-011	8.39e-010
Nitrogen	5.03e-013	2.12e-011
Methane	6.46e-018	2.72e-016
Ethane	5.88e-008	2.47e-006
Propane	2.04e-009	8.58e-008
Isobutane	1.09e-010	4.57e-009
n-Butane	5.58e-011	2.35e-009
Isopentane	2.74e-006	1.15e-004
n-Pentane	1.75e-006	7.36e-005
n-Hexane	6.11e-006	2.57e-004
Cyclohexane	1.22e-003	5.11e-002
Other Hexanes	2.56e-005	1.08e-003
Heptanes	9.24e-005	3.89e-003
Benzene	1.29e-002	5.41e-001
Toluene	7.03e-002	2.96e+000
Ethylbenzene	1.15e-002	4.85e-001
Xylenes	6.23e-002	2.62e+000
C8+ Heavies	1.18e-001	4.97e+000

Total Components	100.00	4.21e+003

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 37.00 deg. F
Pressure: 540.70 psia
Flow Rate: 7.94e+000 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.36e+001	4.13e+003
Water	1.54e+000	6.79e+001
Carbon Dioxide	2.54e-001	1.12e+001
Nitrogen	3.64e-002	1.61e+000
Methane	1.50e+000	6.64e+001
Ethane	3.22e-001	1.42e+001
Propane	8.61e-002	3.80e+000
Isobutane	5.07e-003	2.24e-001
n-Butane	2.85e-003	1.26e-001
Isopentane	6.63e-004	2.93e-002
n-Pentane	4.01e-004	1.77e-002
n-Hexane	1.28e-003	5.64e-002
Cyclohexane	3.70e-002	1.63e+000
Other Hexanes	2.77e-003	1.22e-001
Heptanes	1.83e-002	8.10e-001
Benzene	2.46e-001	1.09e+001
Toluene	8.51e-001	3.76e+001
Ethylbenzene	1.06e-001	4.68e+000
Xylenes	4.62e-001	2.04e+001
C8+ Heavies	9.70e-001	4.28e+001
Total Components	100.00	4.41e+003

FLASH TANK OFF GAS STREAM

Temperature: 84.00 deg. F
Pressure: 52.70 psia
Flow Rate: 1.87e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	3.85e-002	3.41e-002
Carbon Dioxide	4.34e+000	9.41e+000
Nitrogen	1.15e+000	1.59e+000
Methane	8.31e+001	6.56e+001
Ethane	9.14e+000	1.35e+001
Propane	1.56e+000	3.39e+000
Isobutane	6.46e-002	1.85e-001
n-Butane	3.40e-002	9.72e-002
Isopentane	5.94e-003	2.11e-002
n-Pentane	3.35e-003	1.19e-002
n-Hexane	6.51e-003	2.76e-002
Cyclohexane	7.05e-002	2.92e-001
Other Hexanes	1.63e-002	6.92e-002
Heptanes	4.67e-002	2.30e-001
Benzene	7.50e-002	2.88e-001

Toluene	1.18e-001	5.33e-001
Ethylbenzene	6.12e-003	3.20e-002
Xylenes	1.77e-002	9.23e-002
C8+ Heavies	1.70e-001	1.43e+000
Total Components	100.00	9.69e+001

FLASH TANK GLYCOL STREAM

Temperature: 84.00 deg. F
Flow Rate: 7.72e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.57e+001	4.13e+003
Water	1.57e+000	6.79e+001
Carbon Dioxide	4.13e-002	1.78e+000
Nitrogen	4.38e-004	1.89e-002
Methane	1.81e-002	7.81e-001
Ethane	1.66e-002	7.17e-001
Propane	9.55e-003	4.12e-001
Isobutane	9.01e-004	3.89e-002
n-Butane	6.58e-004	2.84e-002
Isopentane	1.90e-004	8.18e-003
n-Pentane	1.34e-004	5.79e-003
n-Hexane	6.66e-004	2.88e-002
Cyclohexane	3.11e-002	1.34e+000
Other Hexanes	1.23e-003	5.30e-002
Heptanes	1.34e-002	5.80e-001
Benzene	2.45e-001	1.06e+001
Toluene	8.58e-001	3.70e+001
Ethylbenzene	1.08e-001	4.65e+000
Xylenes	4.70e-001	2.03e+001
C8+ Heavies	9.58e-001	4.14e+001
Total Components	100.00	4.32e+003

FLASH GAS EMISSIONS

Flow Rate: 5.91e+003 scfh
Control Method: Combustion Device
Control Efficiency: 98.00

Component	Conc. (vol%)	Loading (lb/hr)
Water	6.33e+001	1.78e+002
Carbon Dioxide	3.57e+001	2.45e+002
Nitrogen	3.65e-001	1.59e+000
Methane	5.25e-001	1.31e+000
Ethane	5.77e-002	2.70e-001
Propane	9.87e-003	6.78e-002
Isobutane	4.08e-004	3.70e-003
n-Butane	2.15e-004	1.94e-003
Isopentane	3.75e-005	4.22e-004
n-Pentane	2.12e-005	2.38e-004
n-Hexane	4.11e-005	5.52e-004
Cyclohexane	4.45e-004	5.84e-003
Other Hexanes	1.03e-004	1.38e-003
Heptanes	2.95e-004	4.61e-003

Benzene	4.74e-004	5.76e-003
Toluene	7.43e-004	1.07e-002
Ethylbenzene	3.87e-005	6.40e-004
Xylenes	1.12e-004	1.85e-003
C8+ Heavies	1.08e-003	2.86e-002
Total Components	100.00	4.26e+002

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 5.04e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.98e+001	4.73e+000
Carbon Dioxide	3.06e+000	1.78e+000
Nitrogen	5.09e-002	1.89e-002
Methane	3.67e+000	7.81e-001
Ethane	1.80e+000	7.17e-001
Propane	7.04e-001	4.12e-001
Isobutane	5.04e-002	3.89e-002
n-Butane	3.68e-002	2.84e-002
Isopentane	8.43e-003	8.07e-003
n-Pentane	5.97e-003	5.71e-003
n-Hexane	2.49e-002	2.85e-002
Cyclohexane	1.16e+000	1.29e+000
Other Hexanes	4.54e-002	5.19e-002
Heptanes	4.33e-001	5.76e-001
Benzene	9.69e+000	1.00e+001
Toluene	2.79e+001	3.41e+001
Ethylbenzene	2.96e+000	4.16e+000
Xylenes	1.25e+001	1.77e+001
C8+ Heavies	1.61e+001	3.64e+001
Total Components	100.00	1.13e+002

CONDENSER VENT GAS STREAM

Temperature: 77.00 deg. F
Pressure: 44.00 psia
Flow Rate: 3.57e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.07e+000	1.82e-002
Carbon Dioxide	3.23e+001	1.34e+000
Nitrogen	6.20e-001	1.63e-002
Methane	4.72e+001	7.11e-001
Ethane	1.55e+001	4.37e-001
Propane	2.00e+000	8.31e-002
Isobutane	7.36e-002	4.02e-003
n-Butane	3.81e-002	2.08e-003
Isopentane	2.70e-003	1.83e-004
n-Pentane	2.86e-003	1.94e-004
n-Hexane	3.00e-003	2.43e-004
Cyclohexane	9.07e-002	7.18e-003

Other Hexanes	7.42e-003	6.02e-004
Heptanes	1.77e-002	1.66e-003
Benzene	6.08e-001	4.46e-002
Toluene	4.99e-001	4.33e-002
Ethylbenzene	1.44e-002	1.44e-003
Xylenes	5.33e-002	5.32e-003
C8+ Heavies	2.65e-003	4.24e-004
Total Components	100.00	2.71e+000

CONDENSER PRODUCED WATER STREAM

Temperature: 77.00 deg. F
Flow Rate: 9.35e-003 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	9.98e+001	4.67e+000	998024.
Carbon Dioxide	1.42e-001	6.65e-003	1421.
Nitrogen	3.40e-005	1.59e-006	0.
Methane	3.16e-003	1.48e-004	32.
Ethane	2.54e-003	1.19e-004	25.
Propane	3.25e-004	1.52e-005	3.
Isobutane	9.00e-006	4.21e-007	0.
n-Butane	6.52e-006	3.05e-007	0.
Isopentane	4.30e-007	2.01e-008	0.
n-Pentane	5.05e-007	2.36e-008	0.
n-Hexane	5.71e-007	2.67e-008	0.
Cyclohexane	1.11e-004	5.19e-006	1.
Other Hexanes	1.10e-006	5.14e-008	0.
Heptanes	2.29e-006	1.07e-007	0.
Benzene	2.46e-002	1.15e-003	246.
Toluene	2.11e-002	9.89e-004	211.
Ethylbenzene	5.62e-004	2.63e-005	6.
Xylenes	3.05e-003	1.43e-004	30.
C8+ Heavies	1.99e-007	9.31e-009	0.
Total Components	100.00	4.68e+000	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 77.00 deg. F
Flow Rate: 2.48e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
Water	4.20e-002	4.43e-002
Carbon Dioxide	4.19e-001	4.42e-001
Nitrogen	2.45e-003	2.58e-003
Methane	6.60e-002	6.96e-002
Ethane	2.65e-001	2.79e-001
Propane	3.12e-001	3.29e-001
Isobutane	3.31e-002	3.49e-002
n-Butane	2.50e-002	2.63e-002
Isopentane	7.48e-003	7.89e-003
n-Pentane	5.23e-003	5.52e-003
n-Hexane	2.68e-002	2.83e-002
Cyclohexane	1.22e+000	1.28e+000

Other Hexanes	4.87e-002	5.13e-002
Heptanes	5.45e-001	5.74e-001
Benzene	9.49e+000	1.00e+001
Toluene	3.23e+001	3.40e+001
Ethylbenzene	3.95e+000	4.16e+000
Xylenes	1.67e+001	1.77e+001
C8+ Heavies	3.45e+001	3.64e+001
Total Components	100.00	1.05e+002

Attachment Q

PNEUMATIC COMTROLLERS DATA SHEET

(NOT APPLICABLE)

Attachment R

PNEUMATIC PUMP DATA SHEET

(NOT APPLICABLE)

Attachment S

AIR POLLUTION CONTROL DEVICE SHEET

(NOT APPLICABLE)

Attachment T

EMISSIONS CALCULATIONS

Line Heaters
(1S, 2S)

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	1,026	8,760	<0.01	0.01
Hexane	1.8	$lb/10^6$ scf	AP-42 Chapter 1.4	0.50	1,026	8,760	<0.01	<0.01
Formaldehyde	0.075	$lb/10^6$ scf	AP-42 Chapter 1.4	0.50	1,026	8,760	<0.01	<0.01
Benzene	0.0021	$lb/10^6$ scf	AP-42 Chapter 1.4	0.50	1,026	8,760	<0.01	<0.01
Toluene	0.0034	$lb/10^6$ scf	AP-42 Chapter 1.4	0.50	1,026	8,760	<0.01	<0.01
Pb	0.0005	$lb/10^6$ scf	AP-42 Chapter 1.4	0.50	1,026	8,760	<0.01	<0.01
CO	84	$lb/10^6$ scf	AP-42 Chapter 1.4	0.50	1,026	8,760	0.04	0.18
NOx	100	$lb/10^6$ scf	AP-42 Chapter 1.4	0.50	1,026	8,760	0.05	0.21
$PM_{Filterable}$	1.9	$lb/10^6$ scf	AP-42 Chapter 1.4	0.50	1,026	8,760	<0.01	<0.01
$PM_{Condensable}$	5.7	$lb/10^6$ scf	AP-42 Chapter 1.4	0.50	1,026	8,760	<0.01	0.01
PM_{Total}	7.6	$lb/10^6$ scf	AP-42 Chapter 1.4	0.50	1,026	8,760	<0.01	0.02
SO_2	0.6	$lb/10^6$ scf	AP-42 Chapter 1.4	0.50	1,026	8,760	<0.01	<0.01
CO_2	53.06	kg CO_2 / MMBtu	40 CFR Subpart C	0.50	1,026	8,760	58.49	256.18
CH_4	0.001	kg CO_2 / MMBtu	40 CFR Subpart C	0.50	1,026	8,760	<0.01	<0.01
N_2O	0.0001	kg CO_2 / MMBtu	40 CFR Subpart C	0.50	1,026	8,760	<0.01	<0.01
Total HAPs							<0.01	<0.01
Total CO_2e							58.55	256.44

Notes:

-Emission rates displayed above represent the max. hourly and max. annual emissions for one line heater. Cumulative emission rates for both line heaters are diplayed in the Total Site Emissions Table.
-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)**

Produced Water Tanks
(3S, 4S, 5S, 6S)

Pollutant	Max. Hourly Emissions using ProMax (lb/hr)	Max. Yearly Emissions using ProMax (tons/yr)
VOCs	0.05	0.20
HAPs	0.03	0.13
Hexane	<0.01	<0.01
Benzene	0.01	0.03
Toluene	0.01	0.06
Ethylbenzene	<0.01	0.01
Xylene	0.01	0.03
CO_2	0.14	0.63
CH_4	0.53	2.33
Total CO_2e	13.47	58.98

Notes:

- Emission rates for Produced Water Tanks 3S, 4S, 5S, 6S were calculated using ProMax software. ProMax output sheets are attached.
- 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
- For emission calculation purposes, the total throughput for tanks 3S, 4S, 5S, 6S is modeled as being received through a single tank. The throughput value represents the total throughput for all four (4) 400-barrel tanks. Therefore, emission rates represent a total from all produced fluids tanks located on the well pad. Actual throughput for each tank will vary based on operations.

Dehy Reboiler
(7S)

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	2.00	1,026	8,760	0.01	0.05
Hexane	1.8	$lb/10^6$ scf	AP-42 Chapter 1.4	2.00	1,026	8,760	<0.01	0.02
Formaldehyde	0.075	$lb/10^6$ scf	AP-42 Chapter 1.4	2.00	1,026	8,760	<0.01	<0.01
Benzene	0.0021	$lb/10^6$ scf	AP-42 Chapter 1.4	2.00	1,026	8,760	<0.01	<0.01
Toluene	0.0034	$lb/10^6$ scf	AP-42 Chapter 1.4	2.00	1,026	8,760	<0.01	<0.01
Pb	0.0005	$lb/10^6$ scf	AP-42 Chapter 1.4	2.00	1,026	8,760	<0.01	<0.01
CO	84	$lb/10^6$ scf	AP-42 Chapter 1.4	2.00	1,026	8,760	0.16	0.72
NOx	100	$lb/10^6$ scf	AP-42 Chapter 1.4	2.00	1,026	8,760	0.19	0.85
$PM_{Filterable}$	1.9	$lb/10^6$ scf	AP-42 Chapter 1.4	2.00	1,026	8,760	<0.01	0.02
$PM_{Condensable}$	5.7	$lb/10^6$ scf	AP-42 Chapter 1.4	2.00	1,026	8,760	0.01	0.05
PM_{Total}	7.6	$lb/10^6$ scf	AP-42 Chapter 1.4	2.00	1,026	8,760	0.01	0.06
SO_2	0.6	$lb/10^6$ scf	AP-42 Chapter 1.4	2.00	1,026	8,760	<0.01	0.01
CO_2	53.06	kg CO_2 / MMBtu	40 CFR Subpart C	2.00	1,026	8,760	233.95	1,024.72
CH_4	0.001	kg CO_2 / MMBtu	40 CFR Subpart C	2.00	1,026	8,760	<0.01	0.02
N_2O	0.0001	kg CO_2 / MMBtu	40 CFR Subpart C	2.00	1,026	8,760	<0.01	<0.01
Total HAPs							<0.01	0.02
Total CO_2e							234.20	1,025.78

Notes:

-Emission rates displayed above represent the max. hourly and max. annual emissions for one dehydrator reboiler.
-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)**

Dehy Still Vent
(8S)

Pollutant	Max. Hourly Emissions using ProMax (lb/hr)	Max. Annual Emissions using ProMax (tons/yr)
VOCs	0.19	0.85
HAPs	0.09	0.42
Methane	0.71	3.12
Ethane	0.44	1.92
Propane	0.08	0.36
Iso-Butane	<0.01	0.02
N-Butane	<0.01	0.01
Iso-Pentane	<0.01	<0.01
N-Pentane	<0.01	<0.01
N-Hexane	<0.01	<0.01
Benzene	0.04	0.20
Toluene	0.04	0.19
Ethylbenzene	<0.01	0.01
Xylenes	0.01	0.02

Notes:

- Emission rates for Dehy Still Column were calculated using GLY-CALC software. GLY-CALC output sheets are attached.
- The emission rates displayed above are uncontrolled, vented emissions.
- 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

Dehy Flash Tank
(9S)

Pollutant	Max. Hourly Emissions using ProMax (lb/hr)	Max. Annual Emissions using ProMax (tons/yr)
VOCs	0.13	0.59
HAPs	0.02	0.09
Methane	1.31	5.75
Ethane	0.27	1.18
Propane	0.07	0.30
Iso-Butane	<0.01	0.02
N-Butane	<0.01	0.01
Iso-Pentane	<0.01	<0.01
N-Hexane	<0.01	<0.01
Benzene	0.01	0.03
N-Pentane	<0.01	<0.01
Toluene	0.01	0.05
Ethylbenzene	<0.01	<0.01
Xylenes	<0.01	0.01

Notes:

- Emission rates for Dehy Flash Tank were calculated using GLYCALC software. GLY-CALC output sheets are attached.
- The emission rates displayed above are controlled, vented emissions.

Natural Gas Compressor Engine
(10S)

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	0.29	g/bhp-hr	Vendor Guarantee	1,265	8,372	1,026	8,760	0.81	3.54
Formaldehyde	0.25	g/bhp-hr	Vendor Guarantee	1,265	8,372	1,026	8,760	0.70	3.05
Benzene	1.58E-03	lb/MMBtu	AP-42 Chapter 3.2	1,265	8,372	1,026	8,760	0.02	0.07
Toluene	5.58E-04	lb/MMBtu	AP-42 Chapter 3.2	1,265	8,372	1,026	8,760	0.01	0.03
Ethylbenze	2.48E-05	lb/MMBtu	AP-42 Chapter 3.2	1,265	8,372	1,026	8,760	<0.01	<0.01
Xylene	1.95E-04	lb/MMBtu	AP-42 Chapter 3.2	1,265	8,372	1,026	8,760	<0.01	0.01
CO	1.88	g/bhp-hr	Vendor Guarantee	1,265	8,372	1,026	8,760	5.24	22.97
NOx	2.00	g/bhp-hr	Vendor Guarantee	1,265	8,372	1,026	8,760	5.58	24.43
$PM_{Filterable}$	9.50E-03	lb/MMBtu	AP-42 Chapter 3.2	1,265	8,372	1,026	8,760	0.10	0.44
$PM_{Condensable}$	9.91E-03	lb/MMBtu	AP-42 Chapter 3.2	1,265	8,372	1,026	8,760	0.10	0.46
PM_{Total}	1.94E-02	lb/MMBtu	AP-42 Chapter 3.2	1,265	8,372	1,026	8,760	0.21	0.90
SO_2	5.88E-04	lb/MMBtu	AP-42 Chapter 3.2	1,265	8,372	1,026	8,760	0.01	0.03
CO_2	53.06	kg CO_2 / MMBtu	40 CFR Subpart C	1,265	8,372	1,026	8,760	1,490.80	6,529.69
CH_4	0.001	kg CH_4 / MMBtu	40 CFR Subpart C	1,265	8,372	1,026	8,760	0.03	0.12
N_2O	0.0001	kg N_2O / MMBtu	40 CFR Subpart C	1,265	8,372	1,026	8,760	<0.01	0.01
Total HAPs								0.72	3.16
Total CO_2e								1,492.34	6,536.43

Notes:

-Emission rates displayed above represent the max. hourly and max. annual emissions for one Caterpillar G3516 Compressor Engine.

-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

- Vendor Guarantee Emissions are listed in Attachment S

- Vendor Guarantee Emissions are converted from g/kW-hr to g/bhp-hr. 1 kW = 1.34 bhp

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)**

Truck Loading - Produced Water (12S)

Total Emissions from Tank Unloading Operations

Pollutant	Max. Hourly Emissions (lb/hr)	Max. Yearly Emissions (tons/yr)
VOCs	<0.01	<0.01
HAPs	<0.01	<0.01
Hexane	<0.01	<0.01
Benzene	<0.01	<0.01
Toluene	<0.01	<0.01
Ethylbenzene	<0.01	<0.01
Xylene	<0.01	<0.01
CO_2	<0.01	<0.01
CH_4	<0.01	<0.01
Total CO_2e	0.01	0.03

Notes:
-Emission rates for liquid unloading operations were calculated using ProMax software. ProMax summary sheets are attached.

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

Well Specific Equipment Controls	
Facility Equipment Type	**Count on Site**
Wellheads	2
Separators	2
Meters/Piping	3
Compressors	1
In-line Heaters	2
Dehydrators	1

Gas Composition													
Emissions from Flaring Operations	**Propane**	**Butane**	**Pentanes**	**Octanes**	**Nonanes**	**Decanes**	**Hexane**	**Benzene**	**Toluene**	**Ethylbenzene**	**Xylene**	**CO_2**	**CH_4**
Mole %	0.27	0.03	0.003	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.000	0.16	95.43
MW	44	58	72	114	128	155	86	78	92	106	106	44	16

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	118	0.027	8760	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.13	0.55	3.16	13.86
Connectors	500	0.003	8760	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.06	0.26	1.49	6.52
Open-ended Lines	7	0.06	8760	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.07	0.42	1.86
Pressure Relief Valves	4	0.04	8760	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.03	0.16	0.70
			Total Emissions:	**<0.01**	**0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.21**	**0.92**	**5.24**	**22.93**

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

Notes:
-Gas Composition data for Boggess site was based on the Epic Natural Gas Analysis Report complete August 22, 2014.

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

Fugitive Emissions from Unpaved Haul Roads

Constant	Industrial Roads		
	PM	PM-10	PM-2.5
k (lb/VMT)	4.9	1.5	0.15
a	0.7	0.9	0.9
b	0.45	0.45	0.45

where

k		Patricle size multiplier[1]
s	4.8	Silt content of road surface material (%)
p	150	Number of days per year with precipitation

Item Number	Description	Number of Wheels	W Mean Vehicle Weight (tons)	Mean Vehicle Speed (mph)	Miles per Trip	Maximum Trips per Year	Control Efficiency (%)	PM Emissions (lbs/hr)	PM Emissions (tons/yr)	PM-10 Emissions (lbs/hr)	PM-10 Emissions (tons/yr)	PM-2.5 Emissions (lbs/hr)	PM-2.5 Emissions (tons/yr)
1	Liquids Hauling	14	30	10	1.30	200	NA	5.57	0.56	1.42	0.14	0.14	0.01
2	Employee Vehicles	4	3	10	1.30	200	NA	1.98	0.20	0.50	0.05	0.05	0.005
							Totals:	**7.54**	**0.75**	**1.92**	**0.19**	**0.19**	**0.02**

Notes:

[1] - Particle Size Multiplier used from AP-42 13.2.2 - Final Version 11/2006

[2] - Silt Content of Road Surface uses Sand and Gravel Processing Plant Road from AP-42 13.2.2 - Final Version 11/2006

[3] - Number of days per year with precipitation >0.01 in3 found using AP-42 13.2.2 Figure 13.2.2-1 - Final Version 11/2006

Example Calculations:

Emissions (lb/Vehicle Mile Traveled) - $E = k \times (s/12)^a \times (W/3)^b$ Equation 1a from AP-42 13.2.2 - Final Version 11/2006

Size Specific Emissions (lb/VMT) - $E_{ext} = E[(365-p)/365]$ Equation 2 from AP-42 13.2.2 - Final Version 11/2006

Total Boggess Emission Levels

	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**
Line Heater (1S)	<0.01	0.01	<0.01	<0.01	0.04	0.18	0.05	0.21	<0.01	0.02	<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
Line Heater (2S)	<0.01	0.01	<0.01	<0.01	0.04	0.18	0.05	0.21	<0.01	0.02	<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
Produced Water Tanks (3S, 4S, 5S, 6S)	0.05	0.20	0.03	0.13	--	--	--	--	--	--	--	--	--	--	--	--	0.14	0.63	0.53	2.33	--	--	13.47	58.98
Dehy Reboiler (7S)	0.01	0.05	<0.01	0.02	0.16	0.72	0.19	0.85	0.01	0.06	<0.01	0.02	0.01	0.05	<0.01	0.01	233.95	1,024.72	<0.01	0.02	<0.01	<0.01	234.20	1,025.78
Dehy Still Vent (8S)	0.19	0.85	0.09	0.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.71	3.12	--	--	<0.01	<0.01
Dehy Flash Tank (9S)	0.13	0.59	0.02	0.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Compressor Engine (10S)	0.81	3.54	0.72	3.16	5.24	22.97	5.58	24.43	0.21	0.90	0.10	0.44	0.10	0.46	0.01	0.03	1,490.80	6,529.69	0.03	0.12	<0.01	0.01	1,492.34	6,536.43
Sump Storage Tank (11S)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Truck Loading - Produced Water (12S)	<0.01	<0.01	<0.01	<0.01	--	--	--	--	--	--	--	--	--	--	--	--	<0.01	<0.01	<0.01	<0.01	--	--	0.01	0.03
Fugitives Leaks	<0.01	0.01	<0.01	<0.01	--	--	--	--	--	--	--	--	--	--	--	--	<0.01	<0.01	0.21	0.92	--	--	5.24	22.93
Haul Roads	--	--	--	--	--	--	--	--	7.54	0.75	7.54	0.75	--	--	--	--	--	--	--	--	--	--	--	--
Totals	**1.20**	**5.26**	**0.87**	**3.82**	**5.49**	**24.04**	**5.87**	**25.72**	**7.77**	**1.75**	**7.65**	**1.22**	**0.12**	**0.53**	**0.01**	**0.03**	**1,841.87**	**8,067.40**	**1.49**	**6.52**	**0.00**	**0.02**	**1,862.34**	**8,157.03**

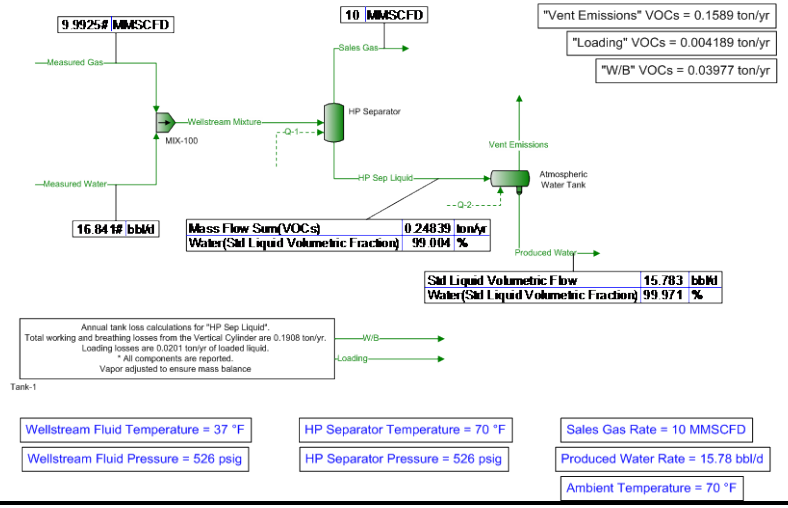
Total Boggess Site Emission Levels - HAP Speciation

	Total HAPs		Formaldehyde		Hexane		Benzene		Toluene		Ethylbenzene		Xylene	
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**
Line Heater (P-01S)	<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
Line Heater (P-02S)	<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
Produced Water Tanks (3S, 4S, 5S, 6S)	0.03	0.13	<0.01	<0.01	<0.01	<0.01	0.01	0.03	0.01	0.06	<0.01	0.01	0.01	0.03
Dehy Reboiler (7S)	<0.01	0.02	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dehy Still Vent (8S)	0.09	0.42	<0.01	<0.01	<0.01	<0.01	0.04	0.20	0.04	0.19	<0.01	0.01	0.01	0.02
Dehy Flash Tank (9S)	0.02	0.09	<0.01	<0.01	<0.01	<0.01	0.01	0.03	0.01	0.05	<0.01	<0.01	<0.01	0.01
Compressor Engine (10S)	0.72	3.16	0.70	3.05	<0.01	<0.01	0.02	0.07	0.01	0.03	<0.01	<0.01	<0.01	0.01
Sump Storage Tank (11S)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Truck Loading - Produced Water (12S)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fugitives Leaks	<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
Haul Roads	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals	**0.87**	**3.82**	**0.70**	**3.06**	**0.01**	**0.03**	**0.07**	**0.32**	**0.07**	**0.32**	**<0.01**	**0.02**	**0.02**	**0.07**

Entrainment
Plant Schematic

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	
Flowsheet:	Entrainment	

XTO – Boggess
Produced Fluids Tanks



Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	
Flowsheet:	Entrainment	

Connections

	HP Sep Liquid	Loading	Measured Gas	Measured Water	Produced Water
From Block	HP Separator	--	--	--	Atmospheric Water Tank
To Block	Atmospheric Water Tank	--	MIX-100	MIX-100	--

Stream Composition

Mole Fraction	HP Sep Liquid %	Loading %	Measured Gas %	Measured Water %	Produced Water %
Nitrogen	0.00310825	0.0387749	1.21822 *	0 *	1.17819E-05
Methane	0.260223	6.65717	88.8305 *	0 *	0.00202215
Carbon Dioxide	0.0276164	12.6739	1.55306 *	0 *	0.00385544
Ethane	0.0229891	0.890959	7.31005 *	0 *	0.000273311
Propane	0.00257013	0.0708623	0.939296 *	0 *	2.17806E-05
Isobutane	7.5064E-05	0.00148158	0.0300031 *	0 *	4.61674E-07
n-Butane	3.37313E-05	0.000853411	0.0130013 *	0 *	2.62121E-07
Isopentane	5.04102E-06	9.20001E-05	0.00210021 *	0 *	2.85364E-08
n-Pentane	2.21991E-06	1.57088E-05	0.0010001 *	0 *	4.77959E-09
i-Hexane	9.23485E-06	9.15797E-05	0.00410042 *	0 *	2.81559E-08
n-Hexane	3.04447E-06	1.48976E-05	0.00140014 *	0 *	4.55948E-09
2,2,4-Trimethylpentane	0	0	0 *	0 *	0
Benzene	0.000994751	1.79474	0.0160016 *	0 *	0.000536632
Heptane	1.71996E-05	6.31304E-05	0.00800082 *	0 *	1.94919E-08
Toluene	0.0016209	2.52123	0.039704 *	0 *	0.000758218
Octane	2.46179E-05	3.79606E-05	0.0116012 *	0 *	1.16226E-08
Ethylbenzene	0.000122021	0.179732	0.0039004 *	0 *	5.44231E-05
o-Xylene	0.000715587	1.29939	0.0160016 *	0 *	0.000389366
Nonane	2.96949E-06	4.94368E-06	0.00140014 *	0 *	1.56075E-09
Decane	1.47702E-06	7.12098E-07	0.000700071 *	0 *	2.23054E-10
Water	99.6799	73.8705	0 *	100 *	99.9921
Oxygen	0	0	0 *	0 *	0
Decanes Plus	0	0	0 *	0 *	0

Molar Flow	HP Sep Liquid lbmol/h	Loading lbmol/h	Measured Gas lbmol/h	Measured Water lbmol/h	Produced Water lbmol/h
Nitrogen	0.000398492	6.9604E-08	13.3659 *	0 *	1.50566E-06
Methane	0.0333617	1.19501E-05	974.611 *	0 *	0.000258419
Carbon Dioxide	0.00354054	2.27507E-05	17.0395 *	0 *	0.000492702
Ethane	0.0029473	1.59934E-06	80.2028 *	0 *	3.49275E-05
Propane	0.000329502	1.27203E-07	10.3056 *	0 *	2.78343E-06
Isobutane	9.62354E-06	2.65956E-09	0.329181 *	0 *	5.89991E-08
n-Butane	4.32451E-06	1.53194E-09	0.142645 *	0 *	3.34975E-08
Isopentane	6.46282E-07	1.65147E-10	0.0230427 *	0 *	3.64678E-09
n-Pentane	2.84603E-07	2.81986E-11	0.0109727 *	0 *	6.10803E-10
i-Hexane	1.18395E-06	1.64393E-10	0.0449881 *	0 *	3.59815E-09
n-Hexane	3.90315E-07	2.67424E-11	0.0153618 *	0 *	5.82674E-10
2,2,4-Trimethylpentane	0	0	0 *	0 *	0
Benzene	0.000127531	3.2217E-06	0.175563 *	0 *	6.85784E-05
Heptane	2.20506E-06	1.13324E-10	0.0877817 *	0 *	2.49094E-09
Toluene	0.000207807	4.52581E-06	0.435617 *	0 *	9.68957E-05
Octane	3.15613E-06	6.81423E-11	0.127283 *	0 *	1.4853E-09
Ethylbenzene	1.56437E-05	3.22633E-07	0.0427936 *	0 *	6.95495E-06
o-Xylene	9.17415E-05	2.3325E-06	0.175563 *	0 *	4.97586E-05
Nonane	3.80702E-07	8.8743E-12	0.0153618 *	0 *	1.99455E-10
Decane	1.8936E-07	1.27827E-12	0.0076809 *	0 *	2.85049E-11
Water	12.7794	0.000132603	0 *	13.639 *	12.7784
Oxygen	0	0	0 *	0 *	0
Decanes Plus	0	0	0 *	0 *	0

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	
Flowsheet:	Entrainment	

Mass Fraction	HP Sep Liquid %	Loading %	Measured Gas %	Measured Water %	Produced Water %
Nitrogen	0.00483101	0.0424958	1.89447 *	0 *	1.83183E-05
Methane	0.231618	4.1782	79.1091 *	0 *	0.00180048
Carbon Dioxide	0.0674325	21.8216	3.79427 *	0 *	0.00941725
Ethane	0.0383528	1.04811	12.2021 *	0 *	0.000456122
Propane	0.00628791	0.122247	2.29928 *	0 *	5.33052E-05
Isobutane	0.000242064	0.00336897	0.0968058 *	0 *	1.4893E-06
n-Butane	0.000108776	0.00194057	0.0419492 *	0 *	8.45567E-07
Isopentane	2.01792E-05	0.000259685	0.00841175 *	0 *	1.1427E-07
n-Pentane	8.8863E-06	4.43406E-05	0.00400559 *	0 *	1.91392E-08
i-Hexane	4.41538E-05	0.000308753	0.0196157 *	0 *	1.34665E-07
n-Hexane	1.45563E-05	5.02262E-05	0.00669806 *	0 *	2.18073E-08
2,2,4-Trimethylpentane	0	0	0 *	0 *	0
Benzene	0.00431109	5.48464	0.0693865 *	0 *	0.00232647
Heptane	9.56201E-05	0.000247482	0.0445045 *	0 *	1.08401E-07
Toluene	0.00828617	9.08829	0.203081 *	0 *	0.00387739
Octane	0.00015602	0.000169644	0.0735649 *	0 *	7.36857E-08
Ethylbenzene	0.000718741	0.74651	0.0229871 *	0 *	0.000320678
o-Xylene	0.00421502	5.39695	0.094306 *	0 *	0.00229426
Nonane	2.11306E-05	2.48059E-05	0.00996875 *	0 *	1.111E-08
Decane	1.16598E-05	3.96385E-06	0.00552949 *	0 *	1.76142E-09
Water	99.6332	52.0645	0 *	100 *	99.9794
Oxygen	0	0	0 *	0 *	0
Decanes Plus	0	0	0 *	0 *	0

Mass Flow	HP Sep Liquid lb/h	Loading lb/h	Measured Gas lb/h	Measured Water lb/h	Produced Water lb/h
Nitrogen	0.0111631	1.94985E-06	374.423 *	0 *	4.21785E-05
Methane	0.535204	0.00019171	15635.2 *	0 *	0.00414568
Carbon Dioxide	0.155818	0.00100125	749.901 *	0 *	0.0216835
Ethane	0.0886225	4.80907E-05	2411.62 *	0 *	0.00105024
Propane	0.0145296	5.60911E-06	454.43 *	0 *	0.000122737
Isobutane	0.000559341	1.5458E-07	19.1327 *	0 *	3.42916E-06
n-Butane	0.00025135	8.90397E-08	8.29085 *	0 *	1.94695E-06
Isopentane	4.66284E-05	1.19152E-08	1.6625 *	0 *	2.6311E-07
n-Pentane	2.05338E-05	2.03449E-09	0.791668 *	0 *	4.40687E-08
i-Hexane	0.000102027	1.41666E-08	3.87687 *	0 *	3.10072E-07
n-Hexane	3.36355E-05	2.30454E-09	1.32381 *	0 *	5.02122E-08
2,2,4-Trimethylpentane	0	0	0 *	0 *	0
Benzene	0.00996172	0.000251653	13.7136 *	0 *	0.00535678
Heptane	0.000220951	1.13553E-08	8.79589 *	0 *	2.49597E-07
Toluene	0.019147	0.000417001	40.137 *	0 *	0.00892782
Octane	0.00036052	7.7838E-09	14.5394 *	0 *	1.69664E-07
Ethylbenzene	0.00166081	3.42523E-05	4.54318 *	0 *	0.000738372
o-Xylene	0.00973973	0.00024763	18.6387 *	0 *	0.00528262
Nonane	4.8827E-05	1.13817E-09	1.97023 *	0 *	2.55811E-08
Decane	2.69425E-05	1.81875E-10	1.09285 *	0 *	4.05573E-09
Water	230.224	0.00238889	0 *	245.71 *	230.206
Oxygen	0	0	0 *	0 *	0
Decanes Plus	0	0	0 *	0 *	0

Stream Properties

Property	Units	HP Sep Liquid	Loading	Measured Gas	Measured Water	Produced Water
Temperature	°F	70	72.1381	37 *	37 *	70
Pressure	psig	526	-14.1668	526 *	526 *	0
Mole Fraction Vapor	%	0.210812	100	99.9631	0	0
Mole Fraction Light Liquid	%	99.7892	0	0.0368596	100	100

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	
Flowsheet:	Entrainment	

Stream Properties

Property	Units	HP Sep Liquid	Loading	Measured Gas	Measured Water	Produced Water
Mole Fraction Heavy Liquid	%	0	0	0	0	0
Molecular Weight	lb/lbmol	18.0237	25.5606	18.0138	18.0153	18.0176
Mass Density	lb/ft^3	58.3306	0.00237094	2.073	62.5547	62.2816
Molar Flow	lbmol/h	12.8204	0.000179508	1097.16	13.639	12.7794
Mass Flow	lb/h	231.072	0.00458833	19764	245.71	230.253
Vapor Volumetric Flow	ft^3/h	3.96142	1.93523	9534.02	3.92792	3.69697
Liquid Volumetric Flow	gpm	0.493892	0.241276	1188.66	0.489715	0.460921
Std Vapor Volumetric Flow	MMSCFD	0.116764	1.63489E-06	9.9925 *	0.124219	0.11639
Std Liquid Volumetric Flow	sgpm	0.464864	1.09639E-05	122.69	0.491192 *	0.460332
Compressibility		0.0293922	0.999539	0.881512	0.0292148	0.000747937
Specific Gravity			0.882538		1.00298	0.998599
API Gravity					9.93517	9.99898
Enthalpy	Btu/h	-1.57352E+06	-17.8549	-3.83764E+07	-1.68534E+06	-1.57197E+06
Mass Enthalpy	Btu/lb	-6809.64	-3891.37	-1941.73	-6859.07	-6827.13
Mass Cp	Btu/(lb*°F)	0.980852	0.3606	0.567834	0.98541	0.982139
Ideal Gas CpCv Ratio		1.32568	1.27475	1.29649	1.32743	1.32582
Dynamic Viscosity	cP		0.0110589		1.5867	0.995442
Kinematic Viscosity	cSt		291.187		1.58348	0.997781
Thermal Conductivity	Btu/(h*ft*°F)		0.0112006		0.330434	0.346968
Surface Tension	lbf/ft				0.00528263	0.00503177 ?
Net Ideal Gas Heating Value	Btu/ft^3	2.95138	322.246	954.049	0	0.097029
Net Liquid Heating Value	Btu/lb	-993.883	4176.75	20072.2	-1059.76	-1057.52
Gross Ideal Gas Heating Value	Btu/ft^3	53.4094	379.104	1056.7	50.3101	50.4091
Gross Liquid Heating Value	Btu/lb	68.4957	5020.86	22234.8	0	2.14499

Warnings

ProMax: ProMax!Project!Flowsheets!Entrainment!PStreams!Measured Water
Warning: The temperature of 37 °F is within 10 °F of ice formation.

Remarks

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	
Flowsheet:	Entrainment	

Connections

	Sales Gas	Vent Emissions	W/B	Wellstream Mixture	
From Block	HP Separator	Atmospheric Water Tank	--	MIX-100	
To Block	--	--	--	HP Separator	

Stream Composition

Mole Fraction	Sales Gas %	Vent Emissions %	W/B %	Wellstream Mixture %	
Nitrogen	1.21728	0.967076	0.0387749	1.20327	
Methane	88.7612	80.6411	6.65717	87.7398	
Carbon Dioxide	1.55158	7.42468	12.6739	1.53399	
Ethane	7.30433	7.09467	0.890959	7.22029	
Propane	0.938566	0.795901	0.0708623	0.927763	
Isobutane	0.0299798	0.0232996	0.00148158	0.0296347	
n-Butane	0.0129912	0.0104531	0.000853411	0.0128417	
Isopentane	0.00209859	0.00156549	9.20001E-05	0.00207443	
n-Pentane	0.000999331	0.000691817	1.57088E-05	0.000987822	
i-Hexane	0.00409725	0.00287539	9.15797E-05	0.00405007	
n-Hexane	0.00139906	0.000949405	1.48976E-05	0.00138295	
2,2,4-Trimethylpentane	0	0	0	0	
Benzene	0.0159781	0.143612	1.79474	0.0158052	
Heptane	0.00799465	0.00536555	6.31304E-05	0.00790258	
Toluene	0.0396555	0.270185	2.52123	0.0392165	
Octane	0.0115922	0.00768485	3.79606E-05	0.0114587	
Ethylbenzene	0.00389607	0.0211661	0.179732	0.00385251	
o-Xylene	0.0159813	0.102272	1.29939	0.0158052	
Nonane	0.00139906	0.000926921	4.94368E-06	0.00138295	
Decane	0.000699532	0.000461221	7.12098E-07	0.000691476	
Water	0.0782877	2.48503	73.8705	1.22785	
Oxygen	0	0	0	0	
Decanes Plus	0	0	0	0	

Molar Flow	Sales Gas lbmol/h	Vent Emissions lbmol/h	W/B lbmol/h	Wellstream Mixture lbmol/h	
Nitrogen	13.3655	0.000396986	6.60826E-07	13.3659	
Methane	974.578	0.0331033	0.000113455	974.611	
Carbon Dioxide	17.036	0.00304784	0.000215997	17.0395	
Ethane	80.1999	0.00291237	1.51843E-05	80.2028	
Propane	10.3052	0.000326719	1.20768E-06	10.3056	
Isobutane	0.329172	9.56454E-06	2.52501E-08	0.329181	
n-Butane	0.142641	4.29101E-06	1.45444E-08	0.142645	
Isopentane	0.023042	6.42635E-07	1.56792E-09	0.0230427	
n-Pentane	0.0109724	2.83992E-07	2.67719E-10	0.0109727	
i-Hexane	0.0449869	1.18035E-06	1.56076E-09	0.0449881	
n-Hexane	0.0153614	3.89732E-07	2.53895E-10	0.0153618	
2,2,4-Trimethylpentane	0	0	0	0	
Benzene	0.175436	5.89531E-05	3.05871E-05	0.175563	
Heptane	0.0877795	2.20257E-06	1.07591E-09	0.0877817	
Toluene	0.435409	0.000110911	4.29683E-05	0.435617	
Octane	0.12728	3.15464E-06	6.46949E-10	0.127283	
Ethylbenzene	0.0427779	8.68871E-06	3.0631E-06	0.0427936	
o-Xylene	0.175472	4.19829E-05	2.21449E-05	0.175563	
Nonane	0.0153614	3.80502E-07	8.42533E-11	0.0153618	
Decane	0.00768071	1.89332E-07	1.2136E-11	0.0076809	
Water	0.859581	0.00102011	0.00125895	13.639	
Oxygen	0	0	0	0	
Decanes Plus	0	0	0	0	

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	
Flowsheet:	Entrainment	

Mass Fraction	Sales Gas %	Vent Emissions %	W/B %	Wellstream Mixture %	
Nitrogen	1.89301	1.35863	0.0424958	1.8712	
Methane	79.0479	64.8789	4.1782	78.1377	
Carbon Dioxide	3.79067	16.387	21.8216	3.74767	
Ethane	12.1926	10.6986	1.04811	12.0522	
Propane	2.2975	1.76007	0.122247	2.27104	
Isobutane	0.0967313	0.0679152	0.00336897	0.095617	
n-Butane	0.0419168	0.0304693	0.00194057	0.0414341	
Isopentane	0.00840529	0.00566441	0.000259685	0.00830846	
n-Pentane	0.00400253	0.0025032	4.43406E-05	0.00395641	
i-Hexane	0.0196007	0.0124267	0.000308753	0.0193749	
n-Hexane	0.00669293	0.00410308	5.02262E-05	0.00661581	
2,2,4-Trimethylpentane	0	0	0	0	
Benzene	0.0692847	0.562581	5.48464	0.0685344	
Heptane	0.0444705	0.0269629	0.000247482	0.043958	
Toluene	0.202834	1.24847	9.08829	0.200587	
Octane	0.0735086	0.0440236	0.000169644	0.0726615	
Ethylbenzene	0.0229617	0.112693	0.74651	0.0227048	
o-Xylene	0.094187	0.544521	5.39695	0.093148	
Nonane	0.00996112	0.00596202	2.48059E-05	0.00984634	
Decane	0.00552526	0.00329104	3.96385E-06	0.00546159	
Water	0.0782944	2.24517	52.0645	1.22795	
Oxygen	0	0	0	0	
Decanes Plus	0	0	0	0	

Mass Flow	Sales Gas lb/h	Vent Emissions lb/h	W/B lb/h	Wellstream Mixture lb/h	
Nitrogen	374.412	0.0111209	1.8512E-05	374.423	
Methane	15634.6	0.531058	0.00182011	15635.2	
Carbon Dioxide	749.745	0.134134	0.00950593	749.901	
Ethane	2411.53	0.0875723	0.000456576	2411.62	
Propane	454.416	0.0144069	5.32533E-05	454.43	
Isobutane	19.1322	0.000555912	1.46759E-06	19.1327	
n-Butane	8.2906	0.000249403	8.4535E-07	8.29085	
Isopentane	1.66246	4.63653E-05	1.13124E-07	1.6625	
n-Pentane	0.791647	2.04897E-05	1.93156E-08	0.791668	
i-Hexane	3.87676	0.000101717	1.34499E-07	3.87687	
n-Hexane	1.32377	3.35853E-05	2.18795E-08	1.32381	
2,2,4-Trimethylpentane	0	0	0	0	
Benzene	13.7036	0.00460494	0.00238921	13.7136	
Heptane	8.79567	0.000220702	1.07808E-07	8.79589	
Toluene	40.1179	0.0102192	0.00395904	40.137	
Octane	14.539	0.00036035	7.39E-08	14.5394	
Ethylbenzene	4.54152	0.000922437	0.000325194	4.54318	
o-Xylene	18.6289	0.00445711	0.00235102	18.6387	
Nonane	1.97018	4.88014E-05	1.08059E-08	1.97023	
Decane	1.09282	2.69384E-05	1.72673E-09	1.09285	
Water	15.4856	0.0183776	0.0226803	245.71	
Oxygen	0	0	0	0	
Decanes Plus	0	0	0	0	

Stream Properties

Property	Units	Sales Gas	Vent Emissions	W/B	Wellstream Mixture	
Temperature	°F	70 *	70 *	72.1381	36.5909	
Pressure	psig	526 *	0 *	-14.1668	526	
Mole Fraction Vapor	%	100	100	100	98.7565	
Mole Fraction Light Liquid	%	0	0	0	0.037183	
Mole Fraction Heavy Liquid	%	0	0	0	1.20635	

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	
Flowsheet:	Entrainment	

Stream Properties

Property	Units	Sales Gas	Vent Emissions	W/B	Wellstream Mixture	
Molecular Weight	lb/lbmol	18.0137	19.94	25.5606	18.0139	
Mass Density	lb/ft^3	1.89037	0.0517052	0.00237094	2.10005	
Molar Flow	lbmol/h	1097.98	0.0410502	0.00170426	1110.8	
Mass Flow	lb/h	19778.7	0.818538	0.0435619	20009.8	
Vapor Volumetric Flow	ft^3/h	10462.9	15.8309	18.3733	9528.21	
Liquid Volumetric Flow	gpm	1304.46	1.97372	2.29069	1187.93	
Std Vapor Volumetric Flow	MMSCFD	9.99996	0.000373869	1.55218E-05	10.1167	
Std Liquid Volumetric Flow	sgpm	122.716	0.00453231	0.000104092	123.181	
Compressibility		0.906446	0.997054	0.999539	0.870875	
Specific Gravity		0.621966	0.688472	0.882538		
API Gravity						
Enthalpy	Btu/h	-3.80916E+07	-1802.79	-169.515	-4.00617E+07	
Mass Enthalpy	Btu/lb	-1925.89	-2202.46	-3891.37	-2002.11	
Mass Cp	Btu/(lb*°F)	0.562497	0.449446	0.3606	0.572987	
Ideal Gas CpCv Ratio		1.28852	1.28591	1.27475	1.29693	
Dynamic Viscosity	cP	0.0117762	0.0113552	0.0110589		
Kinematic Viscosity	cSt	0.3889	13.7101	291.187		
Thermal Conductivity	Btu/(h*ft*°F)	0.0201947	0.0174915	0.0112006		
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	953.303	891.544	322.246	942.334	
Net Liquid Heating Value	Btu/lb	20055.8	16907.6	4176.75	19812.7	
Gross Ideal Gas Heating Value	Btu/ft^3	1055.92	987.452	379.104	1044.35	
Gross Liquid Heating Value	Btu/lb	22217.5	18732.8	5020.86	21961.8	

Warnings

ProMax:ProMax!Project!Flowsheets!Entrainment!PStreams!Wellstream Mixture
Warning: The temperature of 36.5909 °F is below hydrate formation.
Warning: The temperature of 36.5909 °F is within 10 °F of ice formation.

Remarks

Energy Stream Report

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	
Flowsheet:	Entrainment	

Energy Streams

Energy Stream	Energy Rate	Power	From Block	To Block
Q-1	396646 Btu/h	155.888 hp	--	HP Separator
Q-2	-253.947 Btu/h	-0.0998047 hp	--	Atmospheric Water Tank

Remarks

Blocks
Atmospheric Water Tank
Separator Report

Client Name:	XTO	Job: Produced Fluids Tank	
Location:	Harvey Well Pad	Modified: 12:31 PM, 10/6/2017	
Flowsheet:	Entrainment	Status: Solved 4:59 PM, 10/16/2017	

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
HP Sep Liquid	Inlet	HP Separator	Vent Emissions	Vapor Outlet	
Produced Water	Heavy Liquid Outlet		Q-2	Energy	

Block Parameters

Pressure Drop	526	psi	* Main Liquid Phase	Heavy Liquid	
Mole Fraction Vapor	0.320193	%	Heat Duty	-253.947	Btu/h
Mole Fraction Light Liquid	99.6798	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	0	%	Heat Release Curve Increments	10	

Remarks

Blocks
HP Separator
Separator Report

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	Modified: 6:08 PM, 10/5/2017
Flowsheet:	Entrainment	Status: Solved 4:59 PM, 10/16/2017

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Wellstream Mixture	Inlet	MIX-100	Sales Gas	Vapor Outlet	
HP Sep Liquid	Light Liquid Outlet	Atmospheric Water Tank	Q-1	Energy	

Block Parameters

Pressure Drop	0	psi	Main Liquid Phase	Light Liquid	
Mole Fraction Vapor	98.8483	%	Heat Duty	396646	Btu/h
Mole Fraction Light Liquid	1.15173	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	0	%	Heat Release Curve Increments	10	

Entrainments

Entrainment Entrainment

* From Phase (Numerator)	Vapor		* Numerator Value	0.390407	ft^3
* To Phase (Denominator)	Light Liquid		* Denominator Value	42	gal
* Numerator Basis	Volume		Entrainment Value	6.95345	%
* Denominator Basis	per Volume		* Active	True	

Remarks

Blocks
MIX-100
Mixer/Splitter Report

Client Name:	XTO	Job: Produced Fluids Tank	
Location:	Harvey Well Pad	Modified: 6:02 PM, 10/5/2017	
Flowsheet:	Entrainment	Status: Solved 4:59 PM, 10/16/2017	

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Measured Gas	Inlet		Measured Water	Inlet	
Wellstream Mixture	Outlet	HP Separator			

Block Parameters

Pressure Drop	0 psi	Fraction to PStream Wellstream Mixture	100 %

Remarks

Flowsheet Environment
Peng Robinson

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	
Flowsheet:	Entrainment	

Environment Settings

Number of Poynting Intervals	0	Phase Tolerance	1 %
Gibbs Excess Model Evaluation Temperature	77 °F	Emulsion Enabled	False
Freeze Out Temperature Threshold Difference	10 °F		

Components

Component Name	Henry's Law Component	Phase Initiator	Component Name	Henry's Law Component	Phase Initiator
Nitrogen	False	False	Benzene	False	False
Methane	False	False	Heptane	False	False
Carbon Dioxide	False	False	Toluene	False	False
Ethane	False	False	Octane	False	False
Propane	False	False	Ethylbenzene	False	False
Isobutane	False	False	o-Xylene	False	False
n-Butane	False	False	Nonane	False	False
Isopentane	False	False	Decane	False	False
n-Pentane	False	False	Water	False	True
i-Hexane	False	False	Oxygen	False	False
n-Hexane	False	False	Decanes Plus	False	False
2,2,4-Trimethylpentane	False	False			

Physical Property Method Sets

Liquid Molar Volume	COSTALD	Overall Package	Peng-Robinson
Stability Calculation	Peng-Robinson	Vapor Package	Peng-Robinson
Light Liquid Package	Peng-Robinson	Heavy Liquid Package	Peng-Robinson

Remarks

Environments Report

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	

Project-Wide Constants

Atmospheric Pressure	14.6959 psia	Ideal Gas Reference Pressure	14.6959 psia
Ideal Gas Reference Temperature	60 °F	Ideal Gas Reference Volume	379.484 ft^3/lbmol
Liquid Reference Temperature	60 °F		

Environment [Peng Robinson]

Environment Settings

Number of Poynting Intervals	0	Phase Tolerance	1 %
Gibbs Excess Model Evaluation Temperature	77 °F	Emulsion Enabled	False
Freeze Out Temperature Threshold Difference	10 °F		

Components

Component Name	Henry's Law Component	Phase Initiator	Component Name	Henry's Law Component	Phase Initiator
Nitrogen	False	False	Benzene	False	False
Methane	False	False	Heptane	False	False
Carbon Dioxide	False	False	Toluene	False	False
Ethane	False	False	Octane	False	False
Propane	False	False	Ethylbenzene	False	False
Isobutane	False	False	o-Xylene	False	False
n-Butane	False	False	Nonane	False	False
Isopentane	False	False	Decane	False	False
n-Pentane	False	False	Water	False	True
i-Hexane	False	False	Oxygen	False	False
n-Hexane	False	False	Decanes Plus	False	False
2,2,4-Trimethylpentane	False	False			

Physical Property Method Sets

Liquid Molar Volume	COSTALD	Overall Package	Peng-Robinson
Stability Calculation	Peng-Robinson	Vapor Package	Peng-Robinson
Light Liquid Package	Peng-Robinson	Heavy Liquid Package	Peng-Robinson

Remarks

Single Oil Report
Decanes Plus

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	

Properties

	Volume Average Boiling Point	399.878 °F		Low Temperature Viscosity	1.05288 cP
*	Molecular Weight	162.726 lb/lbmol		Temperature of High T Viscosity	210 °F
*	Specific Gravity	0.788		High Temperature Viscosity	0.503332 cP
	API Gravity	48.0685		Watson K	12.066
	Critical Temperature	720.653 °F		ASTM D86 10-90% Slope	0 °F/%
	Critical Pressure	292.582 psig		ASTM D93 Flash Point	157.716 °F
	Critical Volume	10.2876 ft^3/lbmol	?	Pour Point	-12.6777 °F
	Acentric Factor	0.527304		Paraffinic Fraction	51.9393 %
	Carbon to Hydrogen Ratio	6.00643		Naphthenic Fraction	27.7089 %
	Refractive Index	1.43922		Aromatic Fraction	20.3518 %
	Temperature of Low T Viscosity	100 °F		Ideal Gas Heat Capacity	57.9027 Btu/(lbmol*°F)

Warnings

ProMax:ProMax!Project!Oils!Decanes Plus!Properties!Pour Point
Warning: Pour Point calculation: The value of 0.788 for Specific Gravity should be between 0.8 and 1.

Remarks

Single Oil Report
Decanes Plus_x1

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	

Properties

	Volume Average Boiling Point	399.878 °F	Low Temperature Viscosity	1.05288	cP
*	Molecular Weight	162.726 lb/lbmol	Temperature of High T Viscosity	210	°F
*	Specific Gravity	0.788	High Temperature Viscosity	0.503332	cP
	API Gravity	48.0685	Watson K	12.066	
	Critical Temperature	720.653 °F	ASTM D86 10-90% Slope	0	°F/%
	Critical Pressure	292.582 psig	ASTM D93 Flash Point	157.716	°F
	Critical Volume	10.2876 ft^3/lbmol	? Pour Point	-12.6777	°F
	Acentric Factor	0.527304	Paraffinic Fraction	51.9393	%
	Carbon to Hydrogen Ratio	6.00643	Naphthenic Fraction	27.7089	%
	Refractive Index	1.43922	Aromatic Fraction	20.3518	%
	Temperature of Low T Viscosity	100 °F	Ideal Gas Heat Capacity	57.9027	Btu/(lbmol*°F)

Warnings

ProMax:ProMax!Project!Oils!Decanes Plus_x1!Properties!Pour Point
Warning: Pour Point calculation: The value of 0.788 for Specific Gravity should be between 0.8 and 1.

Remarks

Single Oil Report
Decanes Plus_x2

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	

Properties

	Volume Average Boiling Point	399.878 °F	Low Temperature Viscosity	1.05288	cP
*	Molecular Weight	162.726 lb/lbmol	Temperature of High T Viscosity	210	°F
*	Specific Gravity	0.788	High Temperature Viscosity	0.503332	cP
	API Gravity	48.0685	Watson K	12.066	
	Critical Temperature	720.653 °F	ASTM D86 10-90% Slope	0	°F/%
	Critical Pressure	292.582 psig	ASTM D93 Flash Point	157.716	°F
	Critical Volume	10.2876 ft^3/lbmol	? Pour Point	-12.6777	°F
	Acentric Factor	0.527304	Paraffinic Fraction	51.9393	%
	Carbon to Hydrogen Ratio	6.00643	Naphthenic Fraction	27.7089	%
	Refractive Index	1.43922	Aromatic Fraction	20.3518	%
	Temperature of Low T Viscosity	100 °F	Ideal Gas Heat Capacity	57.9027	Btu/(lbmol*°F)

Warnings

ProMax:ProMax!Project!Oils!Decanes Plus_x2!Properties!Pour Point
Warning: Pour Point calculation: The value of 0.788 for Specific Gravity should be between 0.8 and 1.

Remarks

Single Oil Report
Decanes Plus_x3

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	

Properties

	Volume Average Boiling Point	399.878 °F	Low Temperature Viscosity	1.05288	cP
*	Molecular Weight	162.726 lb/lbmol	Temperature of High T Viscosity	210	°F
*	Specific Gravity	0.788	High Temperature Viscosity	0.503332	cP
	API Gravity	48.0685	Watson K	12.066	
	Critical Temperature	720.653 °F	ASTM D86 10-90% Slope	0	°F/%
	Critical Pressure	292.582 psig	ASTM D93 Flash Point	157.716	°F
	Critical Volume	10.2876 ft^3/lbmol	? Pour Point	-12.6777	°F
	Acentric Factor	0.527304	Paraffinic Fraction	51.9393	%
	Carbon to Hydrogen Ratio	6.00643	Naphthenic Fraction	27.7089	%
	Refractive Index	1.43922	Aromatic Fraction	20.3518	%
	Temperature of Low T Viscosity	100 °F	Ideal Gas Heat Capacity	57.9027	Btu/(lbmol*°F)

Warnings

ProMax:ProMax!Project!Oils!Decanes Plus_x3!Properties!Pour Point
Warning: Pour Point calculation: The value of 0.788 for Specific Gravity should be between 0.8 and 1.

Remarks

Calculator Report

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	

(E) Tank T Specifier

Source Code

CV1 = AmbientTemp

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Entrainment!PStreams!Vent Emissions!Phases!Total!Properties!Temperature
Value	70
Unit	

Measured Variable [AmbientTemp]

Source Moniker	ProMax:ProMax!Project!User Value Sets!Produced Water Emissions - User Values!Ambient Temperature!Properties!Parameter
Value	70
Unit	

Remarks

(E) Water P Specifier

Source Code

CV1 = WellstreamP

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Entrainment!PStreams!Measured Water!Phases!Total!Properties!Pressure
Value	526
Unit	

Measured Variable [WellstreamP]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Entrainment!PStreams!Measured Gas!Phases!Total!Properties!Pressure
Value	526
Unit	

Remarks

(E) Water T Specifier

Source Code

CV1 = WellstreamT

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Entrainment!PStreams!Measured Water!Phases!Total!Properties!Temperature
Value	37
Unit	

Measured Variable [WellstreamT]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Entrainment!PStreams!Measured Gas!Phases!Total!Properties!Temperature
Value	37
Unit	

Remarks

Calculator Report

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	

(Entrainment) Produced Water Solver

Source Code

Residual Error (for CV1) = ProducedWater / ProducedWaterTarget - 1

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Entrainment!PStreams!Measured Water!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	16.8409
Unit	

Measured Variable [ProducedWaterTarget]

Source Moniker	ProMax:ProMax!Project!User Value Sets!Produced Water Emissions - User Values!Produced Water Rate!Properties!Parameter
Value	15.7808
Unit	

Measured Variable [ProducedWater]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Entrainment!PStreams!Produced Water!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	15.7828
Unit	

Solver Properties

Status: Solved

Error	0.000126267		Algorithm	Default
Calculated Value	0.491192	sgpm	Iterations	4
Lower Bound		sgpm	Max Iterations	20
Upper Bound		sgpm	Weighting	1
Step Size		sgpm	Solver Active	Active
Is Minimizer	False		* Skip Dependency Check	True

Remarks

(Entrainment) Sales Gas Solver

Source Code

Residual Error (for CV1) = SalesGasFlow / SalesGasTarget - 1

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Entrainment!PStreams!Measured Gas!Phases!Total!Properties!Std Vapor Volumetric Flow
Value	9.9925
Unit	

Measured Variable [SalesGasFlow]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Entrainment!PStreams!Sales Gas!Phases!Total!Properties!Std Vapor Volumetric Flow
Value	9.99996
Unit	

Measured Variable [SalesGasTarget]

Source Moniker	ProMax:ProMax!Project!User Value Sets!Produced Water Emissions - User Values!Sales Gas Rate!Properties!Parameter
Value	10
Unit	

Solver Properties

Status: Solved

Error	-4.32651E-06		Algorithm	Default
Calculated Value	9.9925	MMSCFD	Iterations	4
Lower Bound		MMSCFD	Max Iterations	20

Calculator Report

Client Name:	XTO
Location:	Harvey Well Pad
Job: Produced Fluids Tank	

Solver Properties

Status: Solved

Upper Bound		MMSCFD	Weighting		1
Step Size		MMSCFD	Solver Active		Active
Is Minimizer	False		* Skip Dependency Check		True

Remarks

Water %

Source Code

Residual Error (for CV1) = Water/ 99 - 1

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Entrainment!Blocks!HP Separator!Entrainments!Entrainment!Properties!Numerator Value
Value	0.390407
Unit	

Measured Variable [Water]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Entrainment!PStreams!HP Sep Liquid!Phases!Total!Composition!Std Liquid Volumetric Fraction!Water
Value	99.0042
Unit	

Solver Properties

Status: Solved

Error	4.27512E-05		Algorithm		Default
Calculated Value	0.390407	ft^3	Iterations		4
Lower Bound		ft^3	Max Iterations		20
Upper Bound		ft^3	Weighting		1
Step Size		ft^3	Solver Active		Active
Is Minimizer	False		* Skip Dependency Check		True

Remarks

User Value Sets Report

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	

Produced Water Emissions - User Values

User Value [Produced Water Rate]

* Parameter	15.7808 bbl/d		Upper Bound	bbl/d
Lower Bound	bbl/d		* Enforce Bounds	False

User Value [Sales Gas Rate]

* Parameter	10 MMSCFD		Upper Bound	MMSCFD
Lower Bound	MMSCFD		* Enforce Bounds	False

User Value [Max Condensate Rate]

* Parameter	5 bbl/d		Upper Bound	bbl/d
Lower Bound	bbl/d		* Enforce Bounds	False

User Value [Ambient Temperature]

* Parameter	70 °F		Upper Bound	°F
Lower Bound	°F		* Enforce Bounds	False

User Value [Gas Entrainment]

* Parameter	2.8 ft^3/bbl		Upper Bound	ft^3/bbl
Lower Bound	ft^3/bbl		* Enforce Bounds	False

User Value [GWR Target]

* Parameter	10 scf/bbl		Upper Bound	scf/bbl
Lower Bound	scf/bbl		* Enforce Bounds	False

Remarks

Tank-1

User Value [BlockReady]

* Parameter	1		Upper Bound	
Lower Bound			* Enforce Bounds	False

User Value [ShellLength]

* Parameter	20 ft		Upper Bound	ft
Lower Bound	ft		* Enforce Bounds	False

User Value [ShellDiam]

* Parameter	12 ft		Upper Bound	ft
Lower Bound	ft		* Enforce Bounds	False

User Value [BreatherVP]

* Parameter	0.03 psig		Upper Bound	psig
Lower Bound	psig		* Enforce Bounds	False

User Value [BreatherVacP]

* Parameter	-0.03 psig		Upper Bound	psig
Lower Bound	psig		* Enforce Bounds	False

User Value [DomeRadius]

Parameter	ft		Upper Bound	ft
Lower Bound	ft		* Enforce Bounds	False

User Value Sets Report

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	

User Value [OpPress]

* Parameter	0	psig	Upper Bound	psig
Lower Bound		psig	* Enforce Bounds	False

User Value [AvgPercentLiq]

* Parameter	50	%	Upper Bound	%
Lower Bound		%	* Enforce Bounds	False

User Value [MaxPercentLiq]

* Parameter	100	%	Upper Bound	%
Lower Bound		%	* Enforce Bounds	False

User Value [AnnNetTP]

* Parameter	8.12603	bbl/day	Upper Bound	bbl/day
Lower Bound		bbl/day	* Enforce Bounds	False

User Value [OREff]

* Parameter	0	%	Upper Bound	%
Lower Bound		%	* Enforce Bounds	False

User Value [MaxAvgT]

* Parameter	59.8833	°F	Upper Bound	°F
Lower Bound		°F	* Enforce Bounds	False

User Value [MinAvgT]

* Parameter	40.7333	°F	Upper Bound	°F
Lower Bound		°F	* Enforce Bounds	False

User Value [BulkLiqT]

* Parameter	54.6483	°F	Upper Bound	°F
Lower Bound		°F	* Enforce Bounds	False

User Value [AvgP]

* Parameter	14.1085	psia	Upper Bound	psia
Lower Bound		psia	* Enforce Bounds	False

User Value [Therml]

* Parameter	1202.96	Btu/ft^2/day	Upper Bound	Btu/ft^2/day
Lower Bound		Btu/ft^2/day	* Enforce Bounds	False

User Value [AvgWindSpeed]

* Parameter	9.075	mi/h	Upper Bound	mi/h
Lower Bound		mi/h	* Enforce Bounds	False

User Value [MaxHourlyLoadingRate]

* Parameter	16.62	gpm	Upper Bound	gpm
Lower Bound		gpm	* Enforce Bounds	False

User Value [EntrainedOilFrac]

* Parameter	1	%	Upper Bound	%
Lower Bound		%	* Enforce Bounds	False

User Value [TurnoverRate]

* Parameter	3.68071		Upper Bound	
Lower Bound			* Enforce Bounds	False

User Value Sets Report

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	

User Value [LLossSatFactor]

* Parameter	1.45	Upper Bound	
Lower Bound		* Enforce Bounds	False

User Value [AtmPressure]

* Parameter	14.1085	psia	Upper Bound		psia
Lower Bound		psia	* Enforce Bounds	False	

User Value [TVP]

* Parameter	12.8436	psia	Upper Bound		psia
Lower Bound		psia	* Enforce Bounds	False	

User Value [MaxVP]

* Parameter	14.1085	psia	Upper Bound		psia
Lower Bound		psia	* Enforce Bounds	False	

User Value [MinVP]

* Parameter	11.6144	psia	Upper Bound		psia
Lower Bound		psia	* Enforce Bounds	False	

User Value [AvgLiqSurfaceT]

* Parameter	61.1967	°F	Upper Bound		°F
Lower Bound		°F	* Enforce Bounds	False	

User Value [MaxLiqSurfaceT]

* Parameter	72.1381	°F	Upper Bound		°F
Lower Bound		°F	* Enforce Bounds	False	

User Value [TotalLosses]

* Parameter	0.190801	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False	

User Value [WorkingLosses]

* Parameter	0.00689747	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False	

User Value [StandingLosses]

* Parameter	0.0885031	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False	

User Value [RimSealLosses]

* Parameter	0	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False	

User Value [WithdrawalLoss]

* Parameter	0	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False	

User Value [LoadingLosses]

* Parameter	0.0200969	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False	

User Value [MaxHourlyLoadingLoss]

* Parameter	0.321751	lb/hr	Upper Bound		lb/hr

User Value Sets Report

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	

User Value [MaxHourlyLoadingLoss]

Lower Bound	lb/hr	* Enforce Bounds	False

User Value [PStar]

Parameter		Upper Bound	
Lower Bound		* Enforce Bounds	False

User Value [AllCTotalLosses]

* Parameter	0.190801	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False	

User Value [AllCLoadingLosses]

* Parameter	0.0200969	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False	

User Value [AllCMaxHLoadingLoss]

* Parameter	0.321751	lb/hr	Upper Bound		lb/hr
Lower Bound		lb/hr	* Enforce Bounds	False	

User Value [AllCFlashingLosses]

* Parameter	1.85675	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False	

User Value [DeckFittingLosses]

* Parameter	0	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False	

User Value [DeckSeamLosses]

* Parameter	0	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False	

User Value [FlashingLosses]

* Parameter	1.85675	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False	

User Value [TotalResidual]

* Parameter	519.042	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False	

User Value [GasMoleWeight]

* Parameter	0.0197621	kg/mol	Upper Bound		kg/mol
Lower Bound		kg/mol	* Enforce Bounds	False	

User Value [VapReportableFrac]

* Parameter	100	%	Upper Bound		%
Lower Bound		%	* Enforce Bounds	False	

User Value [LiqReportableFrac]

* Parameter	100	%	Upper Bound		%
Lower Bound		%	* Enforce Bounds	False	

User Value [FlashReportableFrac]

* Parameter	100	%	Upper Bound		%
Lower Bound		%	* Enforce Bounds	False	

User Value Sets Report

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	

Remarks
This User Value Set was programmatically generated. GUID={668B48F2-2A5B-4971-AEE1-405A17714001}

Sum Component Flow/Frac2

User Value [CompSum]

* Parameter	0.158884	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

Remarks
This User Value Set was programmatically generated. GUID={13C47314-B1CC-47CC-9E88-8D2B10FC5C1F}

Sum Component Flow/Frac.3

User Value [CompSum]

* Parameter	0.0397726	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

Remarks
This User Value Set was programmatically generated. GUID={6DB7EA28-F7F4-47C2-B43D-D43A5BDFE875}

Sum Component Flow/Frac.1

User Value [CompSum]

* Parameter	0.0041892	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

Remarks
This User Value Set was programmatically generated. GUID={6401B9B0-2499-4519-9F8D-4CB8DD18CB53}

Recoveries Report

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	

Component Recoveries - Project Inlets

Status: Solved

Recovery Stream Data Source - All Inlets in Project

Flowsheet	PStream	Flowsheet	PStream
Entrainment	Measured Gas	Entrainment	Measured Water

Parameters

* Composition Basis	Molar Flow	* Summation Option	Streams and Summation
* Calculate Ratios	False	* Atomic Basis	False

Tabulated Data

Index	Entrainment:Measured Gas lbmol/h	Entrainment:Measured Water lbmol/h	Summary Table lbmol/h	
Nitrogen	13.3659	0	13.3659	
Methane	974.611	0	974.611	
Carbon Dioxide	17.0395	0	17.0395	
Ethane	80.2028	0	80.2028	
Propane	10.3056	0	10.3056	
Isobutane	0.329181	0	0.329181	
n-Butane	0.142645	0	0.142645	
Isopentane	0.0230427	0	0.0230427	
n-Pentane	0.0109727	0	0.0109727	
i-Hexane	0.0449881	0	0.0449881	
n-Hexane	0.0153618	0	0.0153618	
2,2,4-Trimethylpentane	0	0	0	
Benzene	0.175563	0	0.175563	
Heptane	0.0877817	0	0.0877817	
Toluene	0.435617	0	0.435617	
Octane	0.127283	0	0.127283	
Ethylbenzene	0.0427936	0	0.0427936	
o-Xylene	0.175563	0	0.175563	
Nonane	0.0153618	0	0.0153618	
Decane	0.0076809	0	0.0076809	
Water	0	13.639	13.639	
Oxygen	0	0	0	
Decanes Plus	0	0	0	
Total	1097.16	13.639	1110.8	

Remarks

Component Recoveries - Project Outlets

Status: Solved

Recovery Stream Data Source - All Outlets in Project

Flowsheet	PStream	Flowsheet	PStream
Entrainment	Produced Water	Entrainment	Vent Emissions
Entrainment	Sales Gas		

Parameters

* Composition Basis	Molar Flow	* Summation Option	Streams and Summation
* Calculate Ratios	False	* Atomic Basis	False

Recoveries Report

Client Name:	XTO
Location:	Harvey Well Pad
Job:	Produced Fluids Tank

Tabulated Data

Index	Entrainment:Produced Water lbmol/h	Entrainment:Sales Gas lbmol/h	Entrainment:Vent Emissions lbmol/h	Summary Table lbmol/h
Nitrogen	1.50566E-06	13.3655	0.000396986	13.3659
Methane	0.000258419	974.578	0.0331033	974.611
Carbon Dioxide	0.000492702	17.036	0.00304784	17.0395
Ethane	3.49275E-05	80.1999	0.00291237	80.2028
Propane	2.78343E-06	10.3052	0.000326719	10.3056
Isobutane	5.89991E-08	0.329172	9.56454E-06	0.329181
n-Butane	3.34975E-08	0.142641	4.29101E-06	0.142645
Isopentane	3.64678E-09	0.023042	6.42635E-07	0.0230427
n-Pentane	6.10803E-10	0.0109724	2.83992E-07	0.0109727
i-Hexane	3.59815E-09	0.0449869	1.18035E-06	0.0449881
n-Hexane	5.82674E-10	0.0153614	3.89732E-07	0.0153618
2,2,4-Trimethylpentane	0	0	0	0
Benzene	6.85784E-05	0.175436	5.89531E-05	0.175563
Heptane	2.49094E-09	0.0877795	2.20257E-06	0.0877817
Toluene	9.68957E-05	0.435409	0.000110911	0.435617
Octane	1.4853E-09	0.12728	3.15464E-06	0.127283
Ethylbenzene	6.95495E-06	0.0427779	8.68871E-06	0.0427936
o-Xylene	4.97586E-05	0.175472	4.19829E-05	0.175563
Nonane	1.99455E-10	0.0153614	3.80502E-07	0.0153618
Decane	2.85049E-11	0.00768071	1.89332E-07	0.0076809
Water	12.7784	0.859581	0.00102011	13.639
Oxygen	0	0	0	0
Decanes Plus	0	0	0	0
Total	12.7794	1097.98	0.0410502	1110.8

Remarks

Component Recoveries - Project Losses

Status: Solved

Reference Stream Data Source - All Outlets in Project

Flowsheet	PStream	Flowsheet	PStream
Entrainment	Produced Water	Entrainment	Vent Emissions
Entrainment	Sales Gas		

Recovery Stream Data Source - All Inlets in Project

Flowsheet	PStream	Flowsheet	PStream
Entrainment	Measured Gas	Entrainment	Measured Water

Parameters

* Composition Basis	Molar Flow	* Summation Option	Summation Only
* Calculate Ratios	False	* Atomic Basis	False

Tabulated Data

Index	Summary Table lbmol/h			
Nitrogen	3.52458E-15			
Methane	1.12786E-13			
Carbon Dioxide	0			
Ethane	1.40983E-14			
Propane	8.81144E-15			
Isobutane	6.05787E-16			
n-Butane	3.85501E-16			
Isopentane	1.37679E-16			

Recoveries Report

Client Name:	XTO
Location:	Harvey Well Pad

Job: Produced Fluids Tank

Tabulated Data

Index	Summary Table lbmol/h			
n-Pentane	9.29332E-17			
i-Hexane	8.53608E-16			
n-Hexane	4.23362E-16			
2,2,4-Trimethylpentane	0			
Benzene	8.67376E-15			
Heptane	6.18178E-15			
Toluene	5.83758E-14			
Octane	2.54155E-14			
Ethylbenzene	1.22052E-14			
o-Xylene	5.4273E-14			
Nonane	5.52264E-15			
Decane	3.60977E-15			
Water	-1.76229E-15			
Oxygen	0			
Decanes Plus	0			
Total	2.25573E-13			

Remarks

Component Recoveries - Project Recoveries

Status: Solved

Reference Stream Data Source - All Inlets in Project

Flowsheet	PStream	Flowsheet	PStream
Entrainment	Measured Gas	Entrainment	Measured Water

Recovery Stream Data Source - All Outlets in Project

Flowsheet	PStream	Flowsheet	PStream
Entrainment	Produced Water	Entrainment	Vent Emissions
Entrainment	Sales Gas		

Parameters

* Composition Basis	Molar Flow	* Summation Option	Streams and Summation
* Calculate Ratios	True	* Atomic Basis	False

Tabulated Data

Index	Entrainment:Produced Water %	Entrainment:Sales Gas %	Entrainment:Vent Emissions %	Summary Table %
Nitrogen	1.12649E-05	99.997	0.00297015	100
Methane	2.65151E-05	99.9966	0.00339656	100
Carbon Dioxide	0.00289152	99.9792	0.0178869	100
Ethane	4.3549E-05	99.9963	0.00363126	100
Propane	2.7009E-05	99.9968	0.00317031	100
Isobutane	1.7923E-05	99.9971	0.00290555	100
n-Butane	2.34831E-05	99.997	0.00300817	100
Isopentane	1.58262E-05	99.9972	0.00278889	100
n-Pentane	5.56656E-06	99.9974	0.00258817	100
i-Hexane	7.99801E-06	99.9974	0.00262369	100
n-Hexane	3.79301E-06	99.9975	0.00253702	100
2,2,4-Trimethylpentane				
Benzene	0.0390619	99.9274	0.0335794	100
Heptane	2.83765E-06	99.9975	0.00250914	100
Toluene	0.0222433	99.9523	0.0254608	100

Recoveries Report

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	

Tabulated Data

Index	Entrainment:Produced Water %	Entrainment:Sales Gas %	Entrainment:Vent Emissions %	Summary Table %
Octane	1.16693E-06	99.9975	0.00247844	100
Ethylbenzene	0.0162523	99.9634	0.0203038	100
o-Xylene	0.0283422	99.9477	0.0239132	100
Nonane	1.29838E-06	99.9975	0.00247694	100
Decane	3.71114E-07	99.9975	0.00246497	100
Water	93.6901	6.30239	0.00747937	100
Oxygen				
Decanes Plus				
Total	1.15047	98.8458	0.00369556	100

Remarks

Component Recoveries - Entrainment Inlets

Status: Solved

Recovery Stream Data Source - All Inlets in Flowsheet

Flowsheet	PStream	Flowsheet	PStream
Entrainment	Measured Gas	Entrainment	Measured Water

Parameters

* Composition Basis	Molar Flow	* Summation Option	Streams and Summation
* Calculate Ratios	False	* Atomic Basis	False

Tabulated Data

Index	Entrainment:Measured Gas lbmol/h	Entrainment:Measured Water lbmol/h	Summary Table lbmol/h	
Nitrogen	13.3659	0	13.3659	
Methane	974.611	0	974.611	
Carbon Dioxide	17.0395	0	17.0395	
Ethane	80.2028	0	80.2028	
Propane	10.3056	0	10.3056	
Isobutane	0.329181	0	0.329181	
n-Butane	0.142645	0	0.142645	
Isopentane	0.0230427	0	0.0230427	
n-Pentane	0.0109727	0	0.0109727	
i-Hexane	0.0449881	0	0.0449881	
n-Hexane	0.0153618	0	0.0153618	
2,2,4-Trimethylpentane	0	0	0	
Benzene	0.175563	0	0.175563	
Heptane	0.0877817	0	0.0877817	
Toluene	0.435617	0	0.435617	
Octane	0.127283	0	0.127283	
Ethylbenzene	0.0427936	0	0.0427936	
o-Xylene	0.175563	0	0.175563	
Nonane	0.0153618	0	0.0153618	
Decane	0.0076809	0	0.0076809	
Water	0	13.639	13.639	
Oxygen	0	0	0	
Decanes Plus	0	0	0	
Total	1097.16	13.639	1110.8	

Remarks

Recoveries Report

Client Name:	XTO
Location:	Harvey Well Pad

Job: Produced Fluids Tank

Component Recoveries - Entrainment Outlets

Status: Solved

Recovery Stream Data Source - All Outlets in Flowsheet

Flowsheet	PStream	Flowsheet	PStream
Entrainment	Produced Water	Entrainment	Vent Emissions
Entrainment	Sales Gas		

Parameters

* Composition Basis	Molar Flow	* Summation Option	Streams and Summation
* Calculate Ratios	False	* Atomic Basis	False

Tabulated Data

Index	Entrainment:Produced Water lbmol/h	Entrainment:Sales Gas lbmol/h	Entrainment:Vent Emissions lbmol/h	Summary Table lbmol/h
Nitrogen	1.50566E-06	13.3655	0.000396986	13.3659
Methane	0.000258419	974.578	0.0331033	974.611
Carbon Dioxide	0.000492702	17.036	0.00304784	17.0395
Ethane	3.49275E-05	80.1999	0.00291237	80.2028
Propane	2.78343E-06	10.3052	0.000326719	10.3056
Isobutane	5.89991E-08	0.329172	9.56454E-06	0.329181
n-Butane	3.34975E-08	0.142641	4.29101E-06	0.142645
Isopentane	3.64678E-09	0.023042	6.42635E-07	0.0230427
n-Pentane	6.10803E-10	0.0109724	2.83992E-07	0.0109727
i-Hexane	3.59815E-09	0.0449869	1.18035E-06	0.0449881
n-Hexane	5.82674E-10	0.0153614	3.89732E-07	0.0153618
2,2,4-Trimethylpentane	0	0	0	0
Benzene	6.85784E-05	0.175436	5.89531E-05	0.175563
Heptane	2.49094E-09	0.0877795	2.20257E-06	0.0877817
Toluene	9.68957E-05	0.435409	0.000110911	0.435617
Octane	1.4853E-09	0.12728	3.15464E-06	0.127283
Ethylbenzene	6.95495E-06	0.0427779	8.68871E-06	0.0427936
o-Xylene	4.97586E-05	0.175472	4.19829E-05	0.175563
Nonane	1.99455E-10	0.0153614	3.80502E-07	0.0153618
Decane	2.85049E-11	0.00768071	1.89332E-07	0.0076809
Water	12.7784	0.859581	0.00102011	13.639
Oxygen	0	0	0	0
Decanes Plus	0	0	0	0
Total	12.7794	1097.98	0.0410502	1110.8

Remarks

Component Recoveries - Entrainment Losses

Status: Solved

Reference Stream Data Source - All Outlets in Flowsheet

Flowsheet	PStream	Flowsheet	PStream
Entrainment	Produced Water	Entrainment	Vent Emissions
Entrainment	Sales Gas		

Recovery Stream Data Source - All Inlets in Flowsheet

Flowsheet	PStream	Flowsheet	PStream
Entrainment	Measured Gas	Entrainment	Measured Water

Recoveries Report

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	

Parameters

* Composition Basis	Molar Flow	* Summation Option	Summation Only
* Calculate Ratios	False	* Atomic Basis	False

Tabulated Data

Index	Summary Table lbmol/h			
Nitrogen	3.52458E-15			
Methane	1.12786E-13			
Carbon Dioxide	0			
Ethane	1.40983E-14			
Propane	8.81144E-15			
Isobutane	6.05787E-16			
n-Butane	3.85501E-16			
Isopentane	1.37679E-16			
n-Pentane	9.29332E-17			
i-Hexane	8.53608E-16			
n-Hexane	4.23362E-16			
2,2,4-Trimethylpentane	0			
Benzene	8.67376E-15			
Heptane	6.18178E-15			
Toluene	5.83758E-14			
Octane	2.54155E-14			
Ethylbenzene	1.22052E-14			
o-Xylene	5.4273E-14			
Nonane	5.52264E-15			
Decane	3.60977E-15			
Water	-1.76229E-15			
Oxygen	0			
Decanes Plus	0			
Total	2.25573E-13			

Remarks

Component Recoveries - Entrainment Recoveries

Status: Solved

Reference Stream Data Source - All Inlets in Flowsheet

Flowsheet	PStream	Flowsheet	PStream
Entrainment	Measured Gas	Entrainment	Measured Water

Recovery Stream Data Source - All Outlets in Flowsheet

Flowsheet	PStream	Flowsheet	PStream
Entrainment	Produced Water	Entrainment	Vent Emissions
Entrainment	Sales Gas		

Parameters

* Composition Basis	Molar Flow	* Summation Option	Streams and Summation
* Calculate Ratios	True	* Atomic Basis	False

Tabulated Data

Index	Entrainment:Produced Water %	Entrainment:Sales Gas %	Entrainment:Vent Emissions %	Summary Table %
Nitrogen	1.12649E-05	99.997	0.00297015	100
Methane	2.65151E-05	99.9966	0.00339656	100
Carbon Dioxide	0.00289152	99.9792	0.0178869	100

Recoveries Report

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	

Tabulated Data

Index	Entrainment:Produced Water %	Entrainment:Sales Gas %	Entrainment:Vent Emissions %	Summary Table %
Ethane	4.3549E-05	99.9963	0.00363126	100
Propane	2.7009E-05	99.9968	0.00317031	100
Isobutane	1.7923E-05	99.9971	0.00290555	100
n-Butane	2.34831E-05	99.997	0.00300817	100
Isopentane	1.58262E-05	99.9972	0.00278889	100
n-Pentane	5.56656E-06	99.9974	0.00258817	100
i-Hexane	7.99801E-06	99.9974	0.00262369	100
n-Hexane	3.79301E-06	99.9975	0.00253702	100
2,2,4-Trimethylpentane				
Benzene	0.0390619	99.9274	0.0335794	100
Heptane	2.83765E-06	99.9975	0.00250914	100
Toluene	0.0222433	99.9523	0.0254608	100
Octane	1.16693E-06	99.9975	0.00247844	100
Ethylbenzene	0.0162523	99.9634	0.0203038	100
o-Xylene	0.0283422	99.9477	0.0239132	100
Nonane	1.29838E-06	99.9975	0.00247694	100
Decane	3.71114E-07	99.9975	0.00246497	100
Water	93.6901	6.30239	0.00747937	100
Oxygen				
Decanes Plus				
Total	1.15047	98.8458	0.00369556	100

Remarks

Energy Budgets Report

Client Name:	XTO	Job: Produced Fluids Tank
Location:	Harvey Well Pad	

Power Budget - Project Power Budget

Status: Solved

Parameters

Net Power	hp	Total Power Required	hp
Total Power Supplied	hp	External Energy Only	True

Remarks

Heat Budget - Project Heat Budget

Status: Solved

Heat Budget Data Source - All Exchangers in Project

Flowsheet	Block	Flowsheet	Block
Entrainment	Atmospheric Water Tank	Entrainment	HP Separator

Parameters

Net Duty	396392 Btu/h	Total Duty Required	396646 Btu/h
Total Duty Supplied	253.947 Btu/h	External Energy Only	True

Tabulated Data

Index	Block Duty Btu/h	Block Highest Temperature °F	Block Lowest Temperature °F	
Entrainment:Atmospheric Water Tank	-253.947	70	70	
Entrainment:HP Separator	396646	70	36.5909	

Remarks

Power Budget - Entrainment Power Budget

Status: Solved

Parameters

Net Power	hp	Total Power Required	hp
Total Power Supplied	hp	External Energy Only	True

Remarks

Heat Budget - Entrainment Heat Budget

Status: Solved

Heat Budget Data Source - All Exchangers in Flowsheet

Flowsheet	Block	Flowsheet	Block
Entrainment	Atmospheric Water Tank	Entrainment	HP Separator

Parameters

Net Duty	396392 Btu/h	Total Duty Required	396646 Btu/h
Total Duty Supplied	253.947 Btu/h	External Energy Only	True

Tabulated Data

Index	Block Duty Btu/h	Block Highest Temperature °F	Block Lowest Temperature °F	
Entrainment:Atmospheric	-253.947	70	70	

Energy Budgets Report

Client Name:	XTO
Location:	Harvey Well Pad

Job: Produced Fluids Tank

Tabulated Data

Index	Block Duty Btu/h	Block Highest Temperature °F	Block Lowest Temperature °F	
Water Tank				
Entrainment:HP Separator	396646	70	36.5909	

Remarks

Venus Laboratory
2440 Chambers Street, Suite A
Venus, TX 76084

Certificate of Analysis

Apr. 01, 2015

Workorder: 15040001

Kaycie Wallace
XTO
810 Houston St
Ft Worth, TX 76102

Project: XTO

Collection State: WV

Enclosed are the analytical results for the sample(s) received on Wednesday, April 01, 2015.

The analyses were performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.

If you have questions concerning this report, please contact us referencing workorder 15040001.

SPL is pleased to be of service to you and we look forward to fulfilling your current and future analytical needs.

Sincerely,

Hydrocarbon Laboratory Manager

Certificate of Analysis

Number: 3040-15040001-001A

Venus Laboratory
2440 Chambers Street, Suite A
Venus, TX 76084

Station Name: Quinn A
Station Number: 37-019-21867
Station Location: Bridgeport WV
Cylinder No: 17476
Analyzed: 04/01/2015 09:15:25 by RJ

Sampled By: Josh R
Sample Of: Produced Water Spot
Sample Date: 03/25/2015 09:35
Sample Conditions: 526 psig, @ 37 °F
Method: GPA 2286

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.65 psia		
Hydrogen Sulfide	0.0000	0.0000		GPM TOTAL C2+	2.263
Nitrogen	1.2181	1.8938			
Carbon Dioxide	1.5529	3.7929			
Methane	88.8214	79.0810			
Ethane	7.3093	12.1977	1.949		
Propane	0.9392	2.2985	0.258		
Iso-Butane	0.0300	0.0968	0.010		
n-Butane	0.0130	0.0419	0.004		
Iso-Pentane	0.0021	0.0084	0.001		
n-Pentane	0.0010	0.0040	0.000		
i-Hexanes	0.0041	0.0185	0.002		
n-Hexane	0.0014	0.0067	0.001		
Benzene	0.0160	0.0693	0.004		
Cyclohexane	0.0102	0.0476	0.003		
i-Heptanes	0.0068	0.0344	0.003		
n-Heptane	0.0012	0.0068	0.001		
Toluene	0.0397	0.2026	0.013		
i-Octanes	0.0105	0.0602	0.005		
n-Octane	0.0011	0.0071	0.001		
Ethylbenzene	0.0039	0.0228	0.001		
Xylenes	0.0160	0.0945	0.006		
i-Nonanes	0.0011	0.0072	0.001		
n-Nonane	0.0003	0.0020	0.000		
i-Decanes	0.0007	0.0051	0.000		
n-Decane	0.0000	0.0002	0.000		
Decanes Plus	0.0000	0.0000	0.000		
	100.0000	100.0000	2.263		

Physical Properties	**Total**
Calculated Molecular Weight	18.02
GPA 2172-09 Calculation:	
Calculated Gross BTU per ft³ @ 14.65 psia & 60°F	
Real Gas Dry BTU	1056.2
Water Sat. Gas Base BTU	1037.7
Relative Density Real Gas	0.6234
Compressibility Factor	0.9976

Certificate of Analysis

Number: 3040-15040001-001A

Venus Laboratory
2440 Chambers Street, Suite A
Venus, TX 76084

Station Name: Quinn A
Station Number: 37-019-21867
Station Location: Bridgeport WV
Cylinder No: 17476
Analyzed: 04/01/2015 09:15:25 by RJ

Sampled By: Josh R
Sample Of: Produced Water Spot
Sample Date: 03/25/2015 09:35
Sample Conditions: 526 psig, @ 37 °F
Method: GPA 2286

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.65 psia
Nitrogen	1.2181	1.8938	
Carbon Dioxide	1.5529	3.7929	
Methane	88.8214	79.0810	
Ethane	7.3093	12.1977	1.949
Propane	0.9392	2.2985	0.258
Iso-butane	0.0300	0.0968	0.010
n-Butane	0.0130	0.0419	0.004
Iso-pentane	0.0021	0.0084	0.001
n-Pentane	0.0010	0.0040	0.000
Hexanes Plus	0.1130	0.5850	0.041
	100.0000	100.0000	2.263

GPM TOTAL C2+	2.263
GPM TOTAL C3+	0.314
GPM TOTAL iC5+	0.042

Physical Properties	**Total**
Relative Density Real Gas	0.6234
Calculated Molecular Weight	18.02
Compressibility Factor	0.9976
GPA 2172-09 Calculation:	
Calculated Gross BTU per ft³ @ 14.65 psia & 60°F	
Real Gas Dry BTU	1056.2000
Water Sat. Gas Base BTU	1037.7000

Comments: H2O Mol% : 1.750 ; Wt% : 1.750

Certificate of Analysis

Number: 3040-15040001-001A

Venus Laboratory
2440 Chambers Street, Suite A
Venus, TX 76084

Station Name: Quinn A
Station Number: 37-019-21867
Station Location: Bridgeport WV
Cylinder No: 17476
Analyzed: 04/01/2015 09:15:25 by RJ

Sampled By: Josh R
Sample Of: Produced Water Spot
Sample Date: 03/25/2015 09:35
Sample Conditions: 526 psig, @ 37 °F
Method: GPA 2286

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.65 psia
Nitrogen	1.2181	1.8938	
Carbon Dioxide	1.5529	3.7929	
Methane	88.8214	79.0810	
Ethane	7.3093	12.1977	1.949
Propane	0.9392	2.2985	0.258
Iso-Butane	0.0300	0.0968	0.010
n-Butane	0.0130	0.0419	0.004
Iso-Pentane	0.0021	0.0084	0.001
n-Pentane	0.0010	0.0040	0.000
Hexane	0.0055	0.0252	0.003
Heptanes Plus	0.1075	0.5598	0.038
	100.0000	100.0000	2.263

GPM TOTAL C2+	2.263
GPM TOTAL C3+	0.314
GPM TOTAL iC5+	0.042

Physical Properties	**Total**
Relative Density Real Gas	0.6234
Calculated Molecular Weight	18.02
Compressibility Factor	0.9976
GPA 2172-09 Calculation:	
Calculated Gross BTU per ft³ @ 14.65 psia & 60°F	
Real Gas Dry BTU	1056.2000
Water Sat. Gas Base BTU	1037.7000

Comments: H2O Mol% : 1.750 ; Wt% : 1.750

Certificate of Analysis

Number: 3040-15040001-001A

Venus Laboratory
2440 Chambers Street, Suite A
Venus, TX 76084

Station Name:	Quinn A	Sampled By:	Josh R	
Station Number:	37-019-21867	Sample Of:	Produced Water	Spot
Station Location:	Bridgeport WV	Sample Date:	03/25/2015 09:35	
Cylinder No:	17476	Sample Conditions:	526 psig, @ 37 °F	
Analyzed:	04/01/2015 by BCM	Method:		

Analytical Data

Analyte	Result	Units	Detection Limit
Flash Factor	1.78	cubic ft/bbl	

Attachment U

FACILITY-WIDE EMISSIONS SUMMARY SHEET

ATTACHMENT U – 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}		$PM_{2.5}$		CH_4		GHG (CO_2e)	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Line Heater (1S)	0.05	0.21	0.04	0.18	<0.01	0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.02	<0.01	<0.01	58.55	256.44
Line Heater (2S)	0.05	0.21	0.04	0.18	<0.01	0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.02	<0.01	<0.01	58.55	256.44
Produced Water Tanks (3S – 6S)	--	--	--	--	0.05	0.20	--	--	--	--	--	--	0.14	0.63	13.47	58.98
Dehy Reboiler (7S)	0.19	0.85	0.16	0.72	0.01	0.05	<0.01	0.01	0.01	0.06	0.01	0.06	<0.01	0.02	234.20	1,025.78
Dehy Still Vent (8S)	--	--	--	--	0.19	0.85	--	--	--	--	--	--	0.01	0.02	0.14	0.61
Dehy Flash Tank (9S)	--	--	--	--	0.13	0.59	--	--	--	--	--	--	--	--	--	--
Compressor Engine (10S)	5.58	24.43	5.24	22.97	0.81	3.54	0.01	0.03	0.21	0.90	0.21	0.90	0.03	0.12	1,492.34	6,536.43
Truck Loading – Produced Water (12S)	--	--	--	--	<0.01	<0.01	--	--	--	--	--	--	<0.01	<0.01	0.01	0.03
TOTAL	5.87	25.72	5.49	24.04	1.20	5.25	0.01	0.03	0.23	1.00	0.23	1.00	1.28	5.60	1,857.10	8,134.10

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 U – 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
Line Heater (1S)	<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
Line Heater (2S)	<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
Produced Water Tanks (3S – 6S)	<0.01	<0.01	<0.01	<0.01	0.01	0.01	<0.01	0.01	0.01	0.03	<0.01	<0.01	0.03	0.12
Dehy Reboiler (7S)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.02
Dehy Still Vent (8S)	<0.01	<0.01	0.04	0.20	0.04	0.19	<0.01	0.01	<0.01	0.01	<0.01	<0.01	0.09	0.42
Dehy Flash Tank (9S)	<0.01	<0.01	0.01	0.03	0.01	0.05	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.02	0.09
Compressor Engine (10S)	0.70	3.05	0.02	0.07	0.01	0.03	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.72	3.16
Truck Loading – Produced Water (12S)	<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	0.70	3.06	0.07	0.32	0.07	0.32	<0.01	0.02	0.02	0.07	0.01	0.03	0.87	3.82

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

Attachment V

CLASS I LEGAL ADVERTISEMENT

Attachment V

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that Mountain Gathering, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a G70-D General Permit for a natural gas production operation facility located in Harrison County, West Virginia. The facility is presently permitted under West Virginia General Permits G70-A159 and G35-A061.

The latitude and longitude coordinates are: 39.37614 and -80.38580. The facility is presently operational.

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

Total Particulate Matter (PM_{Total}) = 1.75 tpy
Filterable Particulate Matter ($PM_{Filt.}$) = 1.22 tpy
Condensable Particulate Matter ($PM_{Cond.}$) = 0.53 tpy
Sulfur Dioxide (SO_2) = 0.03 tpy
Volatile Organic Compounds (VOC) = 5.26 tpy
Carbon Monoxide (CO) = 24.04 tpy
Nitrogen Oxides (NO_x) = 25.72 tpy
Hazardous Air Pollutants (HAPs) = 3.82 tpy
Carbon Dioxide Equivalents (CO_2e) = 8,157.03 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 1227, during normal business hours.

Dated this the 10th day of November 2017.

By: Mountain Gathering, LLC
Michael Johnson
Production Operations Manager for Mountain Gathering, LLC
810 Houston Street
Fort Worth, TX 76102